

Supplemental Table 1. Detailed list of the qualitative and quantitative analyses of MET PET and MRI.

Lesions Evaluated	Age (in Y)	Time since RT	PET Observer 1^	PET Observer 2	SUVmax	TBRmax	TBR mean	MTV (cm ³)	Clin MR Observer ^{^A}	MRI Observer 1	MRI Observer 2	Consensus MR Grading	GTV FLAIR	GTV T1 (cm ³)	Final outcome	OS (in days)	Diagnosis by	Tumor type
1	24	>4 weeks	1	1	2	1.50	1.35	1.05	1	2	1	1	33.07	0.9	1	97	MRI	GB
2	25	>4 weeks	1	1	3.5	1.60	1.4	0.98	1	2	1	1	25.33	0.54	1	Alive	MRI	AA
3*	16	>4 weeks	1	1	8.3	3.39	1.99	53.1	1	1	1	1	34.74	1.76	1	59	MRI	GB
4*	15	na	2	2	1.9	1.46	0.65	0	3	2	3	3	4.52	1.74	2	179	MRI	GB
5	9	>4 weeks	1	1	2.7	1.88	1.49	10.53	1	1	1	1	15.72	2.86	1	89	Death	HGG
6	19	>4 weeks	1	1	2.4	1.79	1.43	3.9	1	1	1	1	86.28	2.45	1	287	Biopsy	GB
7	25	>4 weeks	1	1	2.6	1.82	1.5	1.25	1	1	1	1	1.83	2.4	1	286	MRI	GB
8	18	>4 weeks	1	1	6.2	3.13	1.71	39.48	1	1	1	1	110.3	2.71	1	313	RANO	AA
9	23	>4 weeks	1	1	5.9	4.03	1.97	80.61	1	1	1	1	226.6	2.67	1	881	RANO	OA
10	5	>4 weeks	2	2	0.9	0.65	0.63	0	3	2	3	2	2.38	0	2	Alive	MRI	AA
11	5	>4 weeks	1	1	2.7	2.64	1.5	8.04	1	1	1	1	5.38	3.81	1	151	MRI	GB
12	17	>4 weeks	1	1	6.7	3.59	1.67	76.33	1	1	1	1	79.11	58.33	1	58	MRI	GB
13	7	>4 weeks	1	1	0.9	1.17	0.56	0	1	1	1	1	25.2	0.4	1	391	Biopsy	GB
14	16	>4 weeks	1	1	4.3	2.75	1.58	55.92	3	1	1	1	58.12	28.19	1	411	Biopsy	GB
15	13	>4 weeks	1	1	11.4	4.72	2.23	12.69	1	1	1	1	24.57	5.6	1	531	RANO	HG PXA
16	12	>4 weeks	1	1	5.8	3.06	1.62	17.96	1	1	1	1	120.4	99.31	1	195	MRI	HGG nos
17	14	>4 weeks	2	2	2	0.36	0.83	0	2	2	2	2	9.44	1.04	2	Alive	MRI	HGNET
18	2	>4 weeks	1	1	2.1	2.21	1.53	9.5	1	1	1	1	53.14	7.52	1	314	MRI	GB
19	12	>4 weeks	1	1	2.9	2.60	1.54	5.13	1	1	1	1	87.97	11.92	1	650	RANO	GB
20	5	**	1	1	0.9	1.81	1.28	11.27	1	1	1	1	69.03	68.92	2	1146	Biopsy	HGNET
21	13	>4 weeks	1	1	2.9	1.47	1.37	0.18	2	2	2	2	4.76	2.12	2	Alive	MRI	GB
22	19	>4 weeks	1	1	8.7	4.17	1.88	6.5	2	3	2	2	13.76	1.84	1	630	MRI	GB
23	13	**	1	1	9	6.24	2.01	136.8	2	1	1	1	176.8	93.03	1	134	MRI	GB
24	12	<4 weeks	1	1	3.1	2.26	1.73	26.27	3	1	1	1	63.88	10.05	1	192	MRI	GB
25	18	>4 weeks	1	1	5.8	3.54	1.99	133.3	1	1	1	1	113	1.77	1	UK, lost follow-up	RANO	AA
26	17	<4 weeks	1	1	2.7	1.87	1.28	31.09	1	1	1	1	48.8	21.28	1	431	RANO	GB
27	13	<4 weeks	1	1	6.6	4.22	1.86	289	1	1	1	1	133.7	3.37	1	178	MRI	GB

* Denotes the same patient. ** Denotes imaging abnormality between surgery and initiation of radiation therapy. ^ PET Observation scale: 1= no or same or lower uptake than the reference region (contra-lateral frontal lobe white matter), 2= higher uptake than the reference region (contra-lateral frontal lobe white matter). ^^ Clinical MRI Observation scale: 1= definitely tumor, 2= definitely not tumor, 3= neither 1 nor 2. ^^^ OS is calculated from the date of the PET scan. ! the first follow up magnetic resonance imaging obtained with a gap of at least 4 weeks. If progressive disease was made at the first follow-up, the date of progression of was back dated to the index MRI. If the response was anything other than progressive disease, longitudinal MRI was assessed until a final outcome was decided. !! The subject was lost to follow-up. Acronyms: AA, anaplastic astrocytoma; FLAIR, Fluid attenuation inversion recovery; GB, glioblastoma; GTV, gross tumor volume; HGG, High grade glioma; HGNET, high grade neuroepithelial tumor; MRI, magnetic resonance imaging; MTV, Metabolic Tumor volume; OA, grade III oligoastrocytoma; OS, overall survival; PET, positron emission tomography; PXA, pleomorphic xanthoastrocytoma; RANO, response assessment of neurooncologist; SUVmax, maximum standard uptake value; TBRmax, Tumor SUVmax-to Brain SUVmean ratio; TBRmean, Tumor SUVmean-to Brain SUVmean ratio; UK= unknown.

Supplemental Table 2. Details of the tumors and the treatments

Lesion	Tissue Diagnosis	Initial Tumor Location	Treatment at Diagnosis	Location of new abnormality	Molecular markers
1	Glioblastoma	R temporal lobe	Surgery+ RT with TMZ+ Follow-up TMZ	R temporal lobe	P53 mutation
2	AA	R temporal lobe	Surgery+ RT with TMZ+ Follow-up TMZ and erlotinib	R temporal lobe	19q13 deletion, IDH1 mutation
3	Glioblastoma	Cerebellum	Surgery+ RT + Follow-up pembrolizumab	Cerebellum	Alterations in PMS2, PIK3CA, FGFR1, NF1, EZH2
4	Glioblastoma	L frontal lobe	No treatment offered	L Frontal lobe	FGFR1 mutation, PIK3CA mutation
5	HGNET	Cerebellum	Surgery+ RT + Follow-up COPE	Cerebellum	na
6	Glioblastoma	R frontal lobe	Surgery+ RT + Follow-up pembrolizumab; 1 recurrence treated with Surgery+ RT with TMZ+ Follow-up TMZ+LOM	R frontal lobe	P53 mutation
7	Glioblastoma	L occipital lobe	Surgery+ RT with TMZ+ Follow-up TMZ+LOM, Multiple recurrences	corpus callosum	P53 mutation
8	AA	Cerebellum	Surgery+ RT + Follow-up TMZ+Lomustine	Cerebellum	P53 mutation
9	AA	Frontal lobes	Surgery+ RT + Follow-up L erlotinib; Multiple recurrences	L & R Frontal lobes	na
10	AA	L parietal lobe	Surgery +SJY07 chemotherapy	R frontal lobe	na
11	Glioblastoma	Cerebellum	Surgery+ RT with TMZ+ Follow-up TMZ and Bev	Cerebellum	P53 mutation
12	Glioblastoma	R parietooccipital lobes	Surgery+ RT with Vorinostat+ Follow-up TMZ+Bev	Both Frontal	CDKN2A, p53
13	AA	Thalamus	Biopsy + RT with TMZ + Follow-up with Etoposide	Thalamus	P53 mutation
14	Glioblastoma	R parietal region	Surgery+ RT with TMZ+ Follow-up TMZ	R parietal region	P53 mutation, ATRX
15	AA	L occipital lobe	Surgery+ RT with TMZ+ Multiple relapse and multiple therapy	L occipital lobe	BRAFV600E
16	HGG NOS	R thalamus	Biopsy + Carbo+VCR+ Multiple recurrences	R thalamus	H3.3 K27M
17	HGNET	R parietal lobe	Surgery+ RT + Follow-up COPE	R parietal lobe	H3.3 K27M
18	Glioblastoma	L frontal lobe	Surgery +SJY07 chemotherapy	L frontotemporal lobe	BCOR alteration
19	Glioblastoma	R frontal lobe	Surgery+ RT with TMZ+ Follow-up TMZ+CCNU, multiple recurrences	R frontal lobe	P53 mutation
20	HGNET	R frontal, temporal, and parietal lobes	Surgery	R frontal, temporal, and parietal lobes	BCOR mutation
21	Glioblastoma	Cerebellum	Surgery+ RT with TMZ+ Follow-up TMZ+CCNU	Cerebellum	ATRX
22	Glioblastoma	L temporal lobe	Surgery +RT+ Follow up with ribociclib and trametinib	L temporal lobe	P53 mutation, ATRX, 1q gain, CDKN2A
23	Glioblastoma	R frontal lobe	Surgery	R frontal lobe	BRAFV600E
24	Glioblastoma	Pons	Biopsy + RT	Pons	H3.3 K27M
25	HGA NOS	L frontal lobe	Surgery+ RT with TMZ+ Follow-up TMZ	L frontal lobe	H3F3A p.G34R, mutations in TP53 and ATRX
26	Glioblastoma	L temporal lobe	Surgery +RT with TMZ+ Follow-up TMZ	L temporal lobe	P53 mutation
27	Glioblastoma	L parietal lobe	Surgery +RT with veliparib	L parietal lobe	H3F3A p.G34R

Acronyms: AA, anaplastic astrocytoma; Bev, bevacizumab; carbo, carboplatin; CCNU, Lomustine; COPE, cyclophosphamide, vincristine, cisplatin and etoposide; GTV, gross tumor volume; HGG, High grade glioma; HGNET, high grade neuroepithelial tumor; L, left; LOM, lomustine; na, not known; NOS: Not otherwise specified; OA, grade III oligoastrocytoma; r, right; RT, radiation therapy; SJY07 chemotherapy, cyclophosphamide in combination with topotecan; TMZ, temozolomide; VCR, vincristine.