

Supplemental Table 1. Incidence Trends of Patients with Metastatic Medulloblastoma, Atypical Teratoid/Rhabdoid Tumor, Glioblastoma Multiforme, or Pilocytic Astrocytoma Diagnosed From 2004 to 2013^a

Variable	Metastatic Medulloblastoma		Metastatic Atypical Teratoid/Rhabdoid Tumor		Metastatic Glioblastoma Multiforme		Metastatic Pilocytic Astrocytoma	
	APC (95% CI)	P Value	APC (95% CI)	P Value	APC (95% CI)	P Value	APC (95% CI)	P Value
Entire cohort	-0.8 (-3.5 to 1.9)	NA	26.5 (17.3 to 36.5) ^e -20.5 (-28.0 to -12.2) ^f	.02	3.1 (1.2 to 5.0)	NA	12.3 (9.8 to 14.9)	NA
Age at diagnosis, y								
0-19	0.4 (-1.7 to 2.6)	NA	23.2 (14.2 to 33.0) ^g -18.0 (-25.8 to -9.5) ^h	.029	NA	NA	13.4 (10.1 to 16.7)	NA
>19	-5.9 (-11.7 to 0.2)	NA	NA	NA	2.6 (0.8 to 4.5)	NA	NA	NA
Sex								
Male	48.5 (23.8 to 78.3) ^c -13.5 (-18.0 to -8.7) ^d	.03	NA	NA	5.9 (3.7 to 8.2)	NA	NA	NA
Female	-0.7 (-3.6 to 2.2)	NA	NA	NA	-0.4 (-2.2 to 1.4)	NA	NA	NA
Race								
White	-2.7 (-6.3 to 1.0)	NA	3.2 (-1.0 to 7.6)	NA	3.5 (1.6 to 5.5)	NA	NA	NA
Black	NA	NA	NA	NA	NA	NA	NA	NA
Other ^b	2.8 (-0.7 to 6.3)	NA	NA	NA	3.2 (0.1 to 6.5)	NA	NA	NA

Abbreviations: APC, annual percentage change; NA, not applicable.

^a Only significant results presented (P < .05). ^b American Indian/Alaska Native, Asian/Pacific Islander. ^c APC: from 2004 to 2007. ^d APC: from 2007 to 2013. ^e APC: from 2004 to 2009. ^f APC: from 2009 to 2013. ^g APC: from 2004 to 2009. ^h APC: from 2009 to 2013.

Supplemental Table 2. Multivariable Logistic Regression for the Presence of Metastatic Disease at Diagnosis of Atypical Teratoid/Rhabdoid Tumor From 2004 to 2013^a

Variable	Patients, No.		Multivariate Analysis	
	Non-metastatic Disease (n=151)	Metastatic Disease (n=36)	OR (95% CI)	P Value
Age at diagnosis, y				
0 to 3	122	28	1 [Reference]	NA
4 to 18	25	7	NA	NA
>18	4	1	NA	NA
Sex				
Female	70	17	1 [Reference]	NA
Male	81	19	NA	NA
Race				
White	117	28	1 [Reference]	NA
Black	17	5	NA	NA
Other ^b	16	2	NA	NA
Unknown	1	1	NA	NA
Primary site				
Cerebrum	8	1	1 [Reference]	NA
Frontal lobe	16	1	NA	NA
Temporal lobe	7	1	NA	NA
Parietal lobe	7	1	NA	NA
Occipital lobe	1	1	NA	NA
Ventricle, NOS	25	9	NA	NA
Cerebellum, NOS	34	7	NA	NA
Brain stem	16	5	NA	NA
Overlapping lesion of brain	8	1	NA	NA
Brain, NOS	24	8	NA	NA
Spinal cord	4	1	NA	NA
Nervous system, NOS	1	0	NA	NA
Insurance status				
Insured	105	30	1 [Reference]	NA
Unknown	46	6	NA	NA

Abbreviations: OR, odds ratio; NA, not applicable.

^a Only significant results presented ($P < .05$). ^b American Indian/Alaska Native, Asian/Pacific Islander.

Supplemental Table 3. Multivariable Logistic Regression for the Presence of Metastatic Disease at Diagnosis of Glioblastoma Multiforme, Medulloblastoma, or Atypical Teratoid/Rhabdoid Tumor From 2004 to 2013^a

Variable	Patients, No.		Multivariate Analysis	
	Non-metastatic Disease (n=22421)	Metastatic Disease (n=533)	OR (95% CI)	P Value
Age at diagnosis, y				
0 to 18	1160	206	1 [Reference]	NA
>18	21261	327	0.54 (0.38-0.76)	<.001
Sex				
Female	9374	228	1 [Reference]	NA
Male	13047	305	NA	NA
Race				
White	19865	438	1 [Reference]	NA
Black	1341	39	NA	NA
Other ^b	1146	54	1.64 (1.21-2.24)	.002
Unknown	69	2	NA	NA
Primary site				
Cerebrum	841	19	1 [Reference]	NA
Cerebral meninges	1	0	NA	NA
Frontal lobe	5988	79	NA	NA
Temporal lobe	5281	47	0.44 (0.25-0.75)	.003
Parietal lobe	3380	40	NA	NA
Occipital lobe	902	11	NA	NA
Ventricle, NOS	147	17	NA	NA
Cerebellum, NOS	1009	147	NA	NA
Brain stem	263	27	NA	NA
Overlapping lesion of brain	3291	56	NA	NA
Brain, NOS	1243	72	1.93 (1.14-3.28)	.015
Spinal cord	60	12	NA	NA
Optic nerve	6	0	NA	NA
Cranial nerve	1	0	NA	NA
Nervous system, NOS	8	6	NA	NA
ICD-O-3 Histology Groups				
Glioblastoma multiforme	21211	299	1 [Reference]	NA
Medulloblastoma	1025	174	4.66 (2.81-7.72)	<.001
Atypical teratoid/rhabdoid tumor	151	36	5.65 (3.27-9.75)	<.001
Insurance status				
Uninsured	642	11	1 [Reference]	NA
Insured	15504	376	NA	NA
Unknown	6275	146	NA	NA

Abbreviations: CNS, central nervous system; OR, odds ratio; NA, not applicable.

^a Only significant results presented (P < .05). ^b American Indian/Alaska Native, Asian/Pacific Islander.

Supplemental Table 4. Cancer-Specific Survival Rates for Patients with Metastatic Medulloblastoma, Glioblastoma Multiforme, or Atypical Teratoid/Rhabdoid Tumor Diagnosed From 2004 to 2013 According to Surgery, Radiotherapy, and Chemotherapy

Length of Survival According to Metastatic Cancer Type, y	Patients, %						
	Surgery			Radiotherapy		Chemotherapy	
	No	Partial resection/ partial lobectomy	Gross total resection/ total lobectomy	None/Refused	Radiotherapy	No/Unknown	Yes
Metastatic Medulloblastoma							
1	53.8	83.2	91.1	72.5	90.5	30.6	87.7
3	34.6	70.6	69.4	27.8	77.4	30.6	71.4
5	34.6	70.6	57.1	27.8	73.7	30.6	66.9
Metastatic Glioblastoma Multiforme							
1	11.9	24	42.8	7.5	32.2	11.3	33.5
3	1.8	10.1	13.7	2.8	11.5	2.4	14.1
5	1.8	10.1	9.1	2.8	10.1	2.4	12.1
Metastatic Atypical Teratoid/ Rhabdoid Tumor							
1	33.3	NA	42.9	NA	NA	11.4	36.4
3	NA	NA	42.9	NA	NA	NA	18.2
5	NA	NA	NA	NA	NA	NA	18.2

Abbreviations: NA, not applicable; SEER, Surveillance, Epidemiology, and End Results.

Supplemental Table 5. Multivariate Cox Proportional Hazards Analyses for Cancer-Specific Death of Patients with Metastatic Medulloblastoma Diagnosed From 2004 to 2013^a

Variable	Patients, No. (n=174)	HR (95% CI)	P Value
Age at diagnosis, y			
0 to 3	44	1 [Reference]	NA
4 to 6	42	NA	NA
7 to 18	54	NA	NA
>18	34	NA	NA
Sex			
Female	64	1 [Reference]	NA
Male	110	NA	NA
Race			
White	143	1 [Reference]	NA
Black	10	3.21 (1.20-8.62)	.02
Other ^b	21	NA	NA
Radiotherapy			
None/Refused	40	1 [Reference]	NA
Radiotherapy	132	0.27 (0.13-0.56)	< .001
unknown	2	NA	NA
Chemotherapy			
No/Unknown	21	1 [Reference]	NA
Yes	153	0.21 (0.09-0.47)	< .001
Surgery			
No	13	1 [Reference]	NA
Partial resection/ partial lobectomy	79	0.35 (0.14-0.84)	.019
Gross total resection/ total lobectomy	80	0.41 (0.18-0.96)	.04
Surgery, NOS	2	NA	NA

Abbreviations: HR, hazard ratio; NA, not applicable.

^a Only significant results presented (P < .05). ^b American Indian/Alaska Native, Asian/Pacific Islander.

Supplemental Table 6. Multivariate Cox Proportional Hazards Analyses for Cancer-Specific Death of Patients with Metastatic Medulloblastoma Diagnosed From 2004 to 2013^a

Variable	Patients, No. (n=174)	HR (95% CI)	P Value
Age at diagnosis, y			
0 to 3	44	1 [Reference]	NA
4 to 6	42	NA	NA
7 to 18	54	NA	NA
>18	34	NA	NA
Sex			
Female	64	1 [Reference]	NA
Male	110	NA	NA
Race			
White	143	1 [Reference]	NA
Black	10	NA	NA
Other ^b	21	NA	NA
Radiotherapy			
None/Refused	40	1 [Reference]	NA
Radiotherapy	132	0.27 (0.13-0.56)	< .001
unknown	2	NA	NA
Chemotherapy			
No/Unknown	21	1 [Reference]	NA
Yes	153	0.21 (0.09-0.47)	< .001
Surgery			
Partial resection/ partial lobectomy	79	1 [Reference]	NA
No	13	2.87 (1.19-6.95)	.019
Gross total resection/ total lobectomy	80	NA	NA
Surgery, NOS	2	NA	NA

Abbreviations: HR, hazard ratio; NA, not applicable.

^a Only significant results presented (P < .05). ^b American Indian/Alaska Native, Asian/Pacific Islander.

Supplemental Table 7. Multivariate Cox Proportional Hazards Analyses for Cancer-Specific Death of Patients with Metastatic Atypical Teratoid/Rhabdoid Tumor Diagnosed From 2004 to 2013

Variable	Patients, No. (n=36)	HR (95% CI)	P Value
Age at diagnosis, y			
0 to 3	28	1 [Reference]	NA
4 to 18	7	NA	NA
>18	1	NA	NA
Sex			
Female	17	1 [Reference]	NA
Male	19	NA	NA
Race			
White	28	1 [Reference]	NA
Black	5	NA	NA
Other	2	NA	NA
Unknown	1	NA	NA
Radiotherapy			
None	24	1 [Reference]	NA
Radiotherapy	12	0.15 (0.04-0.62)	.009
Chemotherapy			
No/Unknown	11	1 [Reference]	NA
Yes	25	0.16 (0.05-0.54)	.003
Surgery			
No	3	1 [Reference]	NA
Partial resection/ partial lobectomy	23	NA	NA
Gross total resection/ total lobectomy	10	NA	NA

Abbreviations: HR, hazard ratio; NA, not applicable.

^a Only significant results presented (P < .05). ^b American Indian/Alaska Native, Asian/Pacific Islander.

Supplemental Table 8. Multivariate Cox Proportional Hazards Analyses for Cancer-Specific Death of Patients with Metastatic Glioblastoma Multiforme Diagnosed From 2004 to 2013^a

Variable	Patients, No. (n=299)	HR (95% CI)	P Value
Age at diagnosis, y			
0 to 18	11	1 [Reference]	NA
>18	288	NA	NA
Sex			
Female	135	1 [Reference]	NA
Male	164	NA	NA
Race			
White	251	1 [Reference]	NA
Black	18	NA	NA
Other ^b	30	NA	NA
Radiotherapy			
None/Refused	110	1 [Reference]	NA
Radiotherapy	181	0.60 (0.43-0.83)	.002
Unknown	8	NA	NA
Chemotherapy			
No/Unknown	144	1 [Reference]	NA
Yes	155	0.51 (0.38-0.71)	<.001
Surgery			
No	114	1 [Reference]	NA
Partial resection/ partial lobectomy	134	0.72 (0.54-0.96)	.026
Gross total resection/ total lobectomy	45	0.53 (0.35-0.80)	.002
Surgery, NOS	6	0.32 (0.11-0.94)	.039

Abbreviations: HR, hazard ratio; NA, not applicable.

^a Only significant results presented (P < .05). ^b American Indian/Alaska Native, Asian/Pacific Islander.

Supplemental Table 9. Multivariate Cox Proportional Hazards Analyses for Cancer-Specific Death of Patients with Metastatic Glioblastoma Multiforme Diagnosed From 2004 to 2013^a

Variable	Patients, No. (n=299)	HR (95% CI)	P Value
Age at diagnosis, y			
0 to 18	11	1 [Reference]	NA
>18	288	NA	NA
Sex			
Female	135	1 [Reference]	NA
Male	164	NA	NA
Race			
White	251	1 [Reference]	NA
Black	18	NA	NA
Other ^b	30	NA	NA
Radiotherapy			
None/Refused	110	1 [Reference]	NA
Radiotherapy	181	0.60 (0.43-0.83)	.002
Unknown	8	NA	NA
Chemotherapy			
No/Unknown	144	1 [Reference]	NA
Yes	155	0.51 (0.38-0.71)	<.001
Surgery			
Partial resection/ partial lobectomy	134	1 [Reference]	NA
No	114	1.39 (1.04-1.85)	.026
Gross total resection/ total lobectomy	45	NA	NA
Surgery, NOS	6	NA	NA

Abbreviations: HR, hazard ratio; NA, not applicable.

^a Only significant results presented (P < .05). ^b American Indian/Alaska Native, Asian/Pacific Islander.

Supplemental Table 10. Multivariate Cox Proportional Hazards Analyses for Cancer-Specific Death of Patients With Metastatic Pilocytic Astrocytoma Diagnosed From 2004 to 2013^a

Variable	Patients, No. (n=38)^b	HR (95% CI)	P Value
Age at diagnosis, y			
0 to 18	32	1 [Reference]	NA
>18	6	NA	NA
Sex			
Female	16	1 [Reference]	NA
Male	22	NA	NA
Race			
White	28	1 [Reference]	NA
Black	7	NA	NA
Other ^c	2	NA	NA
Unknown	1	NA	NA
Radiotherapy			
None/Refused	31	1 [Reference]	NA
Radiotherapy	7	NA	NA
Chemotherapy			
No/Unknown	18	1 [Reference]	NA
Yes	20	NA	NA
Surgery			
No	6	1 [Reference]	NA
Partial resection/ partial lobectomy	24	NA	NA
Gross total resection/ total lobectomy	8	NA	NA

Abbreviations: HR, hazard ratio; NA, not applicable. ^a Only significant results presented (P < .05). ^b Cancer-specific death occurred in 5 patients. ^c American Indian/Alaska Native, Asian/Pacific Islander.