

Supplementary Table 1. Assessment Completeness and Frequency in 1L-3L

Disease	Line of therapy	Patients, N	Patients with ≥1 rwR assessment, n (%)	Number of rwR assessments			Time to first rwR assessment, months			Time to second rwR assessment, months			Time to third rwR assessment, months		
				Mean	Median	IQR	Mean	Median	IQR	Mean	Median	IQR	Mean	Median	IQR
aUro	Anytime after 1L	10,142	7,525 (74.2%)	5.5	4	(2, 7)	2.9	2.3	(1.7, 3.1)	6.0	5.10	(3.8, 6.5)	9.2	8.00	(6.2, 10.2)
	1L	10,142	7,145 (70.4%)	3.5	2	(1, 4)	2.8	2.3	(1.7, 3.1)	5.8	4.90	(3.7, 6.4)	8.9	7.90	(6, 9.9)
	2L	4,428	3,063 (69.2%)	3.3	2	(1, 4)	2.6	2.3	(1.7, 3)	5.4	4.90	(3.6, 6.2)	8.5	7.60	(5.8, 9.6)
	3L	1,874	1,254 (66.9%)	3.1	2	(1, 4)	2.7	2.2	(1.7, 2.9)	5.3	4.80	(3.5, 6.1)	8.0	7.10	(5.4, 9)
mBC	Anytime after 1L	34,017	27,204 (80.0%)	7.1	5	(2, 10)	4.6	3.0	(2, 4.5)	9.0	6.60	(4.7, 9.8)	13.0	10.30	(7.6, 14.8)
	1L	34,017	22,569 (66.3%)	3.7	2	(1, 5)	4.5	3.0	(2, 4.5)	8.5	6.40	(4.5, 9.5)	12.5	10.00	(7.2, 14.4)
	2L	21,224	14,783 (69.7%)	3.3	2	(1, 4)	3.9	2.8	(1.9, 4)	7.4	5.80	(4.2, 8.3)	11.2	9.20	(6.7, 12.8)
	3L	13,378	9,068 (67.8%)	2.9	2	(1, 3)	3.5	2.7	(1.9, 3.8)	6.8	5.60	(4, 7.7)	10.1	8.60	(6.2, 11.6)
mCRC	Anytime after 1L	32,848	26,416 (80.4%)	6.4	5	(2, 9)	3.2	2.5	(1.8, 3.3)	6.5	5.60	(4.2, 7.2)	9.7	8.60	(6.6, 10.9)
	1L	32,848	24,419 (74.3%)	3.9	3	(1, 5)	3.1	2.5	(1.8, 3.2)	6.2	5.40	(4, 6.9)	9.3	8.30	(6.3, 10.4)
	2L	17,870	13,149 (73.6%)	3.3	2	(1, 4)	2.9	2.5	(1.8, 3.3)	5.7	5.10	(3.9, 6.5)	8.6	7.90	(6.1, 9.8)
	3L	9,375	6,434 (68.6%)	2.7	2	(1, 3)	2.8	2.4	(1.8, 3.2)	5.4	4.90	(3.7, 6.2)	8.1	7.50	(5.7, 9.4)
aEndo	Anytime after 1L	3,406	2,631 (77.2%)	5.7	4	(2, 8)	3.8	2.5	(1.9, 3.9)	7.4	5.50	(4.1, 8)	11.3	9.10	(6.8, 12.6)
	1L	3,406	2,358 (69.2%)	3.2	2	(1, 4)	3.6	2.4	(1.9, 3.9)	6.7	5.10	(4, 7.4)	10.6	8.60	(6.4, 12.075)

	2L	1,849	1,284 (69.4%)	3.1	2	(1, 4)	3.4	2.6	(1.9, 3.5)	6.8	5.50	(4, 7.5)	10.6	8.70	(6.3, 11.975)
	3L	971	653 (67.3%)	2.7	2	(1, 3)	3.2	2.6	(1.9, 3.4)	6.0	4.90	(3.7, 6.5)	9.2	7.40	(5.7, 10.1)
aGastric	Anytime after 1L	11,761	8,582 (73.0%)	4.5	3	(2, 6)	3.0	2.4	(1.8, 3.1)	5.9	5.10	(3.8, 6.6)	9.3	8.00	(6.1, 10.3)
	1L	11,761	7,907 (67.2%)	3.0	2	(1, 4)	2.9	2.4	(1.8, 3.1)	5.7	4.90	(3.7, 6.4)	9.1	7.70	(5.9, 10.1)
	2L	5,297	3,425 (64.7%)	2.7	2	(1, 3)	2.7	2.3	(1.7, 3)	5.3	4.70	(3.6, 6)	8.2	7.20	(5.7, 9.4)
	3L	2,355	1,411 (59.9%)	2.3	2	(1, 3)	2.7	2.2	(1.7, 2.9)	5.2	4.60	(3.5, 5.825)	7.8	7.10	(5.4, 8.8)
HCC	Anytime after 1L	5,053	2,919 (57.8%)	3.9	2	(1, 5)	3.3	2.5	(1.8, 3.5)	6.5	5.30	(4, 7.2)	9.8	8.30	(6.3, 10.9)
	1L	5,053	2,717 (53.8%)	3.0	2	(1, 4)	3.2	2.5	(1.8, 3.4)	6.1	5.10	(3.8, 6.8)	9.2	8.10	(6, 10.3)
	2L	1,408	807 (57.3%)	2.9	2	(1, 3)	3.2	2.4	(1.8, 3.3)	6.0	5.00	(3.7, 6.9)	9.4	8.10	(6.1, 10.75)
	3L	467	257 (55.0%)	2.6	2	(1, 3)	2.8	2.4	(1.8, 3.2)	5.9	5.10	(4, 6.5)	8.8	7.90	(6.4, 10.2)
aHN	Anytime after 1L	9,405	7,453 (79.2%)	4.9	3	(2, 6)	3.4	2.7	(1.9, 4)	6.5	5.50	(4.1, 7.4)	9.8	8.40	(6.5, 11)
	1L	9,405	6,904 (73.4%)	2.9	2	(1, 3)	3.4	2.7	(1.9, 4)	6.1	5.20	(3.9, 6.8)	9.2	7.90	(6, 10.4)
	2L	5,045	3,321 (65.8%)	3.0	2	(1, 3)	2.8	2.4	(1.8, 3.2)	5.4	4.70	(3.5, 6.2)	8.3	7.50	(5.6, 9.5)
	3L	2,267	1,375 (60.7%)	2.7	2	(1, 3)	2.7	2.2	(1.7, 2.9)	5.3	4.50	(3.4, 6)	8.4	7.20	(5.475, 9.4)
aMel	Anytime after 1L	9,889	7,462 (75.5%)	7.4	5	(2, 10)	3.8	2.6	(1.8, 3.2)	6.9	5.30	(3.8, 6.8)	9.8	8.10	(6, 10.4)
	1L	9,889	7,005 (70.8%)	5.3	3	(1, 7)	3.6	2.6	(1.8, 3.2)	6.6	5.20	(3.7, 6.6)	9.6	8.10	(5.9, 10.3)
	2L	3,475	2,381 (68.5%)	4.9	3	(1, 6)	3.1	2.3	(1.6, 3)	5.8	4.70	(3.4, 6.3)	8.8	7.40	(5.5, 9.5)

	3L	1,391	926 (66.6%)	4.7	3	(1, 5.75)	2.9	2.2	(1.6, 2.9)	5.4	4.40	(3.3, 5.8)	8.2	7.10	(5.4, 9)
aNSCLC-1	Anytime after 1L	73,480	54,098 (73.6%)	6.3	4	(2, 8)	2.9	2.1	(1.6, 2.9)	5.9	4.80	(3.5, 6.3)	8.8	7.50	(5.7, 9.6)
	1L	73,480	50,720 (69.0%)	4.1	3	(1, 5)	2.8	2.1	(1.6, 2.9)	5.6	4.60	(3.4, 6.1)	8.4	7.20	(5.5, 9.3)
	2L	31,688	21,666 (68.4%)	3.8	2	(1, 5)	2.8	2.2	(1.6, 2.9)	5.4	4.50	(3.3, 5.9)	8.1	7.00	(5.3, 9.1)
	3L	13,894	9,187 (66.1%)	3.4	2	(1, 4)	2.7	2.1	(1.6, 2.8)	5.1	4.40	(3.3, 5.8)	7.8	6.80	(5.2, 9)
NSCLC-2	Anytime after 1L	129,807	95,771 (73.8%)	6.1	4	(2, 8)	2.8	2.2	(1.6, 2.9)	5.6	4.80	(3.5, 6.2)	8.5	7.50	(5.7, 9.5)
	1L	129,807	90,022 (69.4%)	4.0	3	(1, 5)	2.7	2.2	(1.6, 2.9)	5.4	4.70	(3.4, 6.1)	8.2	7.30	(5.5, 9.3)
	2L	54,782	37,724 (68.9%)	3.7	2	(1, 4)	2.7	2.2	(1.6, 2.9)	5.2	4.50	(3.3, 5.9)	8.0	7.00	(5.3, 9.1)
	3L	23,647	15,669 (66.3%)	3.3	2	(1, 4)	2.6	2.1	(1.6, 2.8)	5.0	4.40	(3.3, 5.7)	7.7	6.80	(5.3, 8.9)
Ovarian	Anytime after 1L	8,576	6,910 (80.6%)	6.1	4	(2, 8)	4.8	2.9	(1.9, 4.7)	10.0	6.90	(4.7, 11)	15.0	11.20	(7.9, 16.9)
	1L	8,576	6,498 (75.8%)	3.5	3	(2, 4)	4.7	2.8	(1.9, 4.6)	9.5	6.50	(4.5, 10.4)	14.0	10.70	(7.5, 15.7)
	2L	4,321	3,104 (71.8%)	3.0	2	(1, 4)	3.9	2.7	(1.9, 4.1)	7.6	5.80	(4.3, 8.6)	11.4	9.10	(6.8, 12.5)
	3L	2,691	1,798 (66.8%)	2.6	2	(1, 3)	3.3	2.6	(1.9, 3.5)	6.8	5.40	(4, 7.6)	10.5	8.60	(6.5, 11.3)
mPanc	Anytime after 1L	12,232	7,644 (62.5%)	4.0	3	(1, 5)	2.6	2.2	(1.7, 2.8)	5.1	4.60	(3.6, 5.8)	7.6	7.00	(5.6, 8.7)
	1L	12,232	7,231 (59.1%)	2.8	2	(1, 4)	2.5	2.2	(1.7, 2.8)	4.8	4.40	(3.5, 5.7)	7.2	6.60	(5.4, 8.4)
	2L	4,902	2,906 (59.3%)	2.5	2	(1, 3)	2.5	2.2	(1.7, 2.8)	4.7	4.40	(3.5, 5.5)	7.1	6.50	(5.3, 8.15)
	3L	1,741	931 (53.5%)	2.2	1	(1, 3)	2.4	2.0	(1.5, 2.7)	4.4	4.00	(3.1, 5.2)	6.9	6.35	(5.125, 8)

mPC	Anytime after 1L	12,835	9,638 (75.1%)	4.1	3	(1, 5)	6.9	4.3	(2.5, 8.2)	12.7	9.70	(6, 16)	17.6	14.20	(9.4, 22.1)
	1L	12,835	8,021 (62.5%)	2.3	2	(1, 3)	7.0	4.4	(2.6, 8.4)	12.0	8.70	(5.4, 15.1)	16.3	12.90	(8.4, 20.7)
	2L	7,943	4,792 (60.3%)	2.0	1	(1, 2)	4.9	3.3	(2.175, 5.4)	8.7	6.05	(4.2, 10.075)	12.3	9.00	(6.3, 14.2)
	3L	4,683	2,844 (60.7%)	2.0	1	(1, 2)	4.0	2.9	(2, 4.6)	6.9	5.60	(3.8, 8)	9.8	7.70	(5.7, 10.9)
aRCC	Anytime after 1L	10,781	8,551 (79.3%)	7.7	5	(2, 11)	3.4	2.6	(1.9, 3.4)	6.5	5.50	(4, 7)	9.7	8.40	(6.4, 10.7)
	1L	10,781	7,818 (72.5%)	4.4	3	(1, 6)	3.3	2.6	(1.9, 3.3)	6.1	5.40	(3.9, 6.8)	9.1	8.20	(6.1, 10.3)
	2L	5,628	4,107 (73.0%)	4.1	3	(1, 5)	3.1	2.6	(1.8, 3.3)	5.8	5.10	(3.8, 6.5)	8.7	7.90	(5.9, 9.7)
	3L	2,893	2,090 (72.2%)	3.7	2	(1, 5)	3.0	2.6	(1.9, 3.3)	5.9	5.20	(3.8, 6.6)	8.7	8.00	(6.1, 9.8)
SCLC	Anytime after 1L	9,817	7,460 (76.0%)	5.2	4	(2, 7)	2.6	2.1	(1.4, 2.9)	5.1	4.40	(3.1, 5.8)	7.7	6.70	(5.2, 8.6)
	1L	9,817	7,241 (73.8%)	3.9	3	(2, 5)	2.6	2.1	(1.4, 2.9)	5.0	4.30	(3.1, 5.7)	7.4	6.50	(5, 8.4)
	2L	3,912	2,399 (61.3%)	2.9	2	(1, 3)	2.3	1.9	(1.4, 2.6)	4.4	3.80	(2.9, 5.1)	6.5	5.70	(4.4, 7.5)
	3L	1,508	884 (58.6%)	2.6	2	(1, 3)	2.1	1.9	(1.4, 2.5)	4.2	3.85	(2.9, 4.9)	6.5	6.00	(4.5, 7.5)

aEndo, advanced endometrial; aGastric, advanced gastric/esophageal; aHN, advanced head and neck; aMel, advanced melanoma; advanced aNSCLC, non-small cell lung; aNSCLC-1, sampled aNSCLC cohort; aNSCLC-2, unsampled aNSCLC cohort; aRCC, advanced renal cell carcinoma; aUro, advanced urothelial; HCC, hepatocellular; mBC, metastatic breast; mCRC, metastatic colorectal; mPanc, metastatic pancreatic; mPC, metastatic prostate; SCLC, small cell lung cancer

Supplementary Table 2. rwOS for responders vs. non-responders for most common 1L-3L regimens

Disease	Line of therapy	Top regimen	Group	Patients, n	Events, n	Median rwOS, months	95% CI	P value
aUro	1L	Carboplatin, Gemcitabine	Responder	891	658	17.4	(16.3, 18.6)	<0.001
			Non-Responder	733	605	11.1	(9.8, 12.1)	
	2L	Pembrolizumab	Responder	232	93	49.8	(41.7, —)	<0.001
			Non-Responder	377	282	11.1	(9.4, 12.4)	
	3L	Enfortumab Vedotin-Ejfv	Responder	115	61	16.8	(14.9, 20.4)	0.001
			Non-Responder	78	45	10.7	(8.2, 13.4)	
mBC	1L	Letrozole, Palbociclib	Responder	1,478	614	62.1	(57.7, 66.4)	<0.001
			Non-Responder	1,253	632	46.8	(41.9, 49.8)	
	2L	Fulvestrant	Responder	202	141	46.1	(36.3, 54.4)	<0.001
			Non-Responder	754	592	27.0	(24.7, 29.8)	
	3L	Capecitabine	Responder	268	190	24.9	(22.4, 30.9)	<0.001
			Non-Responder	692	519	17.7	(16.7, 19.3)	
mCRC	1L	FOLFOX, Bevacizumab	Responder	3,156	2,394	28.3	(26.9, 29.4)	<0.001
			Non-Responder	1,573	1,262	18.3	(17.1, 19.5)	
	2L	FOLFIRI, Bevacizumab	Responder	707	565	24.8	(23.4, 26.8)	<0.001
			Non-Responder	1,199	1,025	12.9	(12.1, 13.8)	
	3L	Regorafenib	Responder	35	27	11.2	(8.0, 27.6)	0.026
			Non-Responder	454	381	9.3	(8.4, 10.1)	

aEndo	1L	Carboplatin, Paclitaxel	Responder	704	383	36.5	(30.8, 42.2)	<0.001
			Non-Responder	387	271	16.9	(14.6, 20.3)	
	2L	Lenvatinib, Pembrolizumab	Responder	57	18	—	(35.9, —)	<0.001
			Non-Responder	76	54	12.8	(8.2, 16.0)	
	3L	Lenvatinib, Pembrolizumab	Responder	34	20	17.7	(15.1, —)	0.021
			Non-Responder	54	39	11.9	(9.6, 16.1)	
aGastric	1L	Carboplatin, Paclitaxel	Responder	1,190	759	25.4	(22.9, 27.6)	<0.001
			Non-Responder	732	581	12.7	(11.8, 14.2)	
	2L	Paclitaxel, Ramucirumab	Responder	131	111	10.9	(9.7, 12.1)	<0.001
			Non-Responder	246	204	7.5	(6.0, 8.8)	
	3L	Paclitaxel, Ramucirumab	Responder	80	64	10.5	(8.3, 13.7)	<0.001
			Non-Responder	109	90	5.9	(5.3, 7.1)	
HCC	1L	Sorafenib	Responder	277	215	24.9	(21.9, 28.5)	<0.001
			Non-Responder	731	605	11.1	(10.4, 12.0)	
	2L	Nivolumab	Responder	61	44	28.7	(18.8, 41.6)	<0.001
			Non-Responder	119	96	10.8	(8.3, 13.9)	
	3L	Cabozantinib	Responder	6	5	13.2	(4.7, —)	>0.9
			Non-Responder	38	25	15.5	(9.5, 21.8)	
aHN	1L	Cisplatin	Responder	609	354	25.3	(23.0, 31.3)	<0.001
			Non-Responder	842	660	12.8	(12.1, 13.8)	

	2L	Pembrolizumab	Responder	249	112	37.1	(29.8, 53.0)	<0.001
			Non-Responder	406	306	10.6	(9.3, 12.6)	
	3L	Pembrolizumab	Responder	58	30	34.0	(28.3, —)	<0.001
			Non-Responder	116	102	11.1	(8.2, 13.9)	
aMel	1L	Ipilimumab, Nivolumab	Responder	775	221	84.5	(65.3, —)	<0.001
			Non-Responder	561	293	19.7	(16.7, 26.1)	
	2L	Ipilimumab, Nivolumab	Responder	165	61	66.5	(46.5, —)	<0.001
			Non-Responder	177	120	9.5	(7.6, 13.1)	
	3L	Ipilimumab, Nivolumab	Responder	41	16	—	(29.3, —)	<0.001
			Non-Responder	62	40	13.4	(10.4, 22.9)	
aNSCLC-1	1L	Carboplatin, Paclitaxel	Responder	4,176	2,888	22.6	(21.6, 23.8)	<0.001
			Non-Responder	2,682	2,054	13.2	(12.3, 13.9)	
	2L	Nivolumab	Responder	954	707	28.1	(25.4, 31.1)	<0.001
			Non-Responder	1,782	1,560	10.7	(10.2, 11.3)	
	3L	Nivolumab	Responder	307	228	32.1	(28.7, 37.4)	<0.001
			Non-Responder	673	581	11.3	(10.2, 12.4)	
aNSCLC-2	1L	Carboplatin, Paclitaxel	Responder	7,578	5,161	21.9	(21.1, 22.7)	<0.001
			Non-Responder	4,611	3,523	12.3	(11.8, 12.8)	
	2L	Nivolumab	Responder	1,793	1,331	29.5	(27.5, 31.8)	<0.001
			Non-Responder	3,048	2,678	10.4	(10.1, 10.8)	

	3L	Nivolumab	Responder	551	401	33.3	(30.4, 37.2)	<0.001
			Non-Responder	1,098	962	10.8	(9.7, 11.9)	
Ovarian	1L	Carboplatin, Paclitaxel	Responder	2,182	992	61.9	(56.7, 66.9)	<0.001
			Non-Responder	1,107	556	49.9	(44.9, 54.3)	
	2L	Doxorubicin Pegylated Liposomal	Responder	46	37	28.7	(21.7, 51.9)	0.002
			Non-Responder	145	118	15.8	(13.3, 19.7)	
	3L	Doxorubicin Pegylated Liposomal	Responder	25	20	19.2	(11.3, 55.6)	0.2
			Non-Responder	123	91	13.6	(11.4, 16.2)	
mPanc	1L	Gemcitabine, Paclitaxel Protein-Bound	Responder	1,241	1,054	12.0	(11.4, 12.6)	<0.001
			Non-Responder	1,596	1,376	8.3	(7.8, 8.9)	
	2L	Gemcitabine, Paclitaxel Protein-Bound	Responder	276	224	11.5	(10.0, 12.4)	<0.001
			Non-Responder	744	654	6.4	(6.0, 6.7)	
	3L	Fluorouracil, Irinotecan Liposomal, Leucovorin	Responder	28	24	13.1	(8.7, 16.9)	<0.001
			Non-Responder	145	129	4.9	(4.5, 5.7)	
mPC	1L	Abiraterone	Responder	614	374	35.3	(33.0, 40.1)	<0.001
			Non-Responder	1,934	1,356	27.8	(26.4, 29.5)	
	2L	Enzalutamide	Responder	161	107	32.8	(27.0, 47.7)	<0.001
			Non-Responder	861	650	22.3	(20.8, 24.5)	

	3L	Docetaxel	Responder	131	96	18.3	(16.3, 21.8)	0.001
			Non-Responder	462	384	13.2	(12.2, 14.5)	
RCC	1L	Sunitinib	Responder	505	365	49.1	(43.6, 53.0)	<0.001
			Non-Responder	789	635	24.0	(21.0, 25.8)	
	2L	Nivolumab	Responder	281	150	49.7	(39.4, 63.8)	<0.001
			Non-Responder	529	390	20.3	(18.1, 22.7)	
	3L	Cabozantinib	Responder	137	95	23.0	(19.4, 31.4)	0.007
			Non-Responder	184	135	16.3	(14.3, 21.2)	
SCLC	1L	Carboplatin, Etoposide	Responder	2,507	2,011	12.4	(11.9, 12.8)	<0.001
			Non-Responder	840	675	9.4	(8.9, 10.3)	
	2L	Topotecan	Responder	73	61	9.7	(7.7, 10.7)	<0.001
			Non-Responder	224	213	5.4	(4.8, 6.0)	
	3L	Topotecan	Responder	24	18	12.8	(8.8, 54.6)	<0.001
			Non-Responder	93	86	5.2	(4.2, 7.0)	

aEndo, advanced endometrial; aGastric, advanced gastric/esophageal; aHN, advanced head and neck; aMel, advanced melanoma; advanced aNSCLC, non-small cell lung; aNSCLC-1, sampled aNSCLC cohort; aNSCLC-2, unsampled aNSCLC cohort; aRCC, advanced renal cell carcinoma; aUro, advanced urothelial; HCC, hepatocellular; mBC, metastatic breast; mCRC, metastatic colorectal; mPanc, metastatic pancreatic; mPC, metastatic prostate; SCLC, small cell lung cancer