Neuro-Oncology
25(2), 424–429, 2023 | https://doi.org/10.1093/neuonc/noac270 | Advance Access date 19 December 2022

Corrigendum to: Molecular biomarker-defined brain tumors: Epidemiology, validity, and completeness in the United States

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This is a corrigendum to: J Bryan Iorgulescu, Chuxuan Sun, Corey Neff, Gino Cioffi, Catherine Gutierrez, Carol Kruchko, Jennifer Ruhl, Kristin A Waite, Serban Negoita, Jim Hofferkamp, Tarik Tihan, Roger McLendon, Daniel J Brat, Quinn T Ostrom, Jill S Barnholtz-Sloan, Molecular biomarker-defined brain tumors: Epidemiology, validity, and completeness in the United States, *Neuro-Oncology*, Volume 24, Issue 11, November 2022, Pages 1989–2000, https://doi.org/10.1093/neuonc/noac113

In the originally published version of this manuscript, in Table 3 of the above manuscript, an error was identified with how the table was generated from the underlying databases that resulted in small errors (each <1% in magnitude) in the frequencies and corresponding percentages of: total cases, age-adjusted incidence, sex, and race/ethnicity for several tumor types. Additionally affected were the median ages at diagnoses (with interquartile ranges [IQR]) for these tumor types. Notably, the correct median age at diagnosis for WHO grade 4 IDH-mutant astrocytomas is: 47 years (IQR: 36-60). This error also affected the total count of "Glioblastoma" in Supplemental Table 1, resulting in an error of <3%. The remaining analyses of the manuscript were unaffected, the manuscript's text was unaffected, and the manuscript's conclusions remain unchanged. The corrected Tables are displayed below, with the corrected results denoted with bolding. The authors apologize for this error that has now been corrected.

Table 3. Annual age-adjusted incidence, median age, sex, and race/ethnicity of molecularly-defined brain tumors from U.S. central cancer registries for diagnosis year 2018

Tumor type	ICD-O-3 histology codes	Grade[a]	Total cases	Age-adjusted incidence per 100,000 (95% CI)	Age (median, interquartile range)	Sex[g]	Race/Ethnicity[f]		
						Female (%)	White non-Hispanic (%)	Black non-Hispanic (%)	Hispanic (%)
Adult-type diffuse glioma									
IDHmut Astrocytoma (BMM 1, 3)	9400/3 9401/3 9445/3	2	425	0.14 (0.12-0.15)	34 (27, 45)	41.6%	80.5%	5.0%	10.2%
		3	**465**	0.15 (0.14-0.16)	**37 (29, 48)**	**44.7%**	82.2%	5.4%	9.5%
		4	241	0.07 (0.06-0.08)	**47 (36, 60)**	42.3%	80.1%	8.5%	9.3%
IDHwt Astrocytoma and Glioblastoma[b] (BMM 2, 4, 5)	9400/3 9401/3 9440/3	2	190	0.05 (0.05-0.06)	**54 (32, 66)**	47.9%	78.2%	--	--
		3	369	0.10 (0.09-0.11)	**59 (47, 70)**	45.5%	84.4%	6.6%	5.7%
		4	**6,878**	**1.73 (1.69-1.78)**	**65 (56, 72)**	40.2%	83.2%	6.0%	8.3%
IDHmut & 1p/19q-codeleted Oligodendroglioma (BMM 6,7)	9450/3 9451/3	2	**437**	0.14 (0.13-0.15)	42 (33, 54)	**47.6%**	76.0%	5.6%	14.0%
		3	274	0.08 (0.07-0.09)	**48 (37, 57)**	46.0%	76.4%	--	--
Medulloblastoma									
SHH-activated & *TP53*wt (BMM 8)	9471/3		**76**	0.03 (0.02-0.03)	**21 (6, 29)**	**36.8%**	**60.3%**	--	--
SHH-activated & *TP53*mut	9476/3		<16	n/a[c]	--	--	--	--	--
WNT-activated	9475/3		<16	n/a[c]	--	--	--	--	--
nonWNT/nonSHH	9477/3		47	n/a[c]	**7 (4, 10)**	42.6%	**52.3%**	--	**36.4%**
Other tumor types[d,e]									
Diffuse midline glioma, H3 K27M-mutant	9385/3		144	**0.05 (0.04-0.06)**	14 (7, 28)	**53.5%**	**58.2%**	--	**22.7%**
ETMR C19MC-altered (BMM 9)	9478/3		<16	<0.01	--	--	--	--	--
RELA-fusion ependymoma	9396/3		<16	<0.01	--	--	--	--	--

Data provided by CDC's National Program of Cancer Registries and NCI's Surveillance, Epidemiology and End Results Program, November 2020 submissions.
-- Suppressed if case counts are <16
BMM = brain molecular markers variable, CI = confidence interval, mut = mutant, wt = wildtype, ETMR = embryonal tumor with multilayered rosettes
[a]Adult-type diffuse glioma cases reported as WHO grade 1 or "low-grade, NOS" were grouped with WHO grade 2.
[b]In WHO-CNS5, all IDH-wildtype adult-type diffuse astrocytic gliomas are classified as glioblastoma, IDH-wildtype, WHO CNS grade 4, without separate grades 2 or 3.
[c]Both histologically-defined and new molecularly-defined ICD-O-3 codes for medulloblastomas were reported in the registry data; however, only a single ICD-O-3 diagnosis can be reported per case. As a result, the national incidence rates could only be estimated for BMM-coded SHH-activated & TP53-wildtype subtype.
[d]The implementation of updated ICD-O-3 codes in 2018 also included 9509/1, which groups together three distinct glioneuronal and neuronal tumor types: papillary glioneuronal tumor, rosette-forming glioneuronal tumor, diffuse leptomeningeal glioneuronal tumor. Altogether, these three diagnoses were reported in 51 patients and associated with an AAIR of 0.02 (95%CI: 0.01-0.02), median age at diagnosis of 24 years-old (interquartile range 13-39), with 52.9% in females.
[e]In 2018 a separate ICD-O-3 code was introduced for pilomyxoid astrocytomas (9425/3)--a subtype of pilocytic astrocytomas that is thought to be more aggressive in behavior. Cases presented at a median age of 3 years-old (interquartile range 1-7; n=29).
[f]For race/ethnicity, patients with Asian/Pacific Islander, other, or unknown races/ethnicities were suppressed due to low cell counts.
[g]% males = 100% - % females.

Supplementary Table 1. Availability and frequency of reported pathological grade by ICD-O-3 coded tumor type, from U.S. central cancer registries for diagnosis year 2018

Tumor type	ICD-O-3	Total	Unvailable[a] n (%)	Available n (%)	Grade for cases with available grade information					
					WHO CNS grade				Low-grade (L) n (%)	High-grade (H) n (%)
					1 n (%)	2 n (%)	3 n (%)	4 n (%)		
Adult-type diffuse gliomas										
'Oligodendroglioma, NOS'	9450/3	655	136 (21%)	519 (79%)	--	88%	9%	--	--	--
'Anaplastic' oligodendroglioma	9451/3	321	54 (17%)	267 (83%)	0%	--	93%	--	--	--
'Diffuse' astrocytoma	9400/3	1,304	442 (34%)	862 (66%)	2%	73%	10%	7%	5%	3%
'Anaplastic' astrocytoma	9401/3	1,363	418 (31%)	945 (69%)	--	3%	88%	8%	0%	--
*Glioblastoma, IDH-mutant	9445/3	237	30 (13%)	207 (87%)	0%	--	--	97%	0%	--
Glioblastoma	9440/3	**11,332**	2,865 (25%)	**8,467 (75%)**	--	--	0.4%	98%	--	1.9%
Giant cell glioblastoma	9441/3	83	--	--	--	--	--	99%	--	--
Gliosarcoma	9442/3	238	28 (12%)	210 (88%)	0%	--	0%	95%	--	--
Malignant glioma, NOS	9380/3	625	308 (49%)	317 (51%)	6%	14%	13%	21%	22%	24%
Pediatric-type diffuse low-grade gliomas										
Angiocentric glioma	9431/1	<16	--	--	--	--	--	--	--	--
Pediatric-type diffuse high-grade gliomas										
*Diffuse midline glioma, H3 K27M-mutant	9385/3	144	72 (50%)	72 (50%)	--	--	--	94%	--	--
Circumscribed astrocytic gliomas										
Pilocytic astrocytoma	9421/1, 9421/3	918	161 (18%)	757 (82%)	95%	2%	--	--	3%	--
*Pilomyxoid astrocytoma	9425/3	28	--	--	--	--	0%	0%	--	0%
Pleomorphic xanthoastrocytoma	9424/3	100	--	--	--	60%	36%	0%	--	0%
Subependymal giant cell astrocytoma	9384/1	23	--	--	--	0%	0%	0%	0%	0%
Choroid glioma	9444/1	<16	--	--	--	--	--	--	--	--
Astroblastoma	9430/3	<16	--	--	--	--	--	--	--	--
Glioneuronal and neuronal tumors										
Ganglioglioma	9505/1	373	88 (24%	285 (76%)	90%	--	0%	--	8.4%	0%
Anaplastic ganglioglioma	9505/3	28	--	--	--	--	--	--	0%	0%
Desmoplastic infantile astrocytoma and ganglioglioma	9412/1	25	--	--	--	--	--	--	--	--
Dysembryoplastic neuroepithelial tumor	9413/0	135	32 (24%)	103 (76%)	86%	0%	0%	0%	--	--
Papillary glioneuronal tumor OR Rosette-forming glioneuronal tumor OR Diffuse leptomeningeal glioneuronal tumor	9509/1	51	--	--	84%	0%	--	0%	--	--

Supplementary Table 1. Continued

Tumor type	ICD-O-3	Total	Unvailable[a] n (%)	Available n (%)	Grade for cases with available grade information					
					WHO CNS grade				Low-grade (L) n (%)	High-grade (H) n (%)
					1 n (%)	2 n (%)	3 n (%)	4 n (%)		
Gangliocytoma	9492/0	<16	--	--	--	--	--	--	--	--
Dysplastic gangliocytoma of cerebellum (Lhermitte-Duclos)	9493/0	<16	--	--	--	--	--	--	--	--
Central neurocytoma OR extraventricular neurocytoma OR Cerebellar liponeurocytoma	9506/1	82	22 (27%)	60 (73%)	--	98%	--	--	--	--
Ependymal tumors										
Ependymoma, NOS	9391/3	503	99 (20%)	404 (80%)	--	91%	--	0%	--	--
Anaplastic ependymoma	9392/3	145	23 (16%)	122 (84%)	0%	--	92%	--	0%	--
*Ependymoma, RELA (ZFTA) fusion-positive	9396/3	<16	--	--	--	--	--	--	--	--
Myxopapillary ependymoma	9394/1	267	55 (21%)	212 (79%)	95%	--	0%	--	0%	0%
Subependymoma	9383/1	174	32 (18%)	142 (82%)	89%	--	--	0%	--	0%
Choroid plexus tumors										
Choroid plexus papilloma	9390/0	102	30 (29%)	72 (71%)	94%	--	0%	0%	--	0%
Atypical choroid plexus papilloma	9390/1	23	--	--	--	95%	--	--	--	--
Choroid plexus carcinoma	9390/3	22	--	--	--	0%	--	0%	0%	--
Embryonal tumors										
Medulloblastoma, NOS	9470/3	211	38 (18%)	173 (82%)	--	0%	--	98%	0%	--
Desmoplastic/nodular medulloblastoma	9471/3	104	--	--	0%	0%	0%	100%	0%	0%
Large cell medulloblastoma	9474/3	36	--	--	0%	0%	0%	100%	0%	0%
*Medulloblastoma, WNT-activated	9475/3	<16	--	--	--	--	--	--	--	--
*Medulloblastoma, SHH-activated &TP53-mutant	9476/3	<16	--	--	--	--	--	--	--	--
*Medulloblastoma, non-WNT/non-SHH	9477/3	51	--	--	0%	0%	0%	100%	0%	0%
Atypical teratoid/rhabdoid tumor	9508/3	77	17 (22%)	60 (78%)	0%	--	--	98%	0%	0%
Other CNS embryonal tumor (CNS Neuroblastoma, Medulloepithelioma, Embryonal tumor with multilayered rosettes)	9500/3, 9501/3, 9473/3, 9478/3	69	38 (55%)	31 (45%)	0%	0%	--	90%	0%	--
Pineal tumors										
Pineocytoma	9361/1	29	--	--	--	--	--	0%	0%	0%
Pineal parenchymal tumor of intermediate differentiation	9361/3	<16	--	--	--	--	--	--	--	--
Pineoblastoma	9362/3	68	28 (41%)	40 (59%)	0%	--	--	60%	0%	--

Supplementary Table 1. Continued

Tumor type	ICD-O-3	Total	Unvailable[a] n (%)	Available n (%)	Grade for cases with available grade information					
					WHO CNS grade				Low-grade (L) n (%)	High-grade (H) n (%)
					1 n (%)	2 n (%)	3 n (%)	4 n (%)		
Papillary tumor of pineal region	9395/3	<16	--	--	--	--	--	--	--	--
Cranial and spinal nerve tumors										
Schwannoma	9560/0	3,163	1,786 (56%)	1,377 (44%)	99%	--	0%	--	--	0%
Neurofibroma	9540/0	57	33 (58%)	24 (42%)	100%	0%	0%	0%	0%	0%
Perineurioma	9571/0,3	<16	--	--	--	--	--	--	--	--
Malignant peripheral nerve sheath tumor OR melanotic MPNST	9540/3	17	--	--	0%	0%	--	0%	0%	--
Paraganglioma	8680/0-3 8694/1, 8693/3	44	24 (55%)	20 (45%)	95%	0%	0%	0%	--	--
Meningiomas										
Meningioma (including meningothelial, fibrous, psammomatous, angiomatous, hemangioblastic, transitional, secretory, microcystic, metaplastic, lymphoplasmacytic-rich)	9530/0, 9531/0, 9532/0, 9533/0, 9534/0, 9535/0, 9537/0	10,408	2,843 (27%)	7,565 (72%)	94%	5.4%	--	--	--	0%
Atypical meningioma	9539/1	1,546	195 (13%)	1,351 (87%)	4.5%	95%	--	--	--	0%
Clear cell OR Chordoid meningioma	9538/1	115	24 (21%)	91 (79%)	--	99%	--	0%	0%	0%
Anaplastic (malignant) meningioma	9530/3	204	35 (17%)	169 (83%)	12%	10%	76%	--	--	0%
Papillary OR Rhabdoid meningioma	9538/3	<16	--	--	--	--	--	--	--	--
Mesenchymal, non-meningothelialtumors										
Benign SFT	9150/1	39	--	--	--	--	--	0%	0%	0%
Malignant SFT	9150/3	45	--	--	0%	--	81%	0%	0%	0%
*SFT grade1	8815/0	30	--	--	--	--	--	0%	0%	0%
*SFT grade 2	8815/1	20	--	--	0%	100%	0%	0%	0%	0%
*SFT grade 3	8815/3	25	--	--	--	--	--	--	--	--
Hemangioblastoma	9161/1	490	156 (32%)	334 (68%)	78%	9.6%	12%	--	--	0%

Supplementary Table 1 . Continued

Tumor type	ICD-O-3	Total	Unvailable[a] n (%)	Available n (%)	Grade for cases with available grade information					
					WHO CNS grade				Low-grade (L) n (%)	High-grade (H) n (%)
					1 n (%)	2 n (%)	3 n (%)	4 n (%)		
Tumors of the sellar region										
Craniopharyngioma (including adamantinomatous, papillary)	9350/1, 9351/1, 9352/1	507	227 (45%)	280 (55%)	99%	--	0%	0%	--	0%
*Pituicytoma, Granular cell tumor of the sellar region, spindle cell oncocytoma	9582/0, 9432/1, 8290/0	16	--	--	--	0%	0%	0%	0%	0%

Data provided by CDC's National Program of Cancer Registries and NCI's Surveillance, Epidemiology and End Results Program, November 2020 submissions.
[t]New ICD-O-3 term and code implemented for cases diagnosed on January 1, 2018 and after.
[a]Pathological grade was reported for cases the underwent definitive resection. Unavailable pathological grade was defined as codes A-D or 9.
-- Suppressed if case counts are <16 or if suppressed cells are able to be otherwise derived.