

# Munich Cancer Registry



- Incidence and Mortality
- Selection Matrix
- Homepage
- *Deutsch*

## ICD-10 C71: Brain cancer

### Survival

Year of diagnosis	1988-1997	1998-2020
Patients	310	6,128
Diseases	311	6,132
Cases evaluated	270	4,512
Creation date	04/15/2022	
Database export	12/20/2021	
Population	4.92 m	



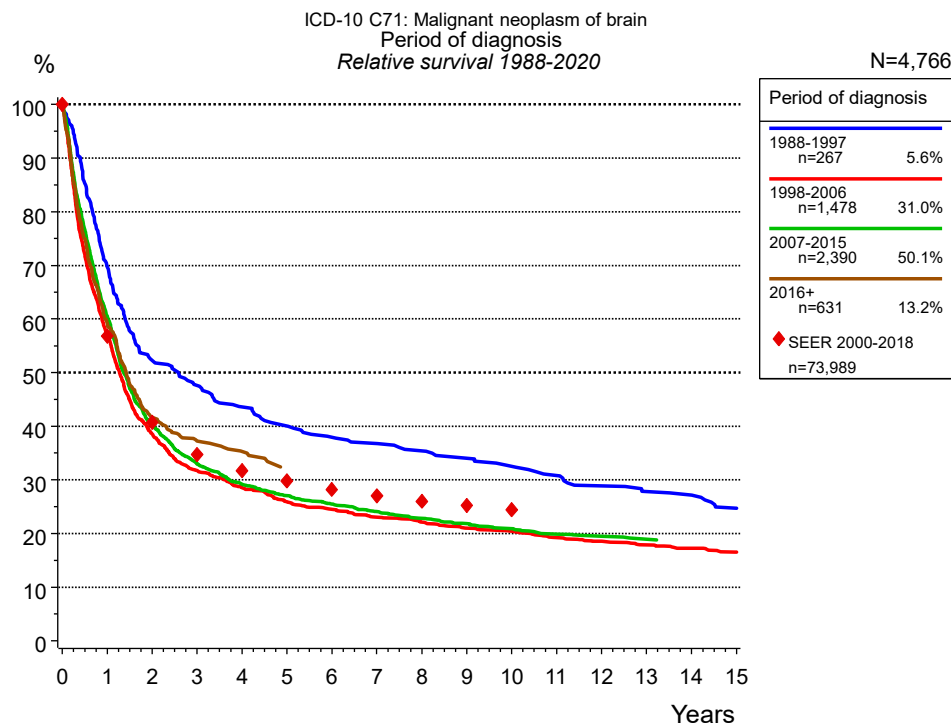
Munich Cancer Registry  
Cancer Registry Bavaria - Upper Bavaria Regional Center  
at Klinikum Grosshadern/IBE  
Marchioninstr. 15  
Munich, 81377  
Germany

<https://www.tumorregister-muenchen.de/en>

[https://www.tumorregister-muenchen.de/en/facts/surv/sC71\\_\\_E-ICD-10-C71-Brain-cancer-survival.pdf](https://www.tumorregister-muenchen.de/en/facts/surv/sC71__E-ICD-10-C71-Brain-cancer-survival.pdf)

## Index of figures and tables

Fig./Tbl.	Page
1a Relative survival by period of diagnosis (chart)	3
1b Survival by period of diagnosis (table)	3
2a Survival by sex (chart)	4
2b Survival by sex (table)	4
2c Conditional survival by sex (chart)	5
2d Conditional survival by sex (table)	5
3a Observed survival by age category (chart)	6
3b Relative survival by age category (chart)	6
3c Survival by age category (table)	7
5a Time to first progression (chart)	8
5b Time to first progression (table)	8
5c Observed post-progression survival (chart)	9
5d Observed post-progression survival (table)	9
5e Observed post-progression survival by period of progression (chart)	10
5f Observed post-progression survival by period of progression (table)	10



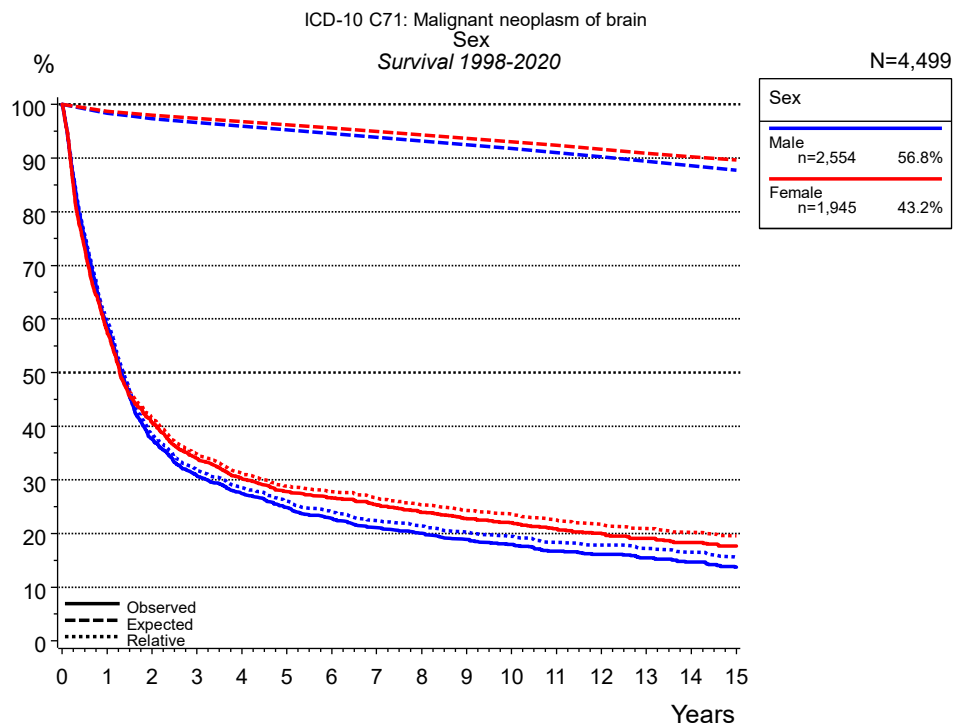
**Figure 1a.** Relative survival of patients with brain cancer by period of diagnosis. Included in the evaluation are 4,766 cases diagnosed between 1988 and 2020.

The survival results of the SEER program (Surveillance, Epidemiology, and End Results) of the American National Cancer Institute (NCI) are summarized as the period of diagnosis from 2000 to 2018, and are represented by colored diamonds in order to facilitate comparisons between MCR and SEER.

The presented survival curves are derived from clinical records with valid follow-up informations, which means that death certificate cases (DCO) cases are omitted from the analysis. With this one restriction, the MCR has provided population-based statistics since 1998, collecting data on all cancer cases in the region of southern Bavaria. Historical data of previous time periods can be heavily selected, therefore, univariate survival comparisons of the presented time periods must be carefully considered. Nonetheless, all calculable survival curves are depicted to facilitate the comparison of long time follow-up analyses of relative survival between particular cancers.

Years	Period of diagnosis							
	1988-1997 n=267		1998-2006 n=1,478		2007-2015 n=2,390		2016+ n=631	
	obs. %	rel. %	obs. %	rel. %	obs. %	rel. %	obs. %	rel. %
0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1	69.0	69.7	56.1	56.9	59.6	60.5	58.2	59.1
2	51.8	52.3	37.7	38.5	39.3	40.2	40.8	41.7
3	46.8	47.6	30.8	31.7	32.0	33.0	36.1	37.3
4	42.6	43.6	27.6	28.6	28.2	29.2	34.1	35.3
5	39.1	40.1	24.9	25.9	25.9	27.0	31.1	31.2
6	36.8	38.0	23.3	24.5	24.2	25.5		
7	35.6	36.8	21.9	23.0	22.7	24.1		
8	34.0	35.4	20.8	22.1	21.4	22.8		
9	32.4	34.0	19.6	21.0	20.3	21.8		
10	30.8	32.5	19.0	20.4	19.3	20.9		
11	29.1	30.8	17.8	19.2	18.3	19.9		
12	27.0	28.9	17.0	18.5	17.8	19.5		
13	25.7	27.9	16.2	17.9	17.2	18.9		
14	25.3	27.2	15.5	17.2				
15	22.6	24.7	14.7	16.5				
Median	2.4		1.2		1.3		1.4	

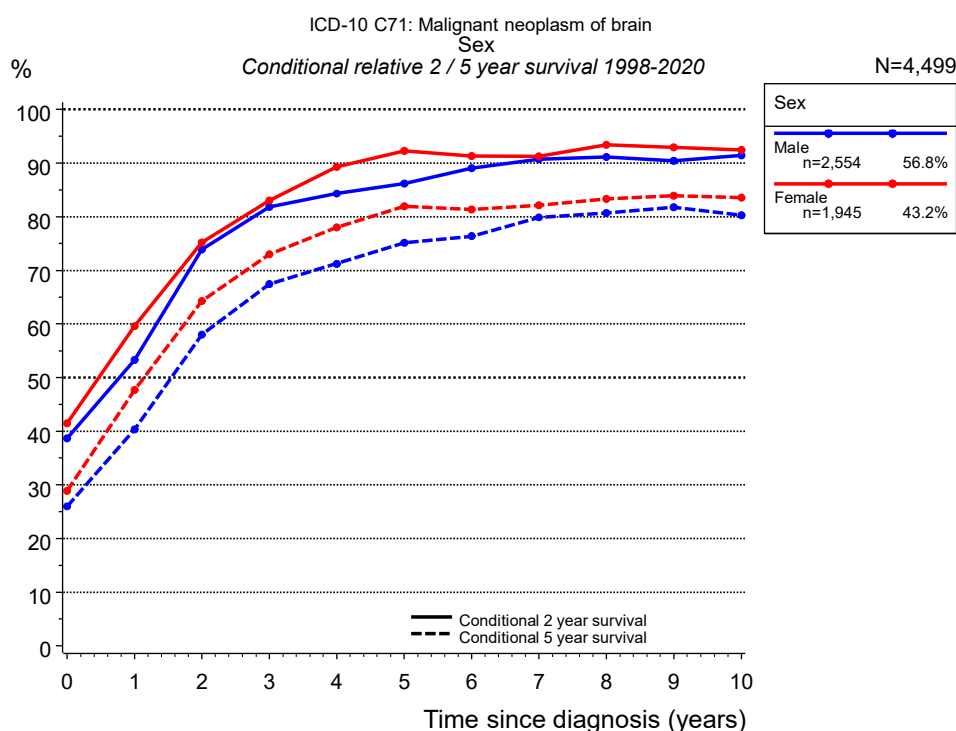
**Table 1b.** Observed (obs.) and relative (rel.) survival of patients with brain cancer by period of diagnosis for period 1988-2020 (N=4,766).



**Figure 2a.** Survival of patients with brain cancer by sex. Included in the evaluation are 4,499 cases diagnosed between 1998 and 2020.

Years	Sex			
	Male n=2,554		Female n=1,945	
	obs. %	rel. %	obs. %	rel. %
0	100.0	100.0	100.0	100.0
1	58.7	59.7	57.7	58.4
2	37.7	38.7	40.7	41.5
3	30.8	31.8	33.9	34.8
4	27.4	28.6	30.2	31.2
5	24.8	26.0	27.8	28.9
6	22.8	24.1	26.6	27.8
7	21.1	22.4	25.4	26.6
8	20.0	21.4	23.9	25.4
9	18.8	20.3	22.8	24.3
10	17.9	19.5	22.0	23.6
11	16.7	18.3	20.9	22.5
12	16.1	17.8	20.1	21.8
13	15.4	17.2	19.1	21.0
14	14.7	16.5	18.4	20.2
15	13.7	15.6	17.7	19.6
Median	1.3		1.3	

**Table 2b.** Observed (obs.) and relative (rel.) survival of patients with brain cancer by sex for period 1998-2020 (N=4,499).

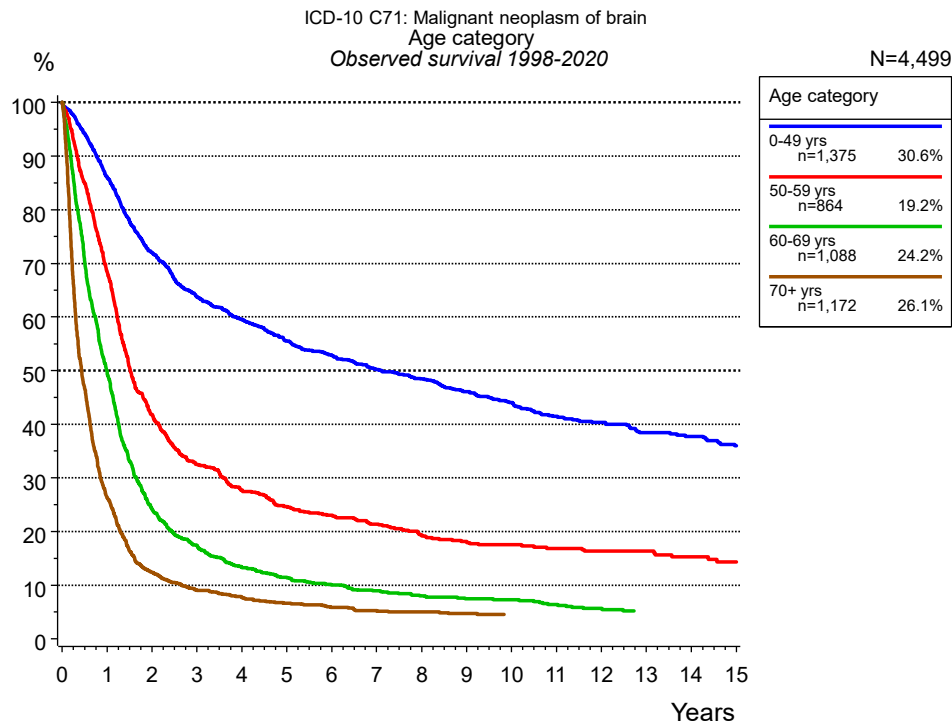


**Figure 2c.** Conditional relative 2 / 5-year survival of patients with brain cancer by sex. For 4,499 of 4,499 cases diagnosed between 1998 and 2020 valid data could be obtained for this item.

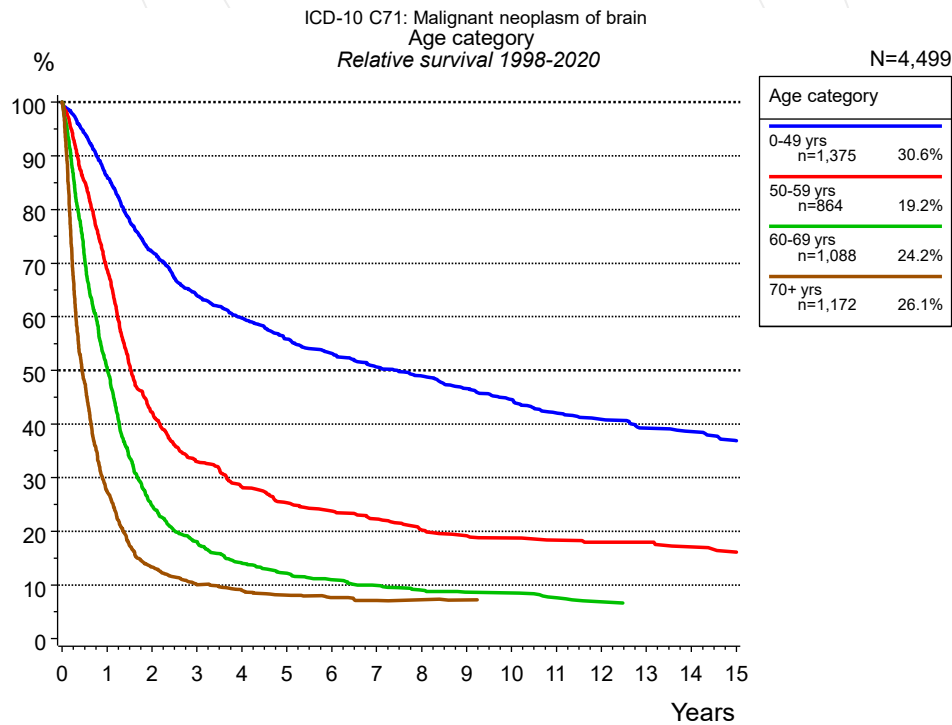
Years	Sex					
	Male			Female		
	n	Cond. surv. % 2 yrs	5 yrs	n	Cond. surv. % 2 yrs	5 yrs
0	2,554	38.7	26.0	1,945	41.5	28.9
1	1,466	53.3	40.4	1,085	59.6	47.7
2	920	73.9	58.0	751	75.2	64.3
3	722	81.8	67.4	614	83.0	73.0
4	606	84.3	71.2	518	89.3	78.0
5	511	86.2	75.1	447	92.3	82.0
6	448	89.1	76.4	398	91.3	81.4
7	391	90.7	79.8	351	91.3	82.1
8	342	91.1	80.7	310	93.4	83.3
9	296	90.4	81.8	273	92.9	83.9
10	248	91.5	80.3	232	92.4	83.6

**Table 2d.** Conditional relative 2 / 5-year survival of patients with brain cancer by sex for period 1998-2020 (N=4,499).

Conditional relative survival rates refer to the relative survival probability, in this case for 2 and 5 years after cancer diagnosis, compared to the age- and sex-matched population (=100 %) under the condition of being alive for a certain time period (x-axis in Figure 2a). The results illustrate to what extent the cancer induced mortality of particular subgroups declines in the subsequent years after detection of the malignancy. For instance, according to the presented survival statistics, patients in the subgroup sex="Male", who are alive at least 3 years after cancer diagnosis, the conditional relative 2-year survival rate is 81.8% (n=722).



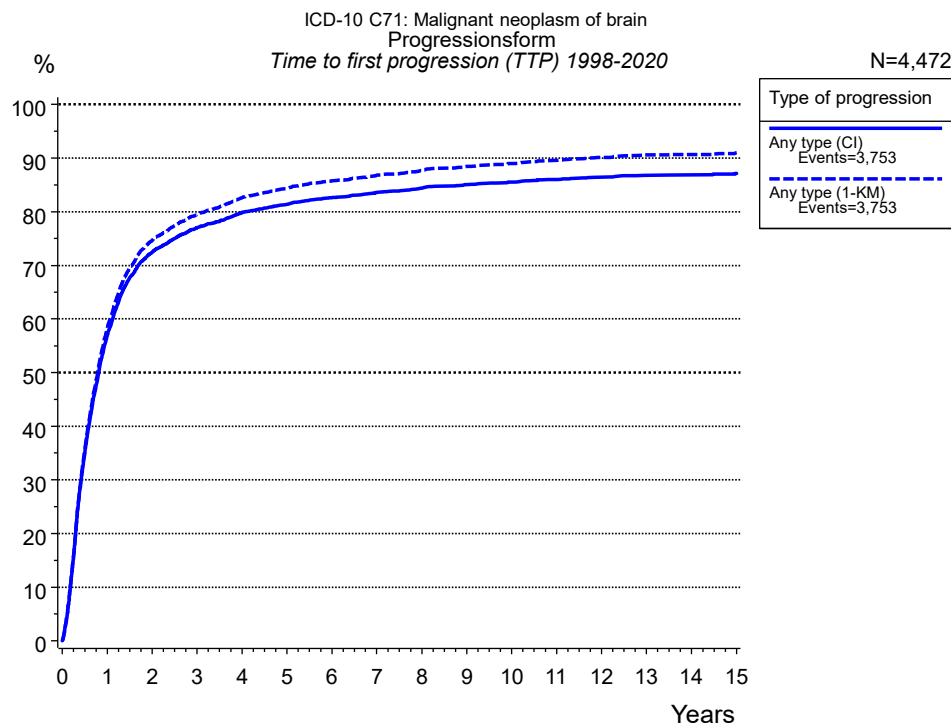
**Figure 3a.** Observed survival of patients with brain cancer by age category. Included in the evaluation are 4,499 cases diagnosed between 1998 and 2020.



**Figure 3b.** Relative survival of patients with brain cancer by age category. Included in the evaluation are 4,499 cases diagnosed between 1998 and 2020.

Years	Age category							
	0-49 yrs n=1,375		50-59 yrs n=864		60-69 yrs n=1,088		70+ yrs n=1,172	
	obs. %	rel. %	obs. %	rel. %	obs. %	rel. %	obs. %	rel. %
0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1	86.1	86.2	68.5	68.8	49.9	50.5	26.2	27.3
2	72.0	72.1	41.8	42.2	24.2	24.8	12.4	13.3
3	63.7	63.9	32.5	33.0	17.4	18.0	9.0	10.1
4	59.5	59.8	27.7	28.3	13.4	14.0	7.7	9.0
5	55.5	55.8	24.7	25.3	11.5	12.2	6.6	8.1
6	52.8	53.2	23.0	23.8	10.1	11.0	5.9	7.6
7	50.2	50.6	21.4	22.3	8.9	9.9	5.3	7.1
8	48.4	48.9	19.3	20.3	8.0	9.0	5.0	7.2
9	46.1	46.6	18.1	19.1	7.4	8.6	4.7	7.2
10	44.0	44.6	17.5	18.7	7.3	8.5	4.5	7.3
11	41.5	42.0	16.8	18.3	6.4	7.6		
12	40.3	40.9	16.3	17.9	5.6	6.8		
13	38.4	39.2	16.3	17.9				
14	37.7	38.6	15.2	17.0				
15	35.9	36.9	14.3	16.1				
Median	7.1		1.5		1.0		0.4	

**Table 3c.** Observed (obs.) and relative (rel.) survival of patients with brain cancer by age category for period 1998-2020 (N=4,499).

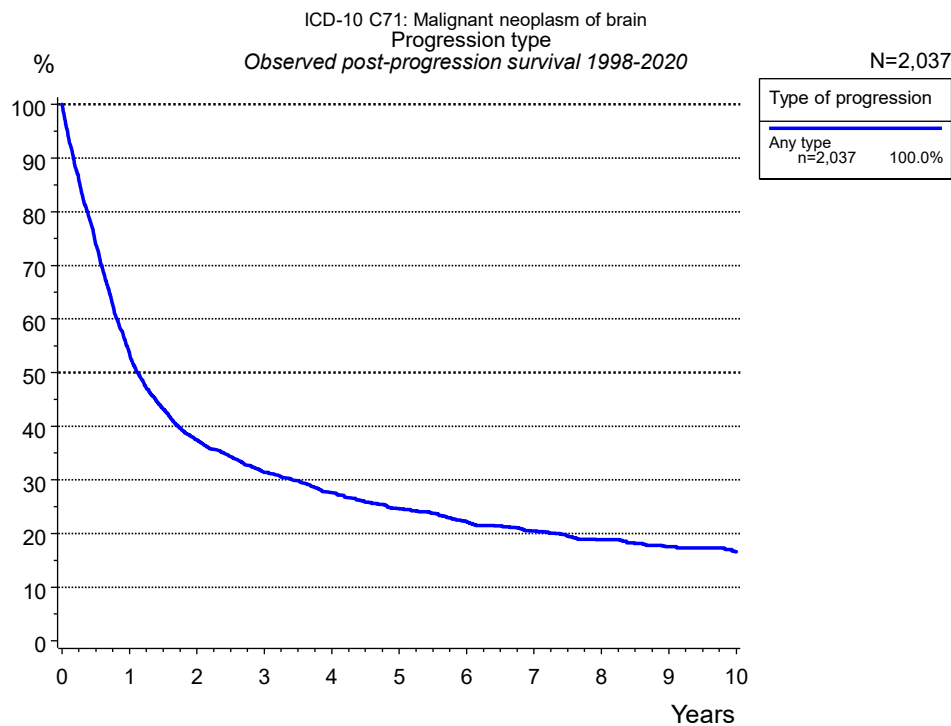


**Figure 5a.** Time to first progression of 4,472 patients with brain cancer diagnosed between 1998 and 2020 (in solid cancers M0 only) estimated by cumulative incidence function (CI, solid line) accounting for death as competing risk and by inverse Kaplan-Meier estimate (1-KM, dashed line). The frequency of events may be underestimated due to underreporting.

Type of progression		
	Any type (CI)	Any type (1-KM)
N	4,472	4,472
Events	3,746	3,746
compet.	228	
Years	%	%
0	0.0	0.0
1	56.9	58.3
2	72.5	74.6
3	77.0	79.5
4	79.8	82.6
5	81.4	84.3
6	82.7	85.7
7	83.6	86.8
8	84.4	87.7
9	85.1	88.5
10	85.5	89.0
11	86.0	89.6
12	86.5	90.2
13	86.8	90.6
14	86.9	90.7
15	87.1	90.9

**Table 5b.** Time to first progression of patients with brain cancer for period 1998-2020 (N=4,472), also showing the total of progression events (Events) and of deaths as competing risk (compet.).



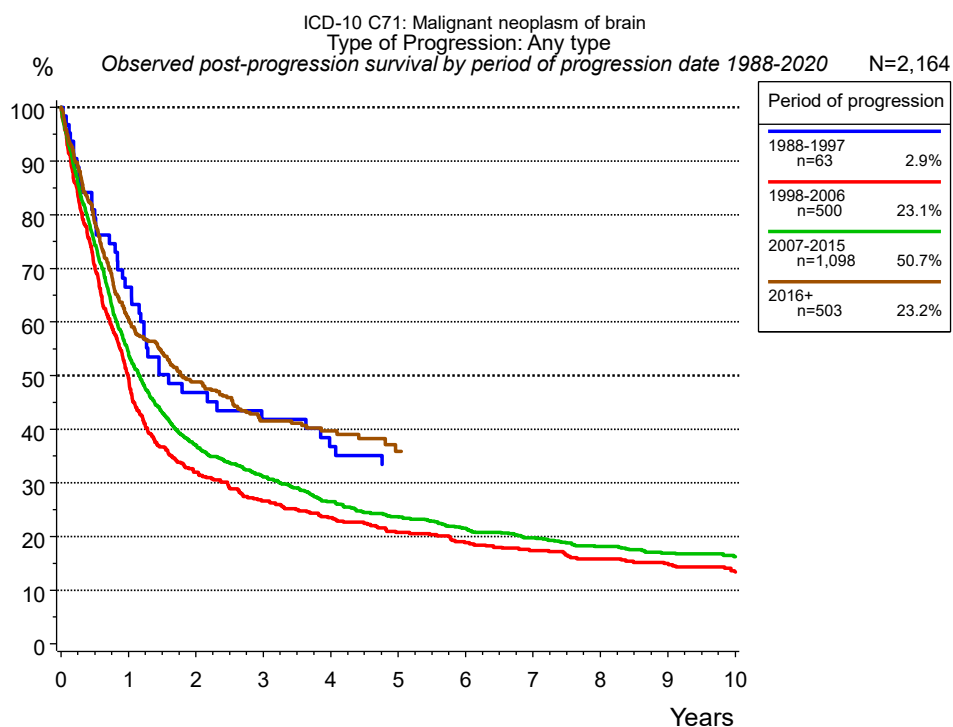


**Figure 5c.** Observed post-progression survival of 2,037 patients with brain cancer diagnosed between 1998 and 2020. These 2,037 patients with documented progression events during their course of disease represent 45.4 % of the totally 4,487 evaluated cases. Patients with cancer relapse documented via death certificates only were excluded (n=1,731, 38.6 %).

Medical record documentation often lacks the linguistic severity to distinguish between local relapse, regional lymph node metastasis and distant spread in solid cancers. Frequently, the statement “not specified” is the only information in registries regarding relapse of the disease. The category “Any type” denotes all cases who suffered from at least one relapse during the course of disease (incl. primary M1-status). Although, the real number of relapsed patients is likely to be much higher. The accumulated percentage of patients with local relapse or distant metastasis exceeds the 100 % value because patients are potentially considered in more than one subgroup.

Type of progression	
Any type n=2,037	
Years	%
0	100.0
1	53.6
2	37.5
3	31.4
4	27.6
5	24.6
6	22.2
7	20.5
8	18.9
9	17.5
10	16.6

**Table 5d.** Observed post-progression survival of patients with brain cancer for period 1998-2020 (N=2,037).



**Figure 5e.** Observed post-progression (any type) survival of 2,164 patients with brain cancer diagnosed between 1988 and 2020 by period of progression.

Years	Period of progression			
	1988-1997 n=63 %	1998-2006 n=500 %	2007-2015 n=1,098 %	2016+ n=503 %
0	100.0	100.0	100.0	100.0
1	66.5	49.5	54.3	60.4
2	46.8	32.0	37.0	48.8
3	41.8	26.6	31.2	41.5
4	36.8	23.5	26.5	39.7
5	33.4	20.8	23.7	35.8
6		18.9	21.5	
7		17.4	19.8	
8		15.8	18.2	
9		15.0	16.9	
10		13.4	16.3	

**Table 5f.** Observed post-progression (any type) survival of patients with brain cancer for period 1988-2020 by period of progression (N=2,164).

## Shortcuts

MCR Munich Cancer Registry, Germany

NCI National Cancer Institute, USA

SEER Surveillance, Epidemiology, and End Results, USA

UICC Union for International Cancer Control, Geneva

DCO Death certificate only Death certificate provides the only notification to the registry.

NA Not available

NOS Not otherwise specified

OS Overall/Observed survival Overall/Observed survival (Kaplan-Meier estimate)

Date of entry: diagnosis  
Event: death from any cause

RS Relative survival Survival compared to “general population”, ratio of observed to expected survival (Ederer II method), reflecting cancer specific survival

AS Assembled survival Assembled chart of observed, expected, relative survival

CS Conditional survival Survival probability under the condition of surviving a given period of time

TTP Time to progression Time to first progression / relapse  
Date of entry: diagnosis  
Event: (progression / relapse): first local-, lymph node recurrence, distant metastasis or unspecified progression

1-KM 1 minus Kaplan-Meier estimator (“inverse” Kaplan-Meier estimator)

CI Cumulative incidence  
Death as competing risk (according to Kalbfleisch und Prentice)

PPS Post-progression survival Survival since first progression / relapse (Kaplan-Meier estimate)  
Date of entry (progression / relapse): first local-, lymph node recurrence, distant metastasis or unspecified progression  
Event: death from any cause

## Recommended Citation

Munich Cancer Registry. Survival ICD-10 C71: Brain cancer [Internet]. 2022 [updated 2022 Apr 15; cited 2022 Jun 1]. Available from: [https://www.tumorregister-muenchen.de/en/facts/surv/sC71\\_\\_E-ICD-10-C71-Brain-cancer-survival.pdf](https://www.tumorregister-muenchen.de/en/facts/surv/sC71__E-ICD-10-C71-Brain-cancer-survival.pdf)

## Copyright

The content of the public web site provided by the Munich Cancer Registry is available worldwide and free of charge. All documents are free to download, utilize, copy, print-out and distribute, providing that the MCR is referenced.

## Disclaimer

The Munich Cancer Registry reserves the right to not be responsible for the topicality, correctness, completeness or quality of the information provided. Liability claims regarding damage caused by the use of any information provided, including any kind of information which is incomplete or incorrect, will therefore be rejected.