

Supplementary Table 1. Results of major Phase II and III clinical trials using anti-ICI as monotherapy

Target Antigen	Drug	Cancer type	Phase NCT number	Study Population	Outcome	Source
CTLA-4	Tremelimumab	Advanced Melanoma	Phase III NCT00257205	655	<p>Tremelimumab 15 mg/kg q90d ORR: 10.7% OS: 12.6 mo DOR: 35.8 mo</p> <p>Chemotherapy ORR: 9.8% OS: 10.7 mo DOR: 13.7 mo</p>	[68]
		Pleural or Peritoneal Malignant Mesothelioma	Phase II NCT01843374	571	<p>Tremelimumab 10 mg/kg q4w ORR: 4.5% OS: 7.7 mo PFS: 2.7 mo</p> <p>Placebo ORR: 1.1% OS: 7.3 mo PFS: 2.8 mo</p>	[69]
CTLA-4	Ipilimumab	Stage III-IV Melanoma	Phase III NCT00094653	676	<p>Ipilimumab 3mg/kg q3w OS: 10.1 mo</p> <p>Ipilimumab 3mg/kg q3w + gp100 vaccine OS: 10.0 mo</p> <p>gp100 vaccine OS: 6.4 mo</p>	[47]
		Stage III-IV Melanoma	Phase II NCT01696045	14	<p>Ipilimumab 3mg/kg q3w ORR: 0.0% OS at 1 yr: 75% PFS: 2.6 mo</p> <p>Ipilimumab 10mg/kg q3w ORR: 25.0% OS at 1 year: 62.5% PFS: 2.9 mo</p>	[72]

CTLA-4	Ipililumab	Stage III Post Resection Melanoma	Phase III NCT00636168	951	<p><i>Ipilimumab 10mg/kg q3w</i> OS at 1 yr: 93.5% OS at 5 yrs: 65.4% RFS: 26.1 mo</p> <p><i>Placebo</i> OS at 1 yr: 87.3% OS at 5 yrs: 54.4% RFS: 17.0 mo</p>	[73]
		Metastatic Melanoma	Phase III NCT01515189	727	<p><i>Ipilimumab 3mg/kg q3w</i> ORR: 12.2% OS: 11.5 mo PFS: 2.8 mo</p> <p><i>Ipilimumab 10mg/kg q3w</i> ORR: 15.3% OS: 15.7 mo PFS: 2.8 mo</p>	[74]
		Advanced Melanoma	Phase III NCT01866319	834	<p><i>Ipilimumab 3mg/kg q3w</i> ORR:3.0% OS: 15.9 mo PFS: 3.4 mo</p> <p><i>Pembrolizumab 10mg/kg q2w/q3w</i> ORR: 14.0% OS: 32.7 mo PFS: 8.7 mo</p>	[75]
		Gastric and Gastroesophageal Junction Cancer	Phase II NCT01585987	143	<p><i>Ipilimumab 10 mg/kg q4w</i> OS: 16.8 mo PFS: 2.7 mo</p> <p><i>Chemotherapy</i> OS: 12.1 mo PFS:4.9 mo</p>	[76]
		Recurrent Ovarian Cancer	Phase II NCT01611558	49	<p><i>Ipilimumab 10mg/kg q3w</i> ORR: 10.3%</p>	[77]
		Metastatic Prostate Cancer	Phase II NCT02279862	82	<p><i>Ipilimumab 3mg/kg q3w</i> OS at 1 yr: 15.4% rPFS at 1yr: 15.4%</p> <p><i>Ipilimumab 10mg/kg q3w</i> OS at 1yr: 22.2% rPFS at 1 yr: 11.1%</p>	www. clinicaltrials.gov

CTLA-4	Ipililumab	Advanced Prostate Cancer	Phase III NCT01057810	837	<i>Ipilimumab 10mg/kg q3w</i> OS: 28.6 mo PFS: 5.6 mo <i>Placebo:</i> OS: 29.7 mo PFS: 3.8 mo	www.clinicaltrials.gov
PD-1	Nivolumab	Advanced (anti-CTLA-4 resistant) Melanoma	Phase III NCT01721746	631	<i>Nivolumab 3 mg/kg q2w</i> ORR: 27.2% OS: 15.7 mo PFS: 3.1 mo <i>Chemotherapy</i> ORR: 9.8% OS: 14.4 mo PFS: 3.6 mo	[78]
		Untreated Advanced Melanoma	Phase III NCT01721772	418	<i>Nivolumab 3 mg/kg q2w</i> ORR: 42.9% OS: 37.5 mo PFS: 5.1 mo <i>Dacarbazine</i> ORR: 14.4% OS: 11.2 mo PFS: 2.2 mo	[79]
		Metastatic or Unresectable Bladder Cancer	Phase II NCT02387996	270	<i>Nivolumab 3 mg/kg q2w</i> ORR: 19.6% OS: 8.7 mo PFS: 2.0 mo	[84]
		Recurrent or Metastatic Head and Neck Squamous Cell Carcinoma	Phase III NCT02105636	361	<i>Nivolumab 3 mg/kg q2w</i> ORR: 13.3% OS: 7.5 mo PFS : 2.0 mo <i>Cetuximab/methotrexate/docetaxel</i> ORR: 5.8% OS: 5.1 mo PFS : 2.3 mo	[85]
		Recurrent/metastatic Nasopharyngeal Cancer	Phase II NCT02339558	45	<i>Nivolumab 3 mg/kg q2w</i> ORR: 20.5% OS: 17.1 mo PFS: 2.8 mo	[86]

PD-1	Nivolumab	Advanced/Metastatic NSCLC	Phase II NCT01721759	117	Nivolumab 3 mg/kg q2w ORR: 14.5% OS: 8.2 mo PFS : 1.9 mo	[87]
		Advanced/Metastatic NSCLC	Phase III NCT02613507	639	Nivolumab 3 mg/kg q2w ORR : 16.6% OS: 12.0 mo PFS: 2.8 mo Docetaxel ORR : 4.2% OS: 9.6 mo PFS: 2.8 mo	[88]
		Advanced/Metastatic NSCLC	Phase III NCT01642004	352	Nivolumab 3 mg/kg q2w ORR: 20.0% OS: 9.2 mo PFS : 3.5 mo Docetaxel ORR: 8.8% OS: 6.0 mo PFS: 2.8 mo	[89]
		Metastatic NSCLC	Phase III NCT01673867	582	Nivolumab 3 mg/kg q2w ORR: 19.2% OS: 12.2 mo PFS: 2.3 mo Docetaxel ORR: 12.4% OS: 9.4 mo PFS: 4.2 mo	[90]
		Stage IV or Recurrent NSCLC not previously treated with systemic therapy	Phase III NCT02041533	541	Nivolumab 3 mg/kg q2w ORR: 26% OS: 14.4 mo PFS: 4.2 mo Chemotherapy ORR: 33% OS: 13.2 mo PFS: 5.9 mo	[91]

PD-1	Nivolumab	Advanced/Metastatic Renal Cell Carcinoma	Phase III NCT01668784	822	Nivolumab 3 mg/kg q2w ORR: 25.1% OS: 25.0 mo Everolimus ORR: 5.4% OS: 19.6 mo	[92]
		Advanced/Metastatic Renal Cell Carcinoma	Phase II NCT01354431	168	Nivolumab 0.3, 2, 10 mg/kg q3w ORR : 0.3mg/kg: 20.0% 2.0mg/kg: 22.2% 10mg/kg : 20.4% OS : 0.3mg/kg: 10.4 mo 2.0mg/kg: 25.5 mo 10mg/kg : 24.8 mo PFS : 0.3mg/kg: 2.7 mo 2.0mg/kg: 4.0 mo 10mg/kg: 4.2 mo	[93]
		R/R Follicular Lymphoma	Phase II NCT02038946	92	Nivolumab 3 mg/kg q2w ORR : 4.3% PFS : 2.2 mo	[80]
		R/R DLBCL	Phase II NCT02038933	121	Nivolumab 3 mg/kg q2w Autologous stem cell transplant failed [N=87] ORR: 10.3% OS: 12.2 mo PFS: 1.9 mo Autologous stem cell transplant ineligible [N=34] ORR: 2.9% OS: 5.8 mo PFS: 1.4 mo	[81]
		R/R Classical HL	Phase II NCT02181738	243	Nivolumab 3 mg/kg q2w ORR: 69% OS: NR PFS: 14.7 mo	[82,83]

PD-1	Pembrolizumab	High risk Melanoma	Phase III NCT02362594	1019	<i>Pembrolizumab 200 mg q3w</i> 1-year RFS: 75.4% 1.5-year RFS: 71.4% <i>Placebo</i> 1-yr RFS: 61.0% 1.5-year RFS: 53.2%	[97]
		Advanced/ metastatic Esophageal Carcinoma	Phase II NCT02559687	121	<i>Pembrolizumab 200 mg q3w</i> ORR: 9.9% OS: 5.8 mo PFS: 2.0 mo	[99]
		Advanced Gastric and Gastroesophageal Junction Adenocarcinoma	Phase III NCT02370498	592	<i>Pembrolizumab 200 mg q3w</i> ORR: 11.1% OS: 9.1 mo PFS: 1.5 mo <i>Paclitaxel</i> ORR: 12.5% OS: 8.3 mo PFS: 4.1 mo	[100]
		Recurrent Head and Neck Squamous Cell Carcinoma	Phase II NCT02255097	172	<i>Pembrolizumab 200 mg q3w</i> ORR: 16.4% OS: 8.4 mo PFS: 2.1 mo	www. clinicaltrials.gov
		Recurrent Head and Neck Squamous Cell Carcinoma	Phase III NCT02252042	247	<i>Pembrolizumab 200 mg q3w</i> ORR: 14.6% OS: 8.4 mo PFS: 2.1 mo <i>Active Comparator</i> ORR: 10.1% OS: 6.9 mo PFS: 2.3 mo	[101]

PD-1	Pembrolizumab	Relapsed NSCLC (Post-therapy)	Phase II/III NCT01905657	1034	<i>Pembrolizumab 2 mg/kg q3w</i> ORR: 18.0% OS: 10.4 mo PFS: 3.9 mo <i>Pembrolizumab 10 mg/kg q3w:</i> ORR: 18.5% OS: 12.7 mo PFS: 4.0 mo <i>Docetaxel</i> ORR: 9.3 % OS: 8.5 mo PFS: 4.0 mo	[102]
		Metastatic NSCLC	Phase III NCT02142738	305	<i>Pembrolizumab 200 mg q3w</i> ORR: 44.8% OS at 6 months: 80.2% PFS: 10.3 mo <i>Chemotherapy</i> ORR: 27.8% OS at 6 months: 72.4% PFS: 6.0 mo	[103]
		PDL-1 positive advanced/ metastatic NSCLC	Phase III NCT02220894	1274	Tumor with PD-L1+: $\geq 50\%$ - $\geq 20\%$ - $\geq 1\%$ <i>Pembrolizumab 200 mg q3w</i> ORR: 39.5% - 33.4% - 27.3% OS: 20.0 mo - 17.7 mo - 16.7 mo PFS: 7.1 mo - 6.2 mo - 5.4 mo <i>Chemotherapy</i> ORR: 32.0% - 28.9% - 26.5% OS: 12.2 mo - 13.0 mo - 12.1 mo PFS: 6.4 mo - 6.6 mo - 6.5 mo	[104]
		Advanced Urothelial Cancer	Phase II NCT02335424	374	<i>Pembrolizumab 200 mg q3w</i> ORR: 30.5% OS: 11.3 mo PFS: 2.2 mo	[105]

PD-1	Pembrolizumab		Phase III NCT02256436	542	Pembrolizumab 200 mg q3w ORR: 21.1% 1 yr OS: 44.2% PFS: 2.1 mo Active Comparator ORR: 11.0% 1-year OS: 29.8% PFS: 3.3 mo	[106]
		R/R cHL	Phase II NCT02453594	210	Pembrolizumab 200 mg q3w ORR: 71.9% OS 24 mo: 84.2% PFS: 13.7 mo	[107]
PD-1	Cemiplimab	Advanced Squamous cell carcinoma	Phase II NCT02760498	78	Cemiplimab 3mg/kg q2w ORR: 44.0% 1-year OS: 93.0%	[108]
PD-L1	Atezolizumab	Advanced/metastatic NSCLC	Phase III [NCT02008227]	1225	Atezolizumab 1200 mg q3w OS: 13.8 mo PFS: 2.8 mo Docetaxel OS: 9.6 mo PFS: 4.0 mo	[119]
		Naïve Locally Advanced (A), recurrent (B) and recurrent with brain metastatic NSCLC (C)	Phase II NCT01846416	138 (A: 31, B: 91, C:13)	Atezolizumab 1200 mg q3w ORR: A: 32% B: 21% C: 23% OS: A: 14.4 mo B: 9.3 mo C: 6.8 mo PFS: A: 4.7 mo B: 2.5 mo C: 2.7 mo	[122]
		Advanced/metastatic NSCLC ≥5% PD-L1+	Phase II NCT02031458	659	Atezolizumab 1200 mg q3w OS: 14.6 mo	[121]

PD-L1	Atezolizumab	Locally Advanced or Metastatic Recurrent NSCLC	Phase II NCT01903993	144	Atezolizumab 1200 mg q3w ORR: 15.3% OS: 12.6 mo PFS: 2.7 mo Docetaxel ORR: 14.7% OS: 9.7 mo PFS: 3.4 mo	[120]
		Locally Advanced or Metastatic Urothelial Bladder Cancer	Phase II NCT02951767	119	Atezolizumab 1200 mg q3w OS: 15.9 mo PFS: 2.7 mo	www.clinicaltrials.gov
		Locally Advanced or Metastatic Urothelial Bladder Cancer	Phase II NCT02108652	123	Atezolizumab 1200 mg q3w ORR: 23.0% OS: 15.9 mo PFS: 2.7 mo	[123]
		Locally Advanced or Metastatic Urothelial Bladder Cancer	Phase III NCT02302807	931	Atezolizumab 1200 mg q3w ORR: 23.0% OS: 11.1 mo PFS: 2.1 mo Chemotherapy ORR: 22.0% OS: 10.6 mo PFS: 4.0 mo	[124]
PD-L1	Avelumab	Recurrent, Locally Advanced or metastatic Gastric & Gastro-oesophageal Junction Cancer	Phase III NCT02625623 (1 st endpoint not reached)	371	Avelumab 10 mg/kg q2w ORR: 2.2% OS: 4.6 mo PFS: 1.4 mo Chemotherapy ORR: 4.3% OS: 5.0 mo PFS: 2.7 mo	[115]
		Merkle Cell Carcinoma	Phase II NCT02155647	88	Avelumab 10 mg/kg q2w ORR: 33.0% OS: 12.9 mo 1-year PFS: 30%	[116,117]

PD-L1	Avelumab	NSCLC	Phase III NCT02395172	792	Avelumab 10 mg/kg q2w OS: 11.4 mo PFS: 2.8 mo Docetaxel OS:10.3 mo PFS: 4.2 mo	[118]
PD-L1	Durvalumab	Stage III NSCLC (Post-Chemoradiation Therapy)	Phase III NCT02125461	713	Durvalumab 10 mg/kg q2w ORR: 28.4% PFS: 16.8 mo Placebo ORR:16.0 % PFS: 5.6 mo	[125]
		Locally Advanced or Metastatic NSCLC	Phase II NCT02087423	444	Durvalumab 10 mg/kg q2w <i>Group 1 [N=28-30]: EGFR+/ALK+ PD-L1<25%</i> ORR: 3.6% OS: 9.9 mo PFS: 1.9 mo <i>Group 2 [N=74-77]: EGFR+/ALK+ PD-L1≥25%</i> ORR: 12.1% OS: 13.3 mo PFS: 1.9 mo <i>Group 3 [N=93-94]: EGFR-/ALK- PD-L1<25%</i> ORR:7.5% OS: 9.3 mo PFS: 1.9 mo <i>Group 4 [N=146-149]: EGFR+/ALK+ PD-L1≥25%</i> ORR: 16.4% OS: 10.9 mo PFS: 3.3 mo <i>Group 5 [N=67-69]: EGFR-/ALK- PD-L1≥90%</i> ORR:30.9% OS: NR PFS: 2.4	[126]

DOR: Duration Of Response; ORR: Overall Response Rate; OS: Overall Survival; PFS: Progression-Free Survival; RFS: Relapse-Free Survival