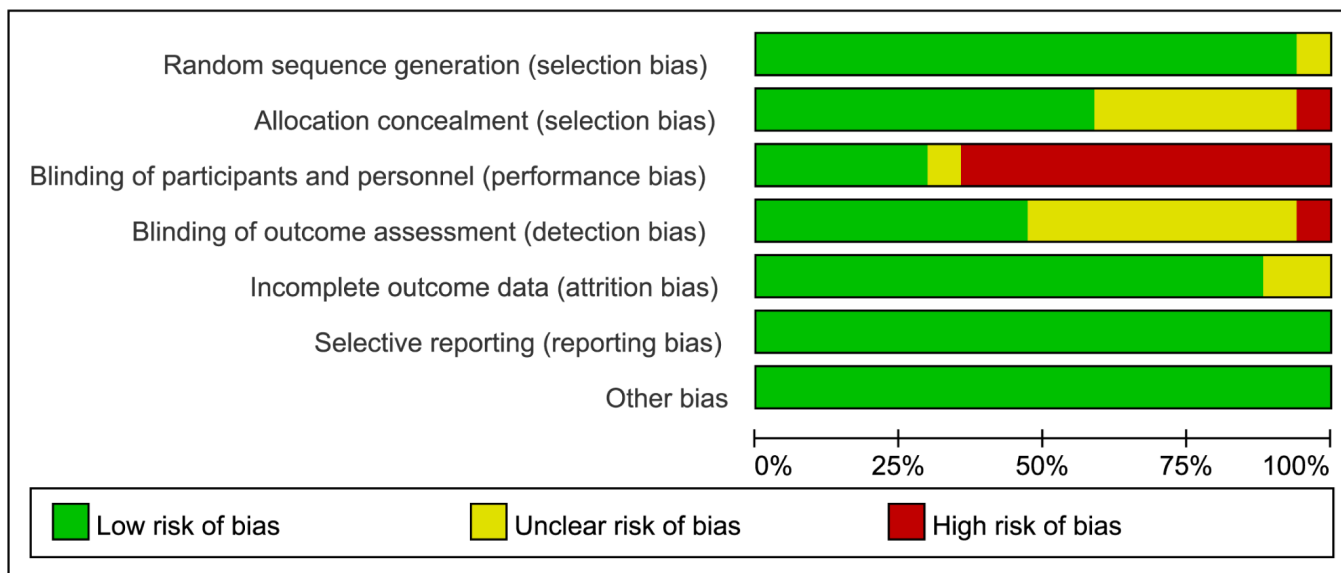


Table S1 Strategy used for PubMed, EMBASE and the Cochrane Library searches

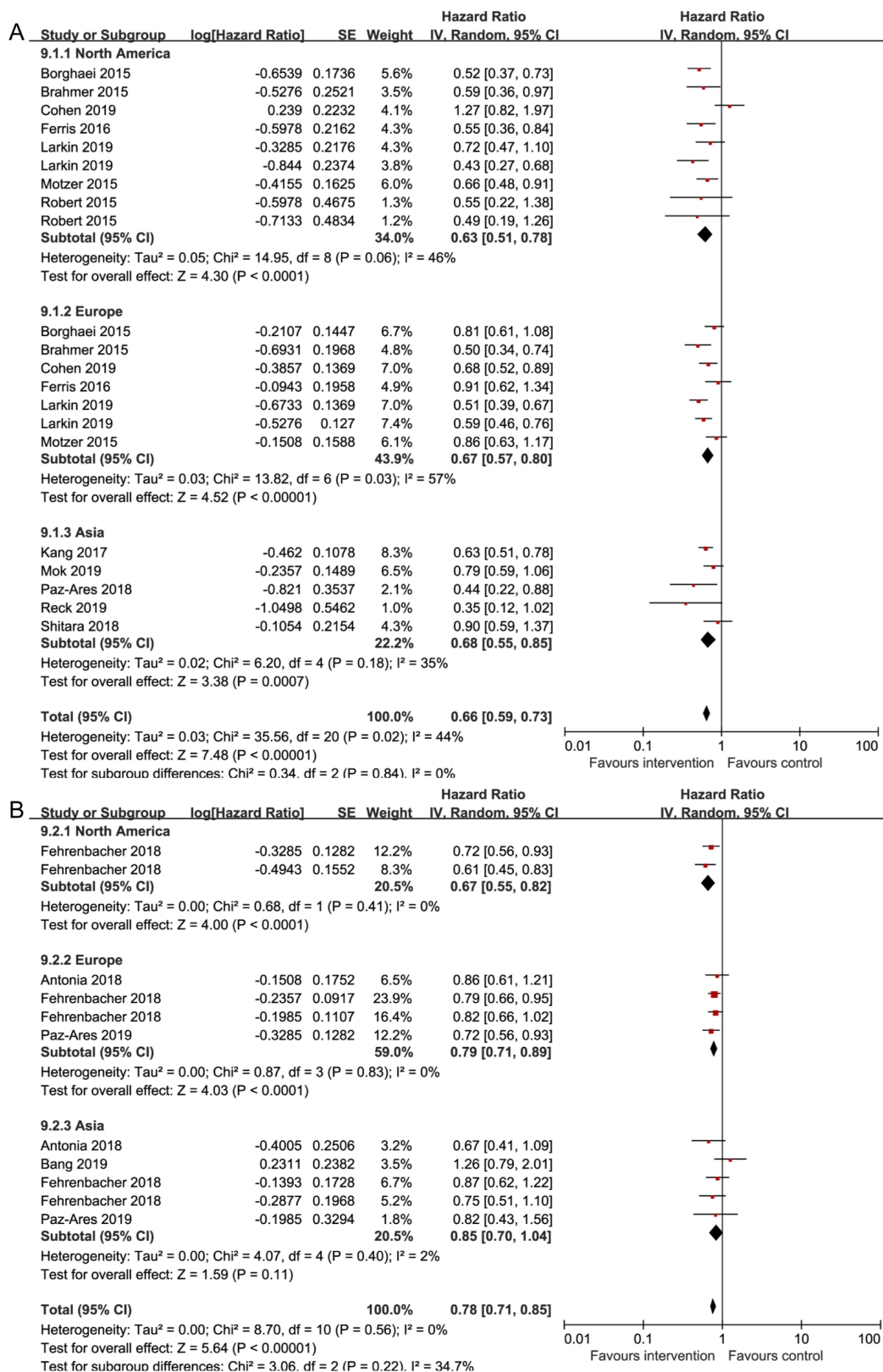
No.	Search strategy	Items found
<b>PubMed</b>		
#1	Neoplasms[MeSH Terms]	3228191
#2	(((((Neoplasia[Title/Abstract] OR Neoplasm*[Title/Abstract] OR Tumor*[Title/Abstract] OR Cancer*[Title/Abstract] OR Malignan*[Title/Abstract] OR Malignant Neoplasm*[Title/Abstract] OR Neoplasm*, Malignant[Title/Abstract] OR Benign Neoplasm*[Title/Abstract] OR Neoplasm*, Benign[Title/Abstract]))))	132344
#3	Carcinoma[MeSH Terms]	624097
#4	(((((Carcinoma[Title/Abstract] OR Epithelial Neoplasm*, Malignant[Title/Abstract] OR Malignant Epithelial Neoplasm*[Title/Abstract] OR Neoplasm*, Malignant Epithelial[Title/Abstract] OR Epithelial Tumor*, Malignant[Title/Abstract] OR Malignant Epithelial Tumor*[Title/Abstract] OR Tumor*, Malignant Epithelial[Title/Abstract] OR Epithelioma*[Title/Abstract] OR Carcinoma*, Undifferentiated[Title/Abstract] OR Undifferentiated Carcinoma*[Title/Abstract] OR Carcinoma*, Anaplastic[Title/Abstract] OR Anaplastic Carcinoma*[Title/Abstract] OR Carcinoma, Spindle-Cell[Title/Abstract] OR Carcinoma, Spindle Cell[Title/Abstract] OR Spindle-Cell Carcinoma*[Title/Abstract] OR Carcinomatos*[Title/Abstract]))))	14141
#5	(#1 OR #2 OR #3 OR #4)	3247133
#6	Nivolumab[MeSH Terms]	1817
#7	(((((Opdivo[Title/Abstract] OR ONO-4538[Title/Abstract] OR ONO 4538[Title/Abstract] OR ONO4538[Title/Abstract] OR MDX-1106[Title/Abstract] OR MDX 1106[Title/Abstract] OR MDX1106[Title/Abstract] OR BMS-936558[Title/Abstract] OR BMS 936558[Title/Abstract] OR BMS936558[Title/Abstract]))))	93
#8	(((((pembrolizumab[Title/Abstract] OR lambrolizumab[Title/Abstract] OR Keytruda[Title/Abstract] OR MK-3475[Title/Abstract] OR SCH-900475[Title/Abstract]))))	2680
#9	(((((Libtayo[Title/Abstract] OR cemiplimab-rwlc[Title/Abstract] OR REGN2810[Title/Abstract] OR cemiplimab[Title/Abstract]))))	30
#10	(((((Pidilizumab[Title/Abstract] OR CT-011[Title/Abstract] OR CT 011[Title/Abstract] OR AMP-514[Title/Abstract] OR MEDI0680[Title/Abstract] OR PDR-001[Title/Abstract] OR BCD-100[Title/Abstract]))))	34
#11	(((((camrelizumab[Title/Abstract] OR SHR-1210[Title/Abstract] OR toripalimab[Title/Abstract] OR JS001[Title/Abstract] OR sintilimab[Title/Abstract] OR IBI308[Title/Abstract] OR BGB-A317[Title/Abstract] OR Tislelizumab[Title/Abstract] OR GB226[Title/Abstract]))))	45
#12	(((((Durvalumab[Title/Abstract] OR MEDI4736[Title/Abstract] OR MEDI-4736[Title/Abstract] OR Imfinzi[Title/Abstract]))))	330
#13	(((((atezolizumab[Title/Abstract] OR anti-PDL1[Title/Abstract] OR immunoglobulin G1, anti-(human CD antigen CD274) (human monoclonal MDPL3280a heavy chain), disulfide with human monoclonal MDPL3280a kappa-chain, dimer[Title/Abstract] OR MPDL3280A[Title/Abstract] OR tecentriq[Title/Abstract] OR RG 7446[Title/Abstract] OR RG-7446[Title/Abstract]))))	57
#14	(((((avelumab[Title/Abstract] OR MSB0010718C[Title/Abstract] OR Bavencio[Title/Abstract]))))	303
#15	(((((BMS-936559) OR MDX1105) OR M7824) OR KN035) OR CS1001) OR ZKAB001)	33
#16	(((((tremelimumab[Title/Abstract] OR ticilimumab[Title/Abstract] OR CP 675[Title/Abstract] OR CP675 cpd[Title/Abstract] OR CP-675[Title/Abstract] OR CP-675,206[Title/Abstract] OR CP-675206[Title/Abstract] OR CP675206[Title/Abstract] OR CP 675206[Title/Abstract]))))	5295
#17	Ipilimumab[MeSH Terms]	1642
#18	(Anti-CTLA-4 MAb Ipilimumab[Title/Abstract] OR Anti CTLA 4 MAb Ipilimumab[Title/Abstract] OR Ipilimumab, Anti-CTLA-4 MAb[Title/Abstract] OR Yervoy[Title/Abstract] OR MDX 010[Title/Abstract] OR MDX010[Title/Abstract] OR MDX-010[Title/Abstract] OR MDX-CTLA-4[Title/Abstract] OR MDX CTLA 4[Title/Abstract])	93
#19	(CTLA-4 [Title/Abstract] OR cytotoxic T-lymphocyte-associated protein 4 [Title/Abstract] OR PD-1 [Title/Abstract] OR programmed death receptor 1 [Title/Abstract] OR programmed death ligand1 [Title/Abstract] OR PD-L1 [Title/Abstract] OR immune checkpoint inhibitor [Title/Abstract] OR Programmed Cell Death 1 Receptor antagonist [Title/Abstract] OR Programmed Cell Death 1 Receptor inhibitor [Title/Abstract] OR CTLA-4 Antigen antagonists [Title/Abstract] OR CTLA-4 Antigen inhibitors [Title/Abstract])	21112
#20	(#6 OR #7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14 OR #15 OR #16 OR #17 OR #18 OR #19)	28917
#21	(randomized controlled trial[Publication Type] OR controlled clinical trial[Publication Type] OR clinical trial[Publication Type])	839547
#22	(clinical Trials as Topic[MeSH Terms] OR Randomized Controlled Trials as Topic[MeSH Terms] OR Controlled Clinical Trials as Topic[MeSH Terms] OR Double-Blind Method[MeSH Terms] OR single-blind method[MeSH Terms] OR Control Groups[MeSH Terms] OR Random Allocation[MeSH Terms] OR cross-over studies[MeSH Terms] OR drug therapy[MeSH Subheading])	2501963
#23	(#21 OR #22)	2922112
#24	("Animals"[Mesh] NOT ("Humans"[Mesh] AND "Animals"[Mesh]))	4630286
#25	(#5 AND #20 AND #23)	5164
#26	(#25 NOT #24)	Final search 5018
<b>EMBASE</b>		
#1	'neoplasm'/exp	4758577
#2	'acral tumor' OR 'acral tumour' OR 'neoplasia' OR 'neoplasms' OR 'neoplasms by histologic type' OR 'neoplasms, cystic, mucinous, and serous' OR 'neoplasms, embryonal and mixed' OR 'neoplasms, germ cell and embryonal' OR 'neoplasms, glandular and epithelial' OR 'neoplasms, hormone-dependent' OR 'neoplasms, post-traumatic' OR 'neoplastic disease' OR 'tumor' OR 'tumour'	3160381
#3	'malignant neoplasm'/exp	3559360
#4	'cancer' OR 'cancers' OR 'malignant neoplasia' OR 'malignant neoplastic disease' OR 'malignant tumor' OR 'malignant tumour' OR 'neoplasia, malignant' OR 'tumor, malignant' OR 'tumour, malignant'	4066523
#5	'carcinoma'/exp	1202176
#6	'carcinoma 63' OR 'carcinoma, brown-pearce' OR 'carcinoma, krebs 2' OR 'carcinoma, neuroendocrine' OR 'carcinoma, scirrhous' OR 'epithelial carcinoma' OR 'epithelial malignant tumor' OR 'epithelial malignant tumour' OR 'internal carcinoma' OR 'malignant epithelial tumor' OR 'malignant epithelial tumour' OR 'microcarcinoma' OR 'neoplasm,malignant epithelial' OR 'neoplasms, ductal, lobular, medullary' OR 'primary carcinoma'	8323
#7	'nivolumab'/exp	13544
#8	'bms 936558' OR 'bms936558' OR 'cmab 819' OR 'cmab819' OR 'mdx 1106' OR 'mdx1106' OR 'ono 4538' OR 'ono4538' OR 'opdivo'	1199
#9	'pembrolizumab'/exp	11478
#10	'keytruda' OR 'lambrolizumab' OR 'mk 3475' OR 'mk3475' OR 'sch 900475' OR 'sch900475'	1290
#11	'cemiplimab'/exp	143
#12	'cemiplimab rwlc' OR 'cemiplimab-rwlc' OR 'libtayo' OR 'regn 2810' OR 'regn2810' OR 'sar 439684' OR 'sar439684'	87
#13	'pidilizumab'/exp	443
#14	'ct 011' OR 'ct011'	224
#15	'cetrelimab'/exp	7
#16	'jnj 63723283' OR 'jnj63723283'	11
#17	'camrelizumab'/exp	29
#18	'shr-1210'	64
#19	'toripalimab'/exp	32
#20	'js 001' OR 'js001' OR 'tab 001' OR 'tab001'	43
#21	'sintilimab'/exp	29
#22	'ibi 308' OR 'ibi308' OR 'tyvyt'	18
#23	'tislelizumab'/exp	59
#24	'bgb a317' OR 'bgba317'	49
#25	'gb226'	3
#26	'amp-514' OR 'medi0680' OR 'pdr-001' OR 'bcd-100'	99
#27	'durvalumab'/exp	2723
#28	'imfinzi' OR 'medi 4736' OR 'medi4736'	653
#29	'atezolizumab'/exp	3954
#30	'monoclonal antibody mpdl 3280a' OR 'monoclonal antibody mpdl3280a' OR 'mpdl 3280a' OR 'mpdl3280a' OR 'rg 7446' OR 'rg7446' OR 'tecentriq' OR 'tecniq'	736
#31	'avelumab'/exp	1654
#32	'bavencio' OR 'msb 0010682' OR 'msb 0010718c' OR 'msb 10682' OR 'msb 10718c' OR 'msb0010682' OR 'msb0010718c' OR 'msb10682' OR 'msb10718c' OR 'pf 06834635' OR 'pf 6834635' OR 'pf06834635' OR 'pf6834635'	264
#33	'bms 936559'/exp	372
#34	'bms936559' OR 'mdx 1105' OR 'mdx1105'	84
#35	'bintrafusp alfa'/exp	39
#36	'bintrafusp alpha' OR 'm 7824' OR 'm7824' OR 'msb 0011359c' OR 'msb0011359c'	59
#37	'envafolimab'/exp	9
#38	'asc 22' OR 'asc22' OR 'kn 035' OR 'kn035'	30
#39	'cs1001' OR 'zka001'	5
#40	'envafolimab'/exp	9
#41	'cp 675 206' OR 'cp 675, 206' OR 'cp 675206' OR 'cp675 206' OR 'cp675, 206' OR 'cp675206' OR 'tremelimumab'	729
#42	'ipilimumab'/exp	12066
#43	'bms 734016' OR 'bms734016' OR 'mdx 010' OR 'mdx 101' OR 'mdx010' OR 'mdx101' OR 'strentarga' OR 'yervoy'	1090
#44	randomized AND controlled AND ('trial'/exp OR trial) OR (controlled AND trial, AND randomized); OR 'randomized controlled trial'/exp OR 'randomized controlled trial' OR (pragmatic AND ('clinical'/exp OR clinical) AND trials) OR (randomised AND controlled AND ('study'/exp OR study)) OR (randomised AND controlled AND ('trial'/exp OR trial)) OR (randomized AND controlled AND study); OR (trial, AND randomized AND controlled)	908562
#45	#1 OR #2 OR #3 OR #4 OR #5 OR #6	6144263
#46	#7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14 OR #15 OR #16 OR #17 OR #18 OR #19 OR #20 OR #21 OR #22 OR #23 OR #24 OR #25 OR #26 OR #27 OR #28 OR #29 OR #30 OR #31 OR #32 OR #33 OR #34 OR #35 OR #36 OR #37 OR #38 OR #39 OR #40 OR #41 OR #42 OR #43	27206
#47	'ctla-4' OR 'cytotoxic t-lymphocyte-associated protein 4' OR 'pd-1' OR 'programmed death receptor 1' OR 'programmed death ligand1' OR 'pd-l1' OR 'immune checkpoint inhibitor' OR 'programmed cell death 1 receptor antagonist' OR 'programmed cell death 1 receptor inhibitor' OR 'ctla-4 antigen antagonist' OR 'ctla-4 antigen inhibitor'	43159
#48	#46 OR #47	58020
#49	#44 AND #45 AND #48	Final search 4177
<b>The Cochrane Library</b>		
#1	MeSH descriptor: [Neoplasms] explode all trees	71851
#2	Neoplasia*:ti,ab,kw OR Neoplasm*:ti,ab,kw OR Tumor*:ti,ab,kw OR Cancer*:ti,ab,kw OR Malignant*:ti,ab,kw OR Malignant Neoplasm*:ti,ab,kw OR Neoplasm*, Malignant*:ti,ab,kw OR Neoplasm*, Benign*:ti,ab,kw OR Neoplasm*, Benign*:ti,ab,kw	196131
#3	MeSH descriptor: [Carcinoma] explode all trees	12426
#4	Carcinoma*:ti,ab,kw OR Epithelial Neoplasm*, Malignant*:ti,ab,kw OR Malignant Epithelial Neoplasm*:ti,ab,kw OR Neoplasm*, Malignant Epithelial*:ti,ab,kw OR Epithelial Tumor*, Malignant*:ti,ab,kw OR Malignant Epithelial Tumor*:ti,ab,kw OR Epithelioma*:ti,ab,kw OR Carcinoma*, Undifferentiated*:ti,ab,kw OR Undifferentiated Carcinoma*:ti,ab,kw OR Carcinoma*, Anaplastic*:ti,ab,kw OR Anaplastic Carcinoma*:ti,ab,kw OR Carcinoma, Spindle-Cell*:ti,ab,kw OR Carcinoma, Spindle Cell*:ti,ab,kw OR Spindle-Cell Carcinoma*:ti,ab,kw OR Carcinomatos*:ti,ab,kw	39759
#5	#1 OR #2 OR #3 OR #4	210985
#6	MeSH descriptor: [Nivolumab] explode all trees	306
#7	Opdivo*:ti,ab,kw OR ONO-4538*:ti,ab,kw OR ONO 4538*:ti,ab,kw OR ONO4538*:ti,ab,kw OR MDX-1106*:ti,ab,kw OR MDX 1106*:ti,ab,kw OR MDX1106*:ti,ab,kw OR BMS-936558*:ti,ab,kw OR BMS 936558*:ti,ab,kw OR BMS936558*:ti,ab,kw	153
#8	pembrolizumab*:ti,ab,kw OR lambrolizumab*:ti,ab,kw OR Keytruda*:ti,ab,kw OR MK-3475*:ti,ab,kw OR SCH-900475*:ti,ab,kw	1106
#9	Libtayo*:ti,ab,kw OR cemiplimab-rwlc*:ti,ab,kw OR REGN2810*:ti,ab,kw OR cemiplimab*:ti,ab,kw	37
#10	Pidilizumab*:ti,ab,kw OR CT-011*:ti,ab,kw OR CT 011*:ti,ab,kw OR AMP-514*:ti,ab,kw OR MEDI0680*:ti,ab,kw OR PDR-001*:ti,ab,kw OR BCD-100*:ti,ab,kw OR JNJ-63723283*:ti,ab,kw	1270
#11	camrelizumab*:ti,ab,kw OR SHR-1210*:ti,ab,kw OR toripalimab*:ti,ab,kw OR JS001*:ti,ab,kw OR sintilimab*:ti,ab,kw OR IBI308*:ti,ab,kw OR BGB-A317*:ti,ab,kw OR Tislelizumab*:ti,ab,kw OR GB226*:ti,ab,kw	96
#12	Durvalumab*:ti,ab,kw OR MEDI4736*:ti,ab,kw OR MEDI-4736*:ti,ab,kw OR Imfinzi*:ti,ab,kw	385
#13	(atezolizumab*:ti,ab,kw OR anti-PDL1*:ti,ab,kw OR immunoglobulin G1, anti-(human CD antigen CD274) (human monoclonal MDPL3280a heavy chain), disulfide with human monoclonal MDPL3280a kappa-chain, dimer*:ti,ab,kw OR MPDL3280A*:ti,ab,kw OR tecentriq*:ti,ab,kw OR RG 7446*:ti,ab,kw OR RG-7446*:ti,ab,kw	778
#14	avelumab*:ti,ab,kw OR MSB0010718C*:ti,ab,kw OR Bavencio*:ti,ab,kw	153
#15	BMS-936559*:ti,ab,kw OR MDX1105*:ti,ab,kw OR M7824*:ti,ab,kw OR KN035*:ti,ab,kw OR CS1001*:ti,ab,kw OR ZKAB001*:ti,ab,kw	23
#16	tremelimumab*:ti,ab,kw OR ticilimumab*:ti,ab,kw OR CP 675*:ti,ab,kw OR CP675 cpd*:ti,ab,kw OR CP-675*:ti,ab,kw OR CP-675,206*:ti,ab,kw OR CP 675206*:ti,ab,kw OR CP 675206*:ti,ab,kw	223
#17	MeSH descriptor: [Ipilimumab] explode all trees	108
#18	Anti-CTLA-4 MAb Ipilimumab*:ti,ab,kw OR Anti CTLA 4 MAb Ipilimumab*:ti,ab,kw OR Ipilimumab, Anti-CTLA-4 MAb*:ti,ab,kw OR Yervoy*:ti,ab,kw OR MDX 010*:ti,ab,kw OR MDX010*:ti,ab,kw OR MDX-010*:ti,ab,kw OR MDX-CTLA-4*:ti,ab,kw OR MDX CTLA 4*:ti,ab,kw	106
#19	CTLA-4*:ti,ab,kw OR cytotoxic T-lymphocyte-associated protein 4*:ti,ab,kw OR PD-1*:ti,ab,kw OR programmed death receptor 1*:ti,ab,kw OR programmed death ligand1*:ti,ab,kw	1874
#20	PD-L1*:ti,ab,kw OR immune checkpoint inhibitor*:ti,ab,kw OR Programmed Cell Death 1 Receptor antagonist*:ti,ab,kw OR Programmed Cell Death 1 Receptor inhibitor*:ti,ab,kw OR CTLA-4 Antigen antagonist*:ti,ab,kw OR CTLA-4 Antigen inhibitors*:ti,ab,kw	1871
#21	#6 OR #7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14 OR #15 OR #16 OR #17 OR #18 OR #19 OR #20	5485
#22	#5 AND #21	Final search 4015



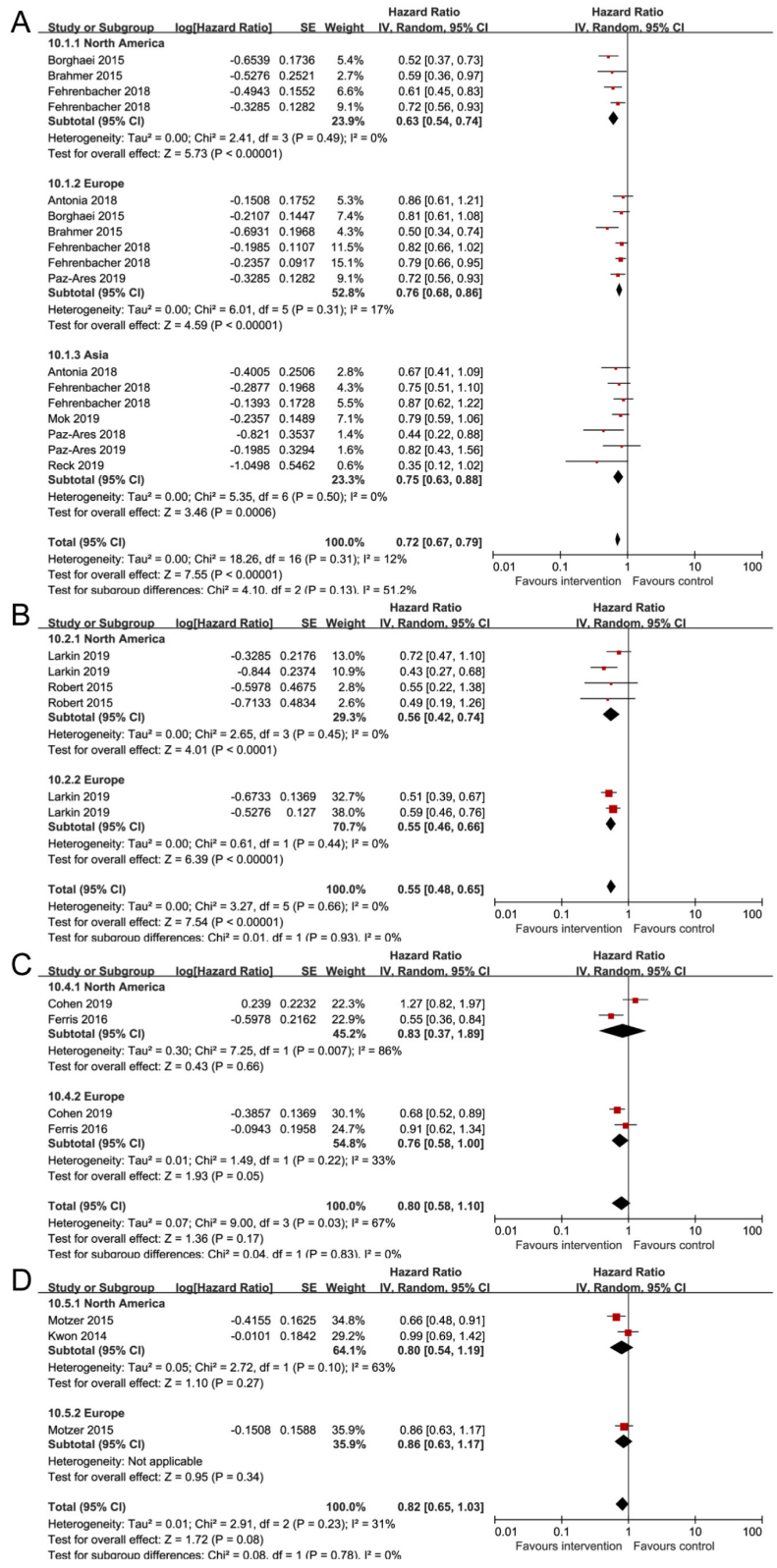
**Figure S1** Risk of bias graph: Review authors' judgments about each risk of bias item presented as percentages across all included studies.

	Random sequence generation (selection bias)	Allocation concealment (selection bias)	Blinding of participants and personnel (performance bias)	Blinding of outcome assessment (detection bias)	Incomplete outcome data (attrition bias)	Selective reporting (reporting bias)	Other bias
Antonia 2018	?	?	+	+	+	+	+
Bang 2019	+	+	-	-	+	+	+
Borghaei 2015	+	?	-	?	+	+	+
Brahmer 2015	+	?	-	?	+	+	+
Cohen 2019	+	+	-	+	+	+	+
Fehrenbacher 2018	+	-	-	?	+	+	+
Ferris 2016	+	?	-	+	?	+	+
Kang 2017	+	+	+	+	?	+	+
Kwon 2014	+	+	+	+	+	+	+
Larkin 2019	+	?	+	+	+	+	+
Mok 2019	+	+	-	?	+	+	+
Motzer 2015	+	?	-	?	+	+	+
Paz-Ares 2018	+	+	+	+	+	+	+
Paz-Ares 2019	+	+	-	?	+	+	+
Reck 2019	+	+	-	?	+	+	+
Robert 2015	+	+	?	?	+	+	+
Shitara 2018	+	+	-	+	+	+	+

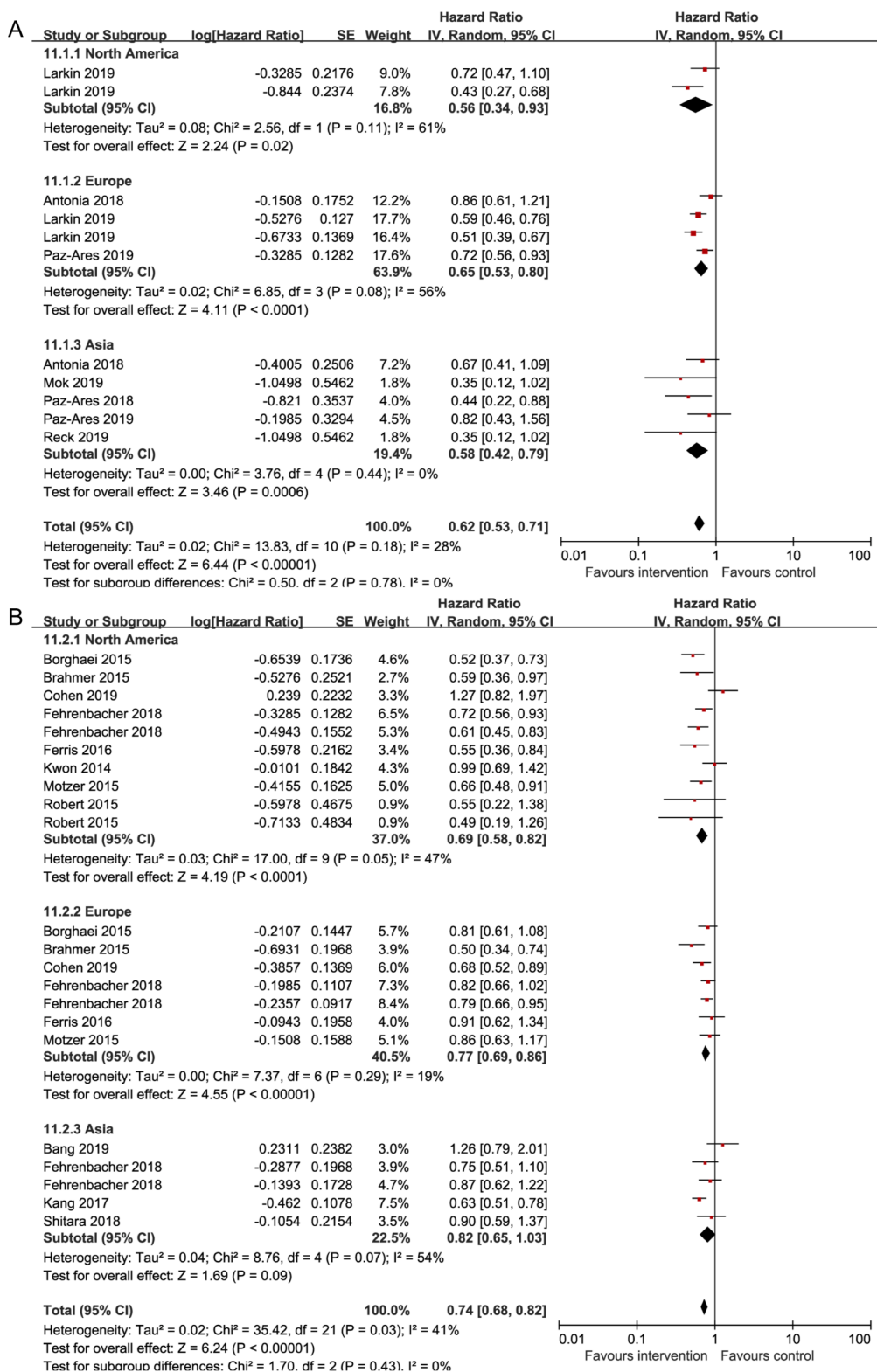
**Figure S2** Risk of bias summary: Review authors' judgments about each risk of bias item for each included study.



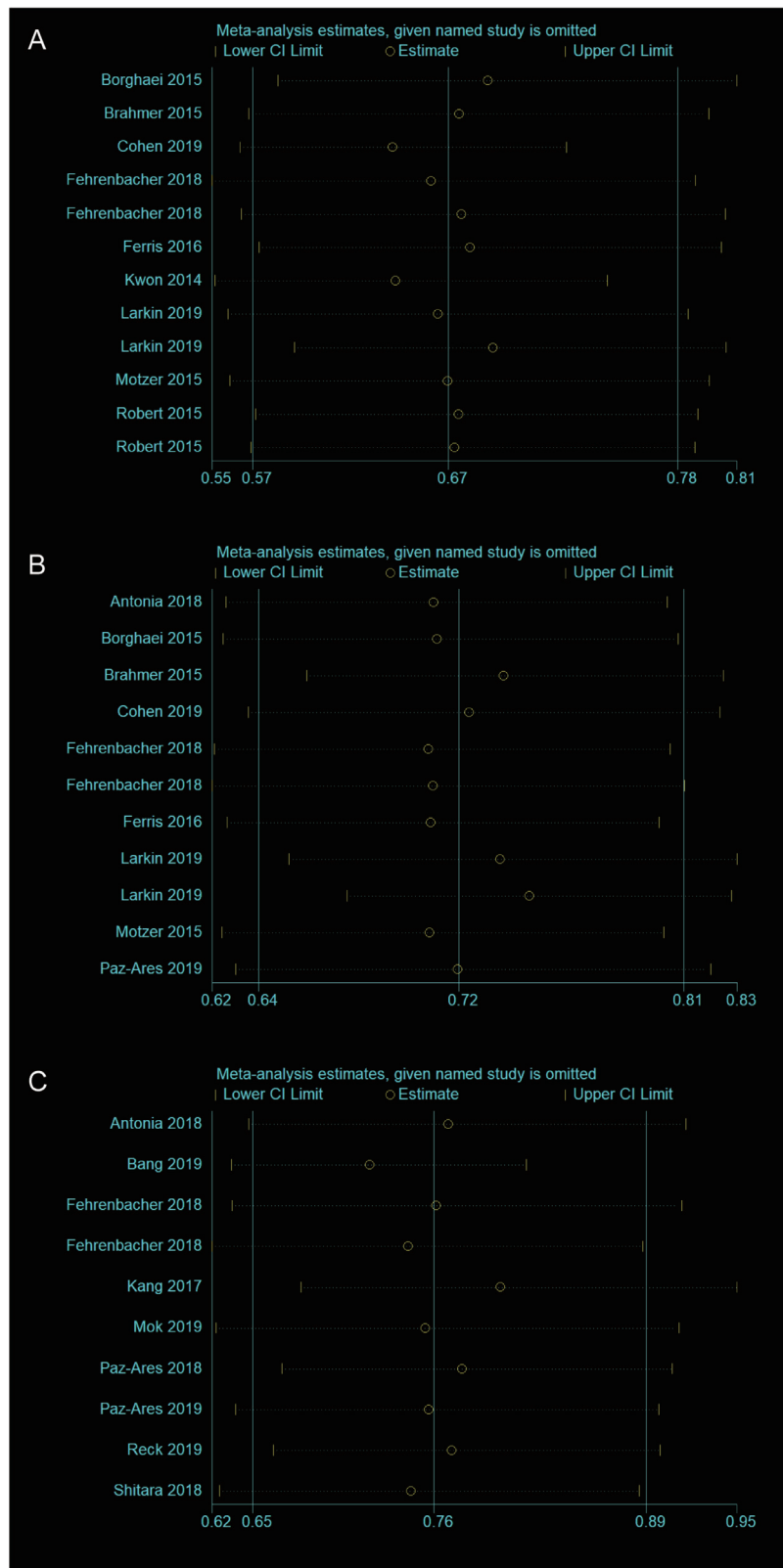
**Figure S3** Pooled hazard ratios and 95% CI for overall survival in patients treated with anti-PD-1 inhibitors (A) or anti-PD-L1 inhibitors (B) according to class of ICI.



**Figure S4** Pooled hazard ratios and 95% CI for overall survival in lung cancer (A), melanoma (B), head and neck cancer (C), and other cancers (D) according to cancer type.



**Figure S5** Pooled hazard ratios and 95% CI for overall survival in first-line (A) or subsequent line (B) according to the setting line of ICI treatment.



**Figure S6** Sensitivity analysis from North American, European, and Asian arms: Sensitivity analysis of overall survival from North American (A), European(B), and Asian (C) arms in included RCTs to determine the robustness of findings in regards to different aspects of trial methodology.