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brain – a county population study
of Tirana hospital admissions //**

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Gehirns – eine bezirksweite
Bevölkerungsstudie des
Universitätsspitals Tirana**

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Primary malignant neoplasm of brain – a county population study of Tirana hospital admissions

I. Akshija¹, R. Frakulli²

Abstract: Objective: Primary malignant brain tumors are not reported separately from all brain malignancies by the Albanian cancer registry. We selected the county of Tirana as a catchment area and consider it a good nonrandom sampling for the whole country.

Methods: Retrospective first admissions at Tirana University Hospital "Mother Teresa" were retrieved from the electronic patients' files, years 2005–2021. The available coding system for the period is ICD-9 three-digit code. The final diagnosis was written by hand from the attending physician and recoded as 'Primary malignant neoplasm of brain' (PMNB) and 'Benign neoplasm of brain and other parts of nervous system' (BNBOPNS).

Results: From a total of 7,345 admissions resulted a total of 5,330 first admissions. PMNB (2005–2021) first admissions were 2,664 and BNBOPNS were 2,666. Average Length of Stay (ALOS) was 13.35 days for code 191 and 11.93 for code 225. Mean age (median) at first admission for PMNB was 49.1 ± 19.1 (54.0) years, for BNBOPNS 50.2 ± 17.6 (54.0). PMNB mean annual incidence (first admissions) per 100,000 population Tirana county 2017–2021 was 7.6 (17-year incidence 6.6), and Albania 2017–2021 was 7.9 (17-year incidence 6.0). PMNB by behavior age standardized mean annual incidence (first admissions) per 100,000 population (95% CI), Tirana

county, period 2017–2021, was respectively total (6.0 [4.5–7.6]), women (4.5 [2.6–6.3]) and men (7.6 [5.1–10.1]).

Conclusions: Increasing incidence of primary malignant neoplasm of brain requires special attention on the causative agencies exploration. Updating classifications and modernization of data is a must.

Keywords: primary malignant brain tumors, incidence, first admissions

Kurzfassung: Primär maligne Neoplasie des Gehirns – eine bezirksweite Bevölkerungsstudie des Universitätsspiitals Tirana. Ziel: Primär maligne Gehirntumoren werden unter den malignen Gehirntumoren im albanischen Krebs-Register nicht separat erfasst. Wir wählten den Bezirk Tirana als Einzugsgebiet, der als gute Non-Random-Stichprobe für das gesamte Land betrachtet wird.

Methodik: Ersteinweisungen ins Universitätsspiital „Mutter Teresa“ Tirana wurden retrospektiv aus den elektronischen Patientenakten der Jahre 2005 bis 2021 ausgewertet. Das für diese Periode vorhandene Kodierungssystem ist der dreistellige ICD-9-Code. Die Enddiagnosen wurden händisch vom zuständigen Arzt ergänzt und als „primär maligne Neoplasie des Gehirns“ (PMNB) bzw. „gutartige

Neoplasie des Gehirns und anderer Teile des Nervensystems“ (BNBOPNS) klassifiziert.

Ergebnisse: Von insgesamt 7.345 Einweisungen waren 5.330 Ersteinweisungen, davon 2.664 PMNB und 2.666 BNBOPNS. Die durchschnittliche Aufenthaltsdauer betrug 13,35 Tage für ICD-9 191 und 11,93 Tage für ICD-9 225. Das mittlere Alter der Patienten bei Erstaufnahme lag in der PMNB-Gruppe bei $49,1 \pm 19,1$ (54,0) Jahre, für BNBOPNS bei $50,2 \pm 17,6$ (54,0) Jahre. Die mittlere jährliche Inzidenz für PMNB bei Erstaufnahme pro 100.000 Einwohner im Bezirk Tirana in den Jahren 2017–2021 war 7,6 (17-Jahre-Inzidenz 6,6) und für Albanien gesamt 7,9 (17-Jahre-Inzidenz 6,0). Die nach Alter standardisierte mittlere jährliche Inzidenz (Erstaufnahmen) von PMNB pro 100.000 Einwohner (95%-KI) im Bezirk Tirana im Zeitraum 2017–2021 betrug insgesamt 6,0 (4,5–7,6), bei Frauen 4,5 (2,6–6,3) und bei Männern 7,6 (5,1–10,1).

Schlussfolgerung: Die steigende Inzidenz der primär malignen Neoplasie des Gehirns erfordert besondere Beachtung und Untersuchung der krankheitsverursachenden Stoffe. Ein Update der Klassifikation und Aktualisierung der Daten ist notwendig. **J Neurol Neurochir Psychiatr 2026; 27 (3): 58–62.**

Schlüsselwörter: primär maligne Gehirntumoren, Inzidenz, Ersteinweisung

■ Introduction

Providing accurate results on incidence of the Primary Malignant Neoplasm of Brain (PMNB) as a subgroup of Malignant Neoplasm of Brain is complex, especially for a country like Albania where medical coding systems, information systems and the diagnostic and procedure codes are not all up to date. In this situation gathering the pieces of available accurate information got us to choose Tirana county, including the capital Tirana, as a catchment area, which provide accurate information in terms of population stability and diagnosis. Actually neurosurgical care in Albania is offered only in four centers: Department of Neurosurgery, TUHC, Tirana, University Hospital of Trauma, Tirana, American Hospital, Tirana, and Memorial Hospital, Fier. While the Hospital of Trauma center is focused on trauma, the American Hospital focuses (during our study period) on cerebrovascular interventions and Memorial Hospital started its activity April, 2021. Thus, for our study period and objective TUHC remains the sole center offering almost all neurosurgical care in the country [1].

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The population of Albania, serving as the denominator of the incidence, has substantially changed numerically. From census 2011 to census 2023 there was a decrease of 420,000 inhabitants, from 2,821,977 to 2,402,113. This trend is decades long resulting from year 1989 [2]. Emigration of the most active strata of the society affects mostly the family supporting age-groups, and doctors and nurses also. The Tirana county, which includes the capital Tirana, show the least decrease, which is an exception. From 763,561 to 758,513, Tirana county lost 5048 of its residents through two last censuses. Low fertility rate, COVID-19 death toll and emigration can be blamed, but emigration is definitely the major cause of population reduction. The population of Albania can be considered unstable and aging.

Literature considers that Albania has the highest death rate of brain cancer, 7.5 per 100,000 population, and also the incidence is high: 10.4 per 100,000 population [3]. To make a comparison, age-adjusted annual incidence for all malignant brain and other CNS tumors was 7.06 in the USA (2014–2018) (malignant primary brain and other CNS tumors in Whites was 7.55 per 100,000) [4].

We excluded brain metastases from other primary sites extracting only the Primary Malignant Neoplasm of Brain (PMNB). Brain metastases from other primary sites; Non-Small Cell

Lung Cancer (NSCLC) constitutes 50% of patients with brain metastases, small cell lung cancer develops brain metastases in 80% of cases, melanoma in 10–40% and breast cancer especially HER2 positive ranges 8–50% in brain metastases [5]. Thus, brain metastases exclusion required recoding of all cases based on the available information.

The list of risk factors and protective one's changes over time, and can be somewhat local. Following the finding of ionising radiation as a risk factor, the medical history of allergies was shown decreasing risk for primary brain tumors [6]. Grouping association of primary brain tumors with higher risk, European ancestry, malignant in men and benign in women, non-malignant, higher socioeconomic status, hormone exposure, taller adult height, high birth weight, peaking with high doses of radiation, non-chromosomal structural birth defects, while risk is reported to decrease by use of aspirin, presence of atopic conditions and smoking [7].

Classification of brain tumors remains a challenge for everybody and especially for countries like Albania. It started during 1920s classification of Bailey et Cushing based on histologic characteristics and degree of malignancy to code glial tumors [8]. Today modern practice improves brain tumor classification through pattern of DNA methylation studies [9]. It is reported that methods of classification of brain tumors based on neural architecture search of MRI images reaches a test accuracy of 90.6, higher than a human-designed network [10]. Some findings remain benchmarks on reporting; e.g. the prevalence of malignant primary brain tumors in adults are mainly diffuse gliomas approximating on 80% of all cases. Familial glioma represents approximately 5% of all gliomas [11, 12]. Pediatric brain tumors tend to decrease in incidence with age, increasing again in the adult population [13].

■ Methods

Retrospective first admissions at Tirana University Hospital “Mother Teresa” were retrieved from the electronic patients’ files between 2005 and 2021. The available coding system for the period is ICD-9 three-digit code. Codes 191 (Malignant neoplasm of brain) and 225 (Benign neoplasm of brain and other parts of nervous system) were recoded based on the final diagnosis written by hand from the attending physician and recoded as ‘Primary malignant neoplasm of brain (PMNB)’ and ‘Benign neoplasm of brain and other parts of nervous system (BNBOPNS)’. Overall, the recoding fits well with ICD-O-3 morphology coding system of malignant primary brain tumors. Census 2011 and 2023 data were used to create distributions by county and age-groups. For the intermediary period 2012–2016, averages from both census reports were calculated. Tirana county shares 26.8% (2011) and 31.6% (2023) of the total population [2]. Formerly nonrandom samples of brain tu-

mors registries were used to project incidence for the whole population; CBTRUS, nonrandom 15% sample and SEER, nonrandom 14% sample of U.S. population [14].

National cancer registries do have different data sources from which they retrieve data depending in what is possible to achieve. The Chinese register, established in 2002, reports that it collects data solely from reliable hospitals because of their ability to ensure data on frequency and appropriateness of diagnosis [15]. We used our hospital data, Tirana University Hospital “Mother Teresa”, as the sole provider considering that at least once every patient had to contact this tertiary care structure to obtain care or for bureaucratic procedures. First admissions were considered incidence cases.

The handwritten text variable as final diagnosis in many cases uses the word malignant. This was taken in consideration to code them second the recommendation about behavior codes classification [16]. Formerly, in situations similar to our situation, the variable reporting duplicates was used in case of multiple records [14]. The 2013 European Standard Population (ESP) (85+) was used as the standard population, paralleling the experience of other countries similar to Albania [17].

WHO Grade classification is widely used on brain tumor staging in clinical practice. Generally important cancer registries exclude lymphoma and leukemia histopathologies [18]. Standards on brain tumor diagnosis depend by country. The best standard, the WHO Classification of Tumors of the Central Nervous System (CNS), published in 2021, makes major changes based on molecular diagnostics. Depending on local capabilities, Albania works on histological findings which are supported by procedures, e.g., immunohistochemical, but lacking molecular biomarkers evaluation which can affect classification, offering reporting differences from place to place. We included lymphoid and histiocytic tumors based on the final diagnoses and their insignificant total number [19]. IBM-SPSS Statistics software was used to perform elaboration and calculations of data.

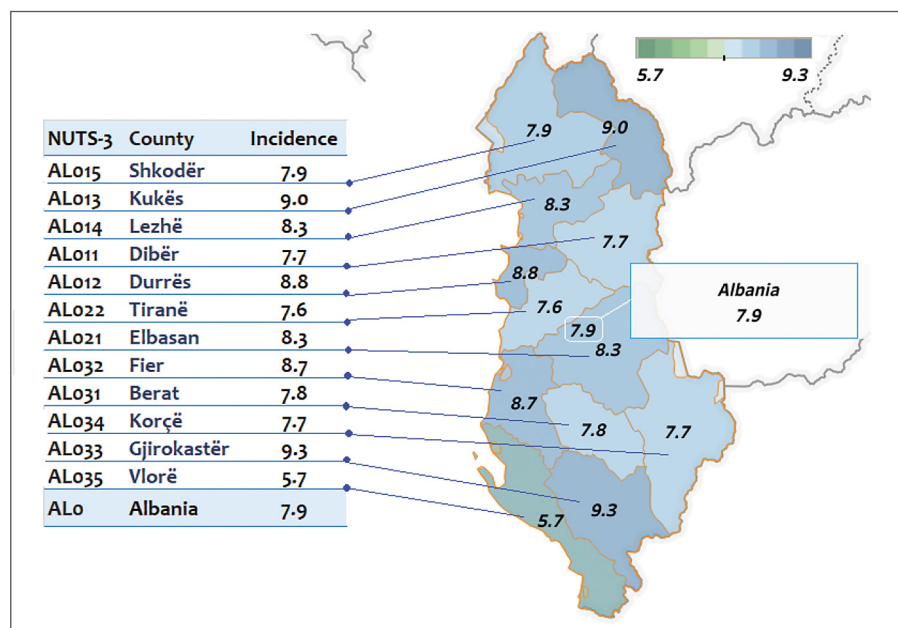


Figure 1: Incidence of Primary Malignant Neoplasm of Brain (PMNB) (period 2017–2021), by county.

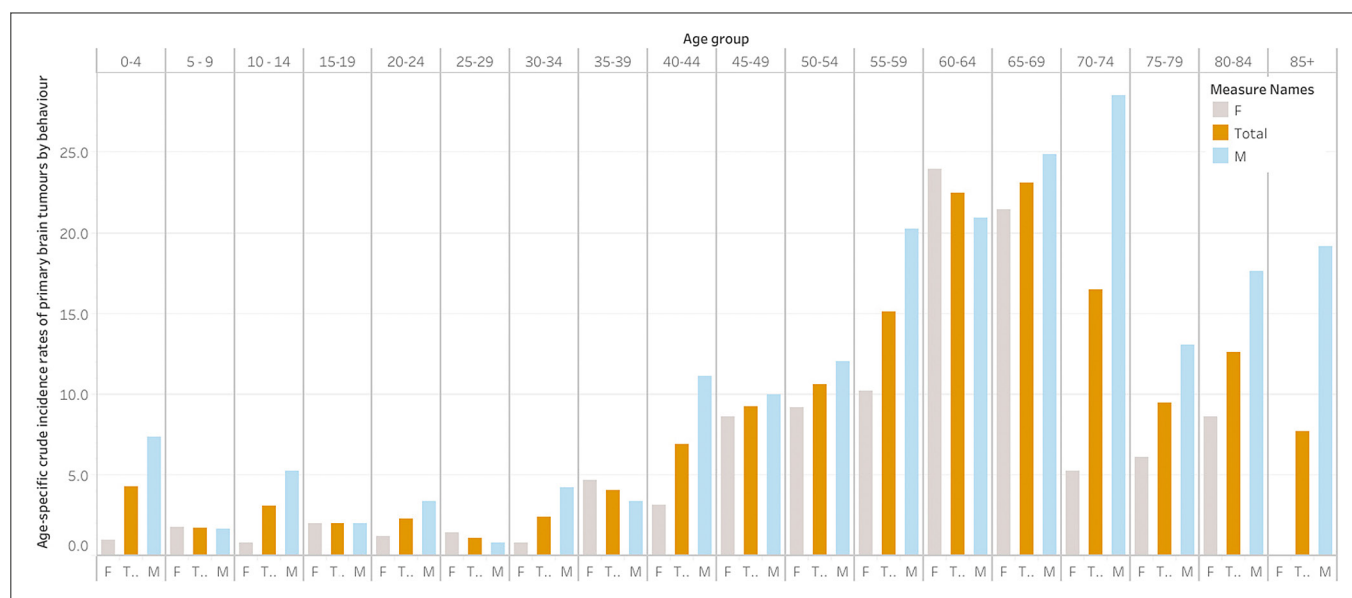


Figure 2: Age-specific crude incidence rates of Primary Malignant Neoplasm of Brain (PMNB) by behavior

■ Results (Fig. 1, 2, Table 1–3)

From a total of 7,345 admissions resulted a total of 5,330 first admissions. Primary Malignant Neoplasm of Brain (PMNB) (period 2005–2021) first admissions were 2,664 cases and Benign Neoplasm of Brain and Other Parts of Nervous System (BNBOPNS) were 2,666 cases. Average Length of Stay (ALOS) was 13.35 days for code 191 (Malignant neoplasm of brain) and 11.93 days for code 225 (Benign neoplasm of brain and other parts of nervous system). Hospital mortality rate for Malignant neoplasm of brain was 4.0%. Males coded as PMNB were 1,618 (60.7%) and female were 1,046 (39.3%). Male to female ratio was 1.55. Males coded as BNBOPNS were 1,271 (47.7%) and female were 1,395 (52.3%).

Age standardized mean annual incidence (first admissions) per 100,000 population (95% CI), Tirana county, period 2017–2021, primary malignant brain tumors by behavior, was respectively Total (6.0 [4.5–7.6]), F (4.5 [2.6–6.3]) and M (7.6 [5.1–10.1]).

■ Discussion

The number of first admissions diagnosed as Primary Malignant Neoplasm of Brain (PMNB) at Tirana University Hospital “Mother Teresa” during the period 2005–2021 continuously raised (Table 2). This is not common, especially the experience of the western European countries shows the opposite. During the pandemic the number of brain tumors admissions

significantly decreased, and they were older by mean of a 1 year [20]. However the increase fits well with the general trend of Albania according to this group of diagnosis. Lack of supportive care structures tend to push toward hospitalization in acute care institutions independent of the pandemic situation. Due to lack of supportive structures and services the Average Length of Stay (ALOS) of brain cancer hospital stay, in Albania, is very high: 13.35 days for code brain cancer and 11.93 for benign brain tumors. The USA in 2006 reports a hospital stay of 6.9 days much lower compared to Albania, although the in-hospital deaths at the same period were similar 4.4% vs 4.0 Albania. For example, transfer to other short-term hospitals and skilled nursing facilities or home care are almost absent [21]. Surgery of brain eloquent tumors in itself has a 6% of permanent deficit rate and median survival for glioblastoma was 4.9 months and 22% of patients were accounted as inpatients for at least one fourth of this time [22, 23]. This situation pushes the patient toward the hospital as one of the few options to get the necessary medical care.

Mean age (median) first admissions for PMNB was 49.1 ± 19.1 (54.0) and shows important differences to much lower mean age at diagnosis like the example of Palestine 44.58 years ($SD \pm 15.27$) [24].

Malignant brain tumors have a global incidence of 4.25 cases per 100,000 person-years, peaking in Europe (6.76) and high income countries (6.29). Our data show that the whole country has a crude incidence of 7.9 cases per 100,000 person-years

ranging from 5.7 to 9.3 cases per 100,000 person-years for ‘Primary malignant neoplasm of brain’. Metastases excluded, the frequency looks very high [25]. Albanian cancer registry supports our findings. Specific weight of mortality from malignant brain tumors is rising from 5.1% in 2015 to 5.9% in 2019. Mortality from malignant brain tumors is rising; cases per 100,000 from 6.5% in 2015 to 7.4% in 2019 [26]. Lower mortality rates

Table 1: Age by sex at first admission

Age (years)	Primary malignant neoplasm of brain			Benign neoplasm of brain and other parts of nervous system		
	Mean	Std. Deviation	Median	Mean	Std. Deviation	Median
F	48.2	19.1	53.0	50.4	16.6	53.5
M	49.7	19.2	54.0	50.1	18.6	55.0
Total	49.1	19.1	54.0	50.2	17.6	54.0

from malignant brain and other CNS tumors for approximately the same period are found in the United States, 4.43 per 100,000 [4]. Malignant CNS tumors, Europe, Australia, New Zealand, and North America have the highest number of new cases, 7.5–14 new cases per 100,000 population year (males), and 4–11 (females) in 2012 [27]. Reports show gliomas, independent of grade, making 60% of all primary brain tumors with an incidence as high as 6 per 100,000 per year [28]. Other studies report brain cancer mortality as the highest in Palestine (7.2 per 100,000 people) and Albania's neighboring countries Montenegro, Bosnia and Herzegovina, Serbia, Croatia and North Macedonia with a mortality ranging from 6.6 to 7.2 per 100,000 people but the study doesn't mention Albania [29].

PMNB by behavior age standardized mean annual incidence (first admissions) per 100,000 population (95% CI), Tirana county, period 2017–2021, was respectively Total (6.0 [4.5–7.6]), women (4.5 [2.6–6.3]) and men (7.6 [5.1–10.1]). Primary malignant brain tumors age-standardized incidence in 2008 was globally ~3.7 for males and 2.6 per

Table 3: Age-specific crude incidence rates of Primary Malignant Neoplasm of Brain (PMNB) by behavior

Age-specific	Total	M	F
0–4	4.31	7.35	1.00
5–9	1.68	1.61	1.75
10–14	3.08	5.24	0.79
15–19	2.01	2.03	2.00
20–24	2.25	3.35	1.24
25–29	1.09	0.76	1.39
30–34	2.40	4.19	0.77
35–39	4.05	3.36	4.69
40–44	6.94	11.12	3.12
45–49	9.27	9.97	8.60
50–54	10.61	12.08	9.20
55–59	15.15	20.25	10.21
60–64	22.49	20.99	23.94
65–69	23.13	24.88	21.48
70–74	16.46	28.52	5.28
75–79	9.49	13.05	6.14
80–84	12.65	17.63	8.61
+85	7.97	19.17	0.00

Table 2: Incidence of Primary Malignant Neoplasm of Brain (PMNB) (period 2005–2021), by county.

Diagnosis	County	F								M								Total										
		2005-06	2007-11	2012-16	2017-21	Total	2007-11	2012-16	2017-21	Total	2007-11	2012-16	2017-21	Total	2005-06	2007-11	2012-16	2017-21	Total	2007-11	2012-16	2017-21	Total	inc.17				
Primary Malignant Neoplasm of Brain (PMNB)	Shkodër	9	19	21	25	74	3.5	4.5	6.4	4.67	9	32	29	36	106	6.0	6.3	9.4	6.81	18	51	50	61	180	4.7	5.4	7.9	5.73
	Kukës	2	8	8	12	30	3.8	4.4	7.8	4.82	3	12	11	16	42	5.6	5.9	10.3	6.67	5	20	19	28	72	4.7	5.2	9.0	5.75
	Lezhë	3	9	11	15	38	2.7	3.8	6.0	3.83	7	18	12	26	63	5.4	4.1	10.5	6.35	10	27	23	41	101	4.0	3.9	8.3	5.09
	Dibër	2	12	8	19	41	3.6	2.7	7.2	4.01	6	14	21	22	63	4.0	6.8	8.1	5.98	8	26	29	41	104	3.8	4.7	7.7	5.01
	Durrës	13	16	27	41	97	2.5	4.4	7.3	4.69	13	22	36	59	130	3.3	5.9	10.4	6.21	26	38	63	100	227	2.9	5.1	8.8	5.45
	Tiranë	60	73	96	113	342	3.9	5.0	5.8	5.23	100	93	140	174	507	5.0	7.6	9.5	8.08	160	166	236	287	849	4.4	6.3	7.6	6.62
	Elbasan	19	21	29	32	101	2.9	4.4	5.5	4.52	18	38	48	64	168	5.1	7.2	11.0	7.45	37	59	77	96	269	4.0	5.8	8.3	5.99
	Fier	17	36	23	40	116	4.7	3.4	6.7	5.00	19	40	67	65	191	5.1	9.6	10.8	8.09	36	76	90	105	307	4.9	6.5	8.7	6.56
	Berat	6	19	18	15	58	5.4	5.1	4.2	4.82	6	23	22	40	91	6.4	6.2	11.5	7.58	12	42	40	55	149	5.9	5.7	7.8	6.20
	Korçë	12	22	23	28	85	4.0	4.7	6.5	5.13	15	37	43	39	134	6.6	8.7	8.9	7.94	27	59	66	67	219	5.4	6.7	7.7	6.55
Primary Malignant Neoplasm of Brain (PMNB)	Gjirokastrër	4	2	5	12	23	1.1	3.1	8.1	4.14	5	9	14	16	44	4.9	8.4	10.6	7.75	9	11	19	28	67	3.0	5.7	9.3	5.96
	Vlorë	3	14	13	11	41	3.2	3.2	3.0	3.00	7	17	24	31	79	3.8	5.9	8.5	5.75	10	31	37	42	120	3.5	4.6	5.7	4.38
	Total	150	251	282	363	1046	3.6	4.3	6.0	4.72	208	355	467	588	1618	5.1	7.2	9.9	7.34	358	606	749	951	2664	4.3	5.8	7.9	6.02
*Inc.17 – Mean annual incidence (first admissions) for the 17 years' period of Primary Malignant Neoplasm of Brain (PMNB) per 100,000 population.																												

100,000 for females, peaking for males in developed countries, 5.8 per 100,000 [30]. Malignant brain tumors were previously reported in Albania (1993–2013), incidence 9.4 per 100,000, continuously rising from year 1995, 4.7 per 100,000. Spikes in incidence rise resulted during 1995–1996 and 2001–2002 periods which were associated from the authors with the introduction of diagnostic tools as the CT-scan first and later the RMN. Although it doesn't explain why after the introduction of CT-scan the incidence decreased again. Male to female ratio was 1.3 [31]. Research referring to National Registry of Brain Tumors expound an incidence of malignant brain tumors of 9.4 per 100,000 per year, in Albania [1]. In Hungary the ratio of new cases to deaths was reported somewhat between 0.55 and 0.92, Albania show a ratio of 0.79 [32].

Both HIV and circumcision have strong cultural references, likewise indirectly contributing in the rise or decrease of cancer. The two aspects of geographical distribution: true differences and inefficient screening and detection [33]. Also differences are found in incidence and mortality inside the same country. Our data support somewhat this finding. Distribution of people affected by oncogenic viruses like HIV put the population at higher risk of HIV-related malignancies (Kelly & Lekgwara, 2020) [34]. These results make geographical and cultural factors part of the overall risk. In England an increased age-standardized incidence (glioblastoma) was observed from 1995 to 2013, in men from 3.24 to 7.34 and women from 2.00 to 4.45 per 100 000 population [35].

References:

- Nico E, Grada M, Xhumari A, Seferi A, Rosseau G, Petrela M. The history and current state of neurosurgery in Albania. *Neurosurgery Practice* 2023; 4: e00037.
- Albanian Population and Housing Census 2023. <https://www.instat.gov.al/en/publications/books/> [last accessed: 04.08.2026].
- Farmanfarma KK, Mohammadian M, Shahabini Z, Hassanipour S, Salehiniya H. Brain cancer in the world: an epidemiological review. *World Cancer Res J* 2019; 6: e1356.
- Ostrom QT, Cioffi G, Waite K, Kruchko C, Barnholtz-Sloan JS. CBRUS Statistical Report: Primary Brain and Other Central Nervous System Tumors Diagnosed in the United States in 2014–2018. *Neuro Oncol* 2021; 23 (12 Suppl 2): iii1–iii105.
- Lamba N, Wen PY, Aizer AA. Epidemiology of brain metastases and leptomeningeal disease. *Neuro Oncol* 2021; 23: 1447–56.
- Le Rhun E, Weller M. Sex-specific aspects of epidemiology, molecular genetics and outcome: primary brain tumours. *ESMO Open* 2020; 5 (Suppl 4): e001034.
- Ostrom QT, Adel Fahmideh M, Cote DJ, Muskens JS, Schraw JM, Scheurer ME, Bondy ML. Risk factors for childhood and adult primary brain tumors. *Neuro Oncol* 2019; 21: 1357–75.
- Martin DH, Bianchi E, Ben Mustapha S, Frères P. Le glioblastome [Glioblastoma]. *Revue medicale de Liege* 2021; 76: 419–24.
- Park JW, Lee K, Kim EE, Kim SI, Park SH. Brain Tumor Classification by Methylation Profile. *J Korean Med Sci* 2023; 38: e356.
- Chitnis S, Hosseini R, Xie P. Brain tumor classification based on neural architecture search. *Sci Rep* 2022; 12: 19206.
- Seano G. *Brain Tumors*. Springer, 2021; pp 3.
- Choi DJ, Armstrong G, Lozzi B, Vijayaraghavan P, Plon SE, Wong TC, et al. The genomic landscape of familial glioma. *Sci Adv* 2023; 9: eade2675.
- DeMonte F. *Tumors of the Brain and Spine*. Springer, 2007; pp 3.
- Davis FG, McCarthy BJ, Berger MS. Centralized databases available for describing primary brain tumor incidence, survival, and treatment: Central Brain Tumor Registry of the United States; Surveillance, Epidemiology, and End Results; and National Cancer Data Base. *Neuro Oncol* 1999; 1: 205–11.
- Zhang L, Jia W, Ji N, Li D, Xiao D. Establishment of the National Brain Tumor Registry of China. *JCO Glob Oncol* 2020; 6: 47–8.
- Miller KD, Ostrom QT, Kruchko C, Patil N, Tihan T, Cioffi G, et al. Brain and other central nervous system tumor statistics, 2021. *CA Cancer J Clin* 2021; 71: 381–406.
- Wanner M, Rohrmann S, Korol D, Shenglia N, Gigineishvili T, Gigineishvili D. Geographical variation in malignant and benign/borderline brain and CNS tumor incidence: a comparison between a high-income and a middle-income country. *J Neurooncol* 2020; 149: 273–82.
- Ostrom QT, Price M, Neff C, Cioffi G, Waite KA, Kruchko C, Barnholtz-Sloan JS. CBRUS Statistical Report: Primary Brain and Other Central Nervous System Tumors Diagnosed in the United States in 2015–2019. *Neuro Oncol* 2022; 24 (Suppl 5): v1–v95.
- Louis DN, Perry A, Wesseling P, Brat DJ, Cree IA, Figarella-Branger D, et al. The 2021 WHO Classification of Tumors of the Central Nervous System: a summary. *Neuro Oncol* 2021; 23: 1231–51.
- Hong B, Allam A, Heese O, Gerlach R, Gheewala H, Rosahl SK, et al. Trends in frailty in brain tumor care during the COVID-19 pandemic in a nationwide hospital network in Germany. *Eur Geriatr Med* 2023; 14: 1383–91.
- Holmquist L, Russo CA, Elixhauser A. Hospitalizations for Brain Cancer, 2006. In: *Healthcare Cost and Utilization Project (HCUP) Statistical Briefs*. Agency for Healthcare Research and Quality (US). 2009.
- Sabel M. *Video Atlas of Neurophysiological Monitoring in Surgery of Infiltrating Brain Tumors*. Georg Thieme Verlag; 2022.
- Arvold ND, Wang Y, Zigler C, Schrag D, Dominici F. Hospitalization burden and survival among older glioblastoma patients. *Neuro Oncol* 2014; 16: 1530–40.
- Abuawad M, Daqour A, Alkaiyat A, Rjoub A, Zahra WA, Issa N, Dumaidi Y, Nasser S. Epidemiology of primary brain tumor among adolescents and adults in Palestine: a retrospective study from 2018 to 2023. *BMC Neurology* 2024; 24: 168.
- Bell JS, Koffie RM, Rattani A, Dewan MC, Baticulon RE, Qureshi MM, et al. Global incidence of brain and spinal tumors by geographic region and income level based on cancer registry data. *J Clin Neurosci* 2019; 66: 121–7.
- Raporti Kombëtar mbi Sëmundjet Tumorale (2021). *Instituti i Shëndetit Publik, Tirana, Albania*.
- Rezaei N, Hanaei S. Human brain and spinal cord tumors: From bench to bedside. *Neuro-immunology and Neurogenetics* (Vol. 1). Springer International Publishing, 2023.
- Rezaei N, Hanaei S. Human brain and spinal cord tumors: From bench to bedside (Vol. 2). Springer, 2023.
- Ilic I, Ilic M. International patterns and trends in the brain cancer incidence and mortality: An observational study based on the global burden of disease. *Heliyon* 2023; 9: e18222.
- Bondy ML, Scheurer ME, Malmer B, Barnholtz-Sloan JS, Davis FG, Il'yasova D, et al. Brain Tumor Epidemiology Consortium. Brain tumor epidemiology: consensus from the Brain Tumor Epidemiology Consortium. *Cancer* 2008; 113 (7 Suppl): 1953–68.
- Djamandi P, Brace G, Kaloshi G, Seferi A, Petrela M. Incidence patterns of primary central nervous system tumors (CNS) in Albania. *Int J Health Sci Res* 2017; 7: 293–5.
- Kenessey I, Patócs A, Dobozi M, Nagy P, Polgár C. A központi idegrendszer primer rosszindulatú daganatainak epidemiológiája és etiológiája [The epidemiology of primary brain malignancies]. *Magyar onkologia* 2023; 67: 279–87.
- Kalubula M, Shen H, Makasa M, Liu L. Epidemiology of Cancers in Zambia: A significant variation in Cancer incidence and prevalence across the nation. *Malawi Med J* 2021; 33: 186–95.
- Uwishema O, Frederiksen KS, Badri R, Pradhan AU, Shariff S, Adanur I, Dost B, Esene I, Rosseau G. Epidemiology and etiology of brain cancer in Africa: A systematic review. *Brain Behav* 2023; 13: e3112.
- Wanis HA, Möller H, Ashkan K, Davies EA. The incidence of major subtypes of primary brain tumors in adults in England 1995–2017. *Neuro Oncol* 2021; 23: 1371–82.
- de Robles P, Fiess KM, Frolkis AD, Pringsheim T, Atta C, St Germaine-Smith C, et al. The worldwide incidence and prevalence of primary brain tumors: a systematic review and meta-analysis. *Neuro Oncol* 2015; 17: 776–83.

Conclusions

Albanian population is aging. An aging population is a factor associated with increase in prevalence of brain tumors [34]. In Albania the difference between censuses goes in favor of increasing the median population age which can be named as aging through emigration. Also it has a negative effect on incidence which is supported from our study and national cancer registry data portraits a constant increase over years.

Conflict of interest

The author declares that no conflict of interest exists.

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