Table 1 Selected immunotherapy trials in NSCLC

Study (PD-L1 inhibitor *vs.* comparison)	Phase	Description	N	RR	PFS (months)	Survival (months)	Treatment related AE of grade 3 or 4 (%)	Deaths attributed to study treatment (%)	Percentage of D/C of study drug	Most common AE among immune modulator group	QoL outcome measure	Summary of QoL findings
CheckMate 017 (7,8); nivolumab *vs.* docetaxel	3	Patients with NSCLC who progressed after receiving platinum doublet CTX treated with N (3 mg/kg q2 wks) *vs.* D (75 mg/m^2 q3 wks)	Total =272: N (n=135); D (n=137)	N =20% (95% CI, 14–28%); D =9% (95% CI, 5–15%); P=0.008	N =3.5 (95% CI, 2.1–4.9); D =2.8 (95% CI, 2.1–3.5); HR 0.62 (95% CI, 0.47–0.81; P<0.001)	Median survival: N =9.2 (95% CI, 7.3–13.3); D =6.0 (95% CI, 5.1–13.3); HR 0.59 (95% CI, 0.44%–0.79; P<0.001); overall survival: N =42% (95% CI, 34–50%); D =24 (95% CI, 17–31%)	N =7%; D =57%	N =0; D =3	N =3% *vs.* D =10%	Fatigue =16% (n=21); decreased appetite =11% (n=14); Asthenia =10 (n=13); Nausea =9 (n=12)	LCSS; EQ-5D; proportion of patients who had clinically meaningful improvement in the average LCSS score by week 12, 16–54, 42 and 84	Clinically meaningful improvement at 12 wk, N=20% *vs.* D 21.9%; at wk 36, D clinically meaningful deterioration; at week 42 to 84, N showed clinically meaningful improvement
CheckMate 026 (9); nivolumab *vs.* platinum doublet therapy	3	Patients with NSCLC with PD-L1 positive tumors randomized to nivolumab (3 mg/kg q2 wks) *vs.* platinum doublet therapy (qwks up to 6 cycles) as first line therapy	Total =541	NA	N=4.2 (95% CI, 3.0–5.6); CTX =5.9 (95% CI, 5.4–6.9); HR 1.15 (95% CI, 0.91–1.45; P=0.25)	Overall survival: N =14.4 (95% CI, 11.7–17.4); CTX =13.2; HR 1.02 (95% CI, 0.80–1.3)	N =18%; CTX =51%	N =2 *vs.* D =3	N =10% *vs.* D =13%	Fatigue =21% (n=56); Diarrhea =14% (n=37); decreased appetite =14% (n=32); nausea =12% (n=31)	No	NA
CheckMate 057 (10); nivolumab *vs.* docetaxel	3	Patients with NSCLC who progressed after receiving platinum doublet CTX treated with N (3 mg/kg q2 wks) *vs.* D (75 mg/m^2 q3 wks)	Total =582: N (n=292); D (n=290)	N =19% (95% CI, 15–24%); D =12% (95% CI, 9–17%); P=0.02	NA	Median survival: N =12.2 (95% CI, 9.7–15.0); D =9.4 (95% CI, 8.1 *vs.* 10.7); HR 0.73 (95% CI, 0.59–0.89; P<0.002); overall survival: N =51% (95% CI, 45–56%); D =39% (95% CI, 33–45%)	N =10% *vs.* D =54%	N =1 *vs.* D =1	N =5% *vs.* D =15%	Fatigue =16% (n=46); nausea =12% (n=34); decreased appetite =10% (n=30); asthenia =10% (n=29)	No	NA
POPLAR (11); atezolizumab *vs.* docetaxel	2	Patients with NSCLC who progressed on platinum therapy randomized to 1,200 mg atezolizumab or docetaxel (75 mg/m^2 q3 wks)	Total =287: A (n=144); D (n=143)	Objective response: A =15%; D =15%	NA	Median survival: A =12.6 (95% CI, 9.7–16.4); D =9.7 (95% CI, 8.6–12.0); HR 0.73 (95% CI, 0.53–0.99; P=0.04)	A =11%; D =39%	A =1 (<1%); D =3 (2%)	A =8% (n=11) *vs.* D =22% (n=30)	Pneumonia =2% (n=3); increased AST =2% (n=3); no atezolizumab-related grade 4 adverse events	No	NA
OAK (12,13); atezolizumab *vs.* docetaxel	3	Patients with NSCLC previously treated with 1–2 platinum based CTX regiments randomized to atezolizumab (1,200 mg) or docetaxel (75 mg/m^2 q3 wks)	Total =850: A (n=425); D (n=425)	Objective response: A =14%; D =13%	NA	Median survival: A =13.8 (95% CI, 11.8–15.7); D =9.6 (95% CI, 8.6–11.2); HR 0.73 (95% CI, 0.62–0.87; P=0.0003)	A =15%; D =43%	A =0; D =1 (respiratory tract infection)	A =8% (n=46) *vs.* D =19% (n=108)	Fatigue =14% (n=87); nausea =9% (n=53); decreased appetite =9% (n=52); asthenia =8% (n=51)	EORTC QLQ-C30 and QLQ-LC13 used to analyze TTS in symptoms, physical function and HRQoL	A delayed TTD in physical and role function (HR 0.75, 95% CI, 0.58–0.98; HR 0.79, 95% CI, 0.62–1.0). A had fewer meaningful clinically worsening of symptoms (diarrhea, mouth sores, peripheral neuropathy and alopecia P<0.0001, dysphagia (P=0.0052)
KEYNOTE010 (14); pembrolizumab *vs.* docetaxel	2/3	Patients with previously treated with NSCLC with >1% PD-L1 expression treated with 2 mg/kg pembrolizumab *vs.* 10 mg/kg of pembrolizumab *vs.* (docetaxel 75 mg/m^2 q3 wks)	Total =1,034: P: 2 mg/kg (n=345); P: 10 mg/kg (n=346); docetaxel (n=343)	P: 2 mg/kg *vs.* D =18%, P=0.005; P: 10 mg/kg *vs.* D =18%, P=0.0002; D =9%	Median survival: P: 2 mg/kg =3.9; P: 10 mg/kg =4; D =4; P: 2 mg/kg *vs.* D (HR 0.88; 95% CI, 0.74–1.05; P=0.07); P: 10 mg/kg *vs.* D (HR 0.79; 95% CI, 0.66–0.94; P=0.004)	P: 2 mg/kg =10.4; P: 10 mg/kg =12.7; D =8.5; P: 2 mg/kg *vs.* D (HR 0.71, 95% CI, 0.58–0.88; P=0.0008); P: 10 mg/kg *vs.* D (HR 0.61; 0.49–0.75; P<0.0001)	P: 2 mg/kg =13% (n=43); P: 10 mg/kg =16% (n=55); D =35% (n=109)	P: 2 mg/kg =3; P: 10 mg/kg =3; D =5	P: 2 mg/kg =4% (n=15); P: 10 mg/kg =5% (n=17); D =10 (n=31)	Decreased appetite =14% (n=46); fatigue =14% (n=46); rash =9% (n=29); diarrhea =7% (n=29)	No	NA
KEYNOTE021 (15); pembrolizumab, carboplatin and pemetrexed *vs.* carboplatin and pemetrexed	2	CTX naïve patients with ALK and EGFR negative NSCLC randomized to either pembrolizumab (200 mg), carboplatin (AUC 5 mg/mL per minute) and pemetrexed (500 mg/m^3 q3 wks) followed by pembrolizumab and pemetrexed (for 24 months) for maintenance *vs.* carboplatin and pemetrexed (4 cycles) followed by pemetrexed maintenance	Total =123: P + CTX (n=60); CXT alone (n=63)	P + CTX =55% (95% CI, 42–68%); CTX alone =29% (95% CI, 18–41%); P=0.0016	P + CTX =13.0 (95% CI, 8.3 to not reached); CTX alone =8.9 (95% CI, 4.4–10.3)	No difference in OS at 10.6 months	P + CTX =39%; CTX =26%	P + CTX =1 (1%); CTX =2 (3%)	P + CTX =10% (n=6); CTX =13% (n=8)	Fatigue =64% (n=38); nausea =58% (n=34); anemia =32% (n=19); vomiting =27% (n=16)	No	NA
KEYNOTE024 (16); pembrolizumab *vs.* platinum based CTX	3	Patients with untreated NSCLC >50% PD-L1 expression, randomized to P (200 mg q3 wks) *vs.* platinum based CTX	Total =305: P (n=154); C (n=151)	P =44.8%; CTX =27.8%	P =10.3 (95% CI, 6.7 to not reached); CTX =6.0 (95% CI, 4.2–6.2); HR =0.50 (95% CI, 0.37–0.68; P<0.001)	6-month overall survival: P =80.2% (95% CI, 72.9–85.7%); CTX =72.4% (95% CI, 64.5–78.9%); HR 0.60 (95% CI, 0.41–0.89; P=0.005)	P =26.6%; CTX =53.3%	P =1 *vs.* CTX =3	P =7.1% (n=11) *vs.* CTX =10.7% (n=16)	Nausea =9.7% (n=15); anemia =5.2% (n=8); fatigue =10.4% (n=16); decreased appetite =9.1% (n=14)	EORTC WLW-C30, EORTC LC13, EQ-5D-3L were used to assess baseline to wk 15 change in the QLQ-C30 and QLQ-LC13 score	QLQ-C30 score: P=6.9 (95% CI, 3.3–10.6), CTX =−0.9 (−4.8 to 3.0) (P=0.0020); time to deterioration: P= median not reached (95% CI, 8·5 to not reached) *vs.* CTX =5.0 months (3.6 to not reached); HR 0.66 (95% CI, 0.44–0.97); P=0.029

A, atezolizumab; AE, adverse event; AST, aspartate aminotransferase; CI, confidence interval; CRC, colorectal cancer; CTX, chemotherapy; EFGR, epidermal growth factor receptor negative; EORTC, European Organization for the Research and Treatment of Cancer; EQ-5D, European Quality of Life–5 Dimensions; HRQoL, health-related quality of life; LCSS, lung cancer symptom scale (LC13-Lung Cancer 13 items); mOS, median overall survival; NA, not available; N, nivolumab; NSCLC, non-small cell lung cancer; OS, overall survival; P, pembrolizumab; PFS, progression free survival; RCC, renal cell carcinoma; RR, response rate; wk, week; TTD, time to deterioration; QLQ, quality of life questionnaire; C30, Core 30 items; N, number of patients.