

**S1 Table.** The items available in each included studies and summary data for each intervention group

	All-grade irAEs		Grade $\geq$ 3 irAEs	
	Events	Time (95% CI)	Events	Time (95% CI)
<b>PMT-O</b>				
IPI monotherapy				
Weber-2013 <sup>a)</sup>	45	6.1 (6.1-6.1)	20	9.4 (9.4-9.4)
Eggermont-2016	497	6.3 (4.0-10.2)	NA	NA
Ascierto-2017	546	7.4 (7.1-7.6)	NA	NA
Weber-2017	709	4.4 (2.6-8.9)	175	7.0 (4.6-10.6)
Larkin-2019	374	4.6 (3.6-8.9)	61	7.4 (4.7-8.1)
NIV monotherapy				
Brahmer-2015	41	7.3 (3.0-15.1)	2	57.6 (24.1-91.0)
Broghaei-2015	140	5.1 (4.7-12.1)	11	13.5 (1.9-26.5)
Horn-2017	201	5.7 (4.5-11.2)	NA	NA
Larkin-2017	232	8.7 (6.1-14.1)	NA	NA
Weber-2017	481	8.4 (7.7-8.4)	30	24 (18.6-30.4)
Armand-2018	50	12.0 (12.0-17.0)	NA	NA
Carneiro-2019	2	10.2 (6.4-14.0)	NA	NA
Horinouchi-2019	91	2.9 (2.0-17.8)	NA	NA
Larkin-2019	323	8.9 (5.7-12.1)	41	42.3 (14.1-109.2)
Sharma-2019	NA	NA	9	7.9 (4.6-84.6)
PEM monotherapy				
Fradet-2019 <sup>a)</sup>	52	3.5 (3.5-3.5)	NA	NA
Georger-2019	33	6.1 (4.6-6.9)	NA	NA
AVE monotherapy				
Kelly-2018	235	10.7 (8.9-12.1)	NA	NA
NIV+IPI				
Larkin-2019	615	4.9 (2.1-8.0)	159	7.9 (6.3-12.2)
Lebbé-2019	532	6.0 (3.9-6.1)	105	9.0 (7.7-9.0)
Morse-2019	126	9.1 (5.2-9.1)	NA	NA
Sharma-2019	NA	NA	55	7.9 (7.4-11.2)
Tomita-2019	50	3.6 (3.1-16.6)	NA	NA

**IPI+CT**

Govindan-2017	265	4.1 (4.0-12.0)	NA	NA
Kwon-2014	NA	NA	102	5.7 (5.7-9.1)
Reck-2016	243	5.0 (4.7-9.0)	NA	NA

**PMT-R**

## IPI monotherapy

Weber-2013 <sup>a)</sup>	33	6.86 (4.1-8.4)	12	7.7 (7.7-7.7)
Eggermont-2016	409	4.4 (4.0-54.3)	NA	NA
Ascierto-2017	492	2.9 (2.6-5.1)	NA	NA
Weber-2017	521	4.4 (3.1-9.3)	153	3.7 (3.1-46.9)
Larkin-2019	292	4.1 (2.9-11.0)	51	3.6 (3.6-6.3)

## NIV monotherapy

Brahmer-2015	27	2.5 (0.7-5.0)	1	7.9 (7.9-7.9)
Brognaei-2015	92	5.7 (1.5-12.1)	9	5.9 (2.0-8.1)
Horn-2017	141	5.9 (2.3-10.1)	NA	NA
Larkin-2017	149	4.7 (2.4-28.6)	NA	NA
Weber-2017	351	22.1 (2.4-48.1)	24	5.1 (3.0-52.6)
Larkin-2019	222	28.7 (1.9-35.1)	24	5.1 (3.1-6.0)

## NIV+IPI

Larkin-2019	497	5.1 (2.9-10.9)	147	3.3 (3.2-4.0)
Lebbé-2019	256	6.1 (1.8-24.1)	81	4.1 (1.7-8.3)
Morse-2019	484	5.0 (1.5-9.0)	NA	NA
Tomita-2019	33	13.1 (2.0-14.6)	NA	NA

**IPI+CT**

Govindan-2017	177	3.3 (2.7-28.7)	NA	NA
Kwon-2014	NA	NA	91	2.9 (2.9-11.1)
Reck-2016	184	2.9 (2.0-10.4)	NA	NA

**PMT-IMR**

## IPI monotherapy

Weber-2017	241	4.4 (4.4-14.4)	128	3.3 (3.3-18.6)
Larkin-2019	105	4.9 (4.9-12.4)	44	3.9 (3.9-5.7)

## NIV monotherapy

Weber-2017	83	48.4 (6.4-48.4)	15	5.7 (1.1-46.2)
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Larkin-2019	47	40.6 (2.4-40.6)	15	7.0 (2.6-12.4)
NIV+IPI				
Larkin-2019	192	5.9 (4.3-9.3)	109	3.1 (3.1-4.1)
Morse-2019	26	7.5 (2.0-10.6)	NA	NA

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AVE, avelumab; CI, confidence interval; CT, conventional therapy; IPI, ipilimumab; irAEs, immune-related adverse events; NA, not available; NIV, nivolumab; PEM, pembrolizumab; PMT-O, pooled median time to onset; PMT-R, pooled median time to resolution. <sup>a)</sup>The relevant data of all immune-related adverse events were provided rather than that of each organ-specific immune-related adverse events.