

Survival Outcomes of Glioblastoma Patients Under 45 years of Age by Anatomic Origin of Malignancy Reflects the Reported Distribution of Prognostic Tumor Mutations

Daniel Diaz-Aguilar; Jos'lyn Woodard; Marvin Bergsneider MD
Department of Neurosurgery, David Geffen School of Medicine, Los Angeles, California, USA

Introduction

There is a paucity of research on the outcomes of GBM by lobe of tumor predominance. Certain populations of GBM have been reported to have a greater proportion of prognostically favorable mutations when compared to other lobes. For example, the favorable IDH mutation correlates with patients less than than 45 years of age and demonstrates a propensity towards the frontal lobe. We utilized the nationwide SEER database to investigate the association of this population and differences in mortality by lobe.

Objectives

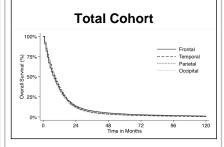
Evaluate the differences in mortality, response to surgical treatment, radiation or a combination by anatomic lobe for patients with GBM in the overall population and when stratified by ages groups.

Methods

Using the Surveillance,
Epidemiology and End Results
(SEER) database, we identified
32,004 GBM patients by ICD and
histology codes during the period
of 1990-2014. ICD Codes:
Malignant neoplasm of 191.1 Frontal, 191.2 - Temporal, 191.3
- Parietal, 191.4 - occipital
cortex. Survival analyses were
performed using log-rank sum
evaluations for direct lobe
comparison and Wilson-cox
regressions to generate a
multivariate model.

	Glioblastoma (N = 32,004)					
Lobe:	Frontal	Temporal	Parietal	Occipital		
No. of	N = 11,735	N=10,741	N = 7,376	N = 1,943 (6.07%)	P	
patients (%)	(36.67%)	(33.56%)	(23.05%)			
Age					< 0.001	
<40s	715 (7.09%)	320 (2.98%)	268 (3.63%)	57 (2.93%)		
40-50	1308 (11.15%)	951 (8.85%)	617 (8.36%)	152 (7.82%)		
50-60	2479 (21.12%)	2251 (20.96%)	1536 (20.82%)	392 (20.17%)		
60-70	3078 (26.23%)	2998 (27.91%)	1992 (27.01%)	507 (26.09%)		
>70	4155 (35.41%)	4221 (39.3%)	2963 (40.17%)	835 (42.97%)		
Race					<0.001	
White	9599 (81.19%)	8918 (82.79%)	6120 (82.46%)	1633 (83.66%)		
Black	619 (5.24%)	542 (5.03%)	398 (5.36%)	91 (4.66%)		
Hispanic	561 (4.74%)	413 (3.83%)	303 (4.08%)	66 (3.38%)		
Other	1044 (8.83%)	899 (8,35%)	601 (8.1%)	162 (8.30%)		
Sex					< 0.001	
Male	6453 (54.52%)	6642 (61.57%)	4208 (56.66%)	1175 (60.16%)		
Female	5384 (45,48%)	4145 (38,43%)	3219 (43,34%)	778 (39.84%)		
Tumor Size						
(cm)					< 0.001	
Unknown	2713 (23.12%)	2580 (24.02%)	1696 (22.99%)	537 (27.63%)		
<5	5652 (48.16%)	5252 (48.89%)	4388 (59.49%)	927 (47.71%)		
>5	3371 (28.72%)	2619 (24.38%)	1293 (11.52%)	471 (24.66%)		
Radiotherapy						
None	3347.00	2691.00	1847.00	456,00	< 0.001	
	(28.52%)	(25.05%)	(25.04%)	(23.47%)		
RT	8220.00	7862.00	5404.00	1452.00		
	(70.05%)	(73.20%)	(73.26%)	(74.73%)		
Surgery					< 0.001	
None	2355.00	1447.00	1547.00	307.00		
	(20.07%)	(13.47%)	(20.97%)	(15.80%)		
STR	4721.00	4408.00	2746.00	735.00		
	(40.23%)	(41.04%)	(37.23%)	(37.83%)		
GTR	3152.00	3323.00	1870.00	591.00		
	(26.86%)	(30.94%)	(25.35%)	(30.42%)		

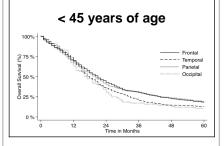
Patient Cohort	GBM Age < 45		GBM Age > 45		
	HR (95% CI)	<u>R</u>	HR (95% CI)	D.	
All Patients					
Frontal	1 (Reference)		1 (Reference)		
Temporal	1.19	0.01	0.95	< 0.001	
	(1.05-1.33)		(0.92 - 0.98)		
Parietal	1.21	0.00	1.01	0.68	
	(1.07-1.38)		(0.97-1.05)		
Occipital	1.20	0.16	0.95	0.09	
	(0.93-1.55)		(0.89-1.01)		
No Treatment					
Frontal					
Temporal	1.16	0.60	1.02	0.74	
	(0.67-2.00)		(0.91-1.14)		
Parietal	1.41	0.23	1.05	0.40	
	(0.80-2.49)		(0.94-1.18)		
Occipital	3.08	0.28	0.93	0.49	
	(0.40-23.8)		(0.75-1.14)		
Treated with RT					
Frontal	1 (Reference)		1 (Reference)		
Temporal	1.21	< 0.001	0.94	< 0.001	
	(1.07-1.37)		(0.90-0.97)		
Parietal	1.15	0.04	0.99	0.52	
	(1.01-1.32)		(0.94-1.03)		
Occipital	1.15	0.28	0.94	0.07	
	(0.89-1.49)		(0.88-1.01)		
Treated Surgical			100.1		
Frontal	1 (Reference)		1 (Reference)		
Temporal	1.20	0.01	0.92	< 0.001	
	(1.06-1.36)		(0.88-0.95)		
Parietal	1.16	0.04	0.98	0.34	
0 1 1 1	(1.01-1.33)	0.04	(0.94-1.02)	0.27	
Occipital		0.04	(0.90-1.03)	0.27	
	(1.02-1.78)		(0.90-1.03)		
Treated Surgical Frontal			1 (0, 0,)		
	1 (Reference)		1 (Reference)		
Temporal	1.35	< 0.001	0.97	0.147	
D. L. I	(1.20-1.53)	0.155	(0.93-1.01)	0.101	
Parietal	1.10	0.155	1.03	0.184	
0.134	(0.96-1.26)	0.027	(0.99-1.08)	0.026	
Occipital	(1.02-1.73)	0.037	1.01 (0.94-1.08)	0.836	



Results

- Significant differences in demographics and clinical characteristics between anatomic lobes
- Significant clinical characteristics were incorporated into a multivariate regression model

- No significant differences in morbidity occur between anatomic lobe.
- No significant differences occured in patients > 45 years of age.
- Patients <45 years of age the frontal lobe responded significantly better to all treatment modalities. No significant differences occured in patients who were untreated.
- Patients < 45 years of age significant differences in morbidity occur between anatomic lobe. Log-rank test (?2 = 28.95, P = 0.001).



Conclusions

GBM Patients below 45 years of age have a greater variation in outcomes when compared by lobe of tumor origin.

Discussion

The lobar origin of glioblastoma multiforme was associated with significantly different outcomes. This effect persisted after correcting for demographic and clinical variables. The effect we observed mirrored the incidence of prognostic tumor mutations between lobes, reported elsewhere; however, the origin of this variability remains unclear and is likely multifactorial. This finding warrants further investigation and may help in the discovery of variables to guide GBM management.

References

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