

# Munich Cancer Registry



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## ICD-10 C71: Brain cancer

### Survival

Year of diagnosis	1988-1997	1998-2016
Patients	727	5,665
Diseases	729	5,671
Cases evaluated	658	4,179
Creation date	08/22/2018	
Export date	08/09/2018	
Population	4.81 m	



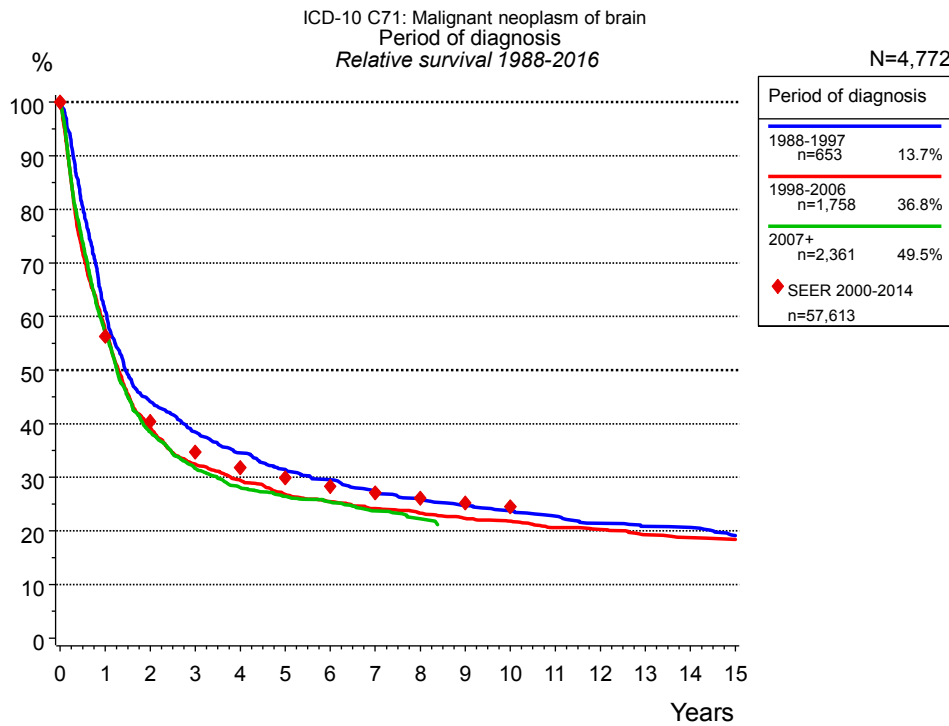
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<https://www.tumorregister-muenchen.de/en>

[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)

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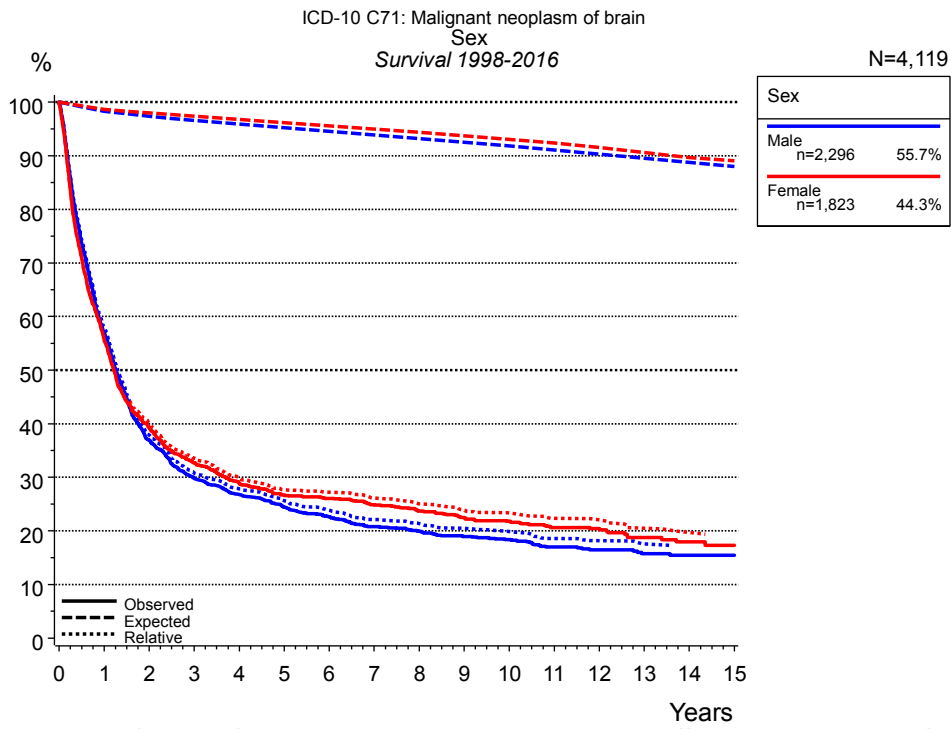
**Figure 1a.** Relative survival of patients with brain cancer by period of diagnosis. Included in the evaluation are 4,772 cases diagnosed between 1988 and 2016.

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 2014, 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=653		1998-2006 n=1,758		2007+ n=2,361	
	obs. %	rel. %	obs. %	rel. %	obs. %	rel. %
0	100.0	100.0	100.0	100.0	100.0	100.0
1	60.3	61.0	56.6	57.4	56.3	57.2
2	43.4	44.2	38.4	39.3	37.5	38.4
3	37.6	38.5	31.5	32.4	30.6	31.6
4	33.6	34.6	28.4	29.5	27.1	28.1
5	30.5	31.5	25.7	26.8	25.3	26.4
6	28.4	29.6	24.3	25.5	24.2	25.4
7	26.1	27.3	22.9	24.1	22.4	23.7
8	24.5	25.8	21.9	23.3	21.2	22.3
9	23.3	24.7	20.9	22.4		
10	22.2	23.7	20.2	21.8		
11	21.1	22.8	18.9	20.6		
12	19.7	21.4	18.5	20.3		
13	19.0	20.9	17.4	19.3		
14	18.8	20.7	16.9	18.8		
15	17.2	19.1	16.6	18.4		

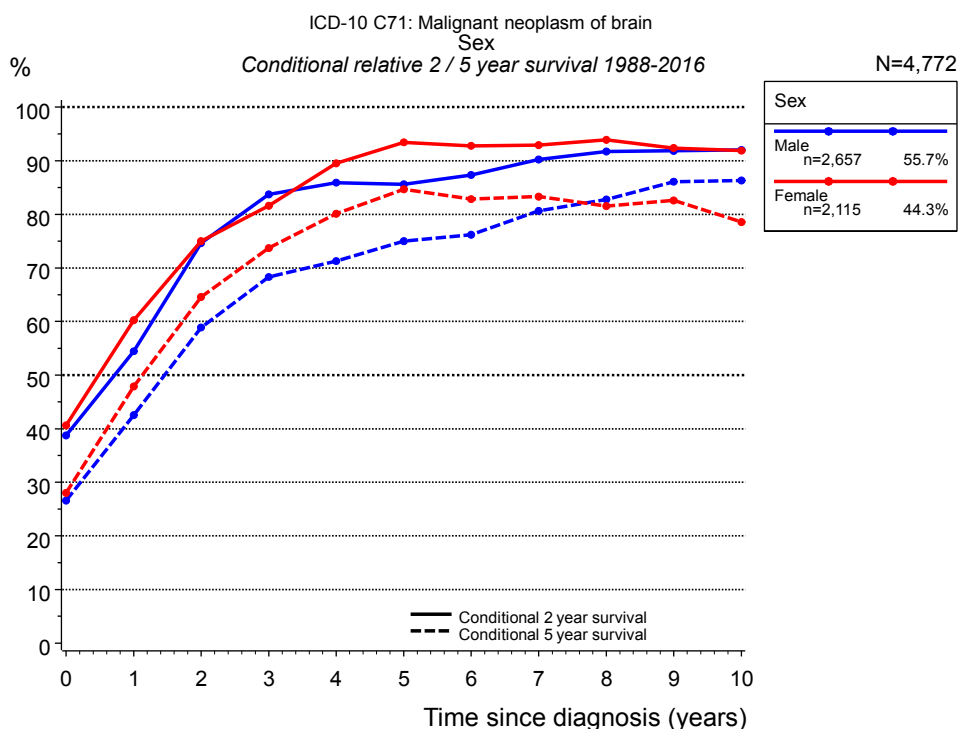
**Table 1b.** Observed (obs.) and relative (rel.) survival of patients with brain cancer by period of diagnosis for period 1988-2016 (N=4,772).



**Figure 2a.** Survival of patients with brain cancer by sex. Included in the evaluation are 4,119 cases diagnosed between 1998 and 2016.

Years	Sex			
	Male n=2,296		Female n=1,823	
	obs. %	rel. %	obs. %	rel. %
0	100.0	100.0	100.0	100.0
1	57.0	57.9	55.8	56.5
2	36.9	37.9	39.2	40.0
3	29.7	30.8	32.7	33.5
4	26.8	27.9	29.0	29.9
5	24.4	25.6	26.7	27.7
6	22.6	23.9	26.1	27.2
7	20.8	22.1	24.9	26.1
8	20.0	21.3	23.7	25.0
9	19.0	20.5	22.5	23.9
10	18.3	19.9	21.8	23.3
11	17.0	18.6	20.6	22.3
12	16.5	18.2	20.4	22.0
13	15.7	17.5	18.8	20.5
14			17.9	19.7
15			17.3	18.7

**Table 2b.** Observed (obs.) and relative (rel.) survival of patients with brain cancer by sex for period 1998-2016 (N=4,119).

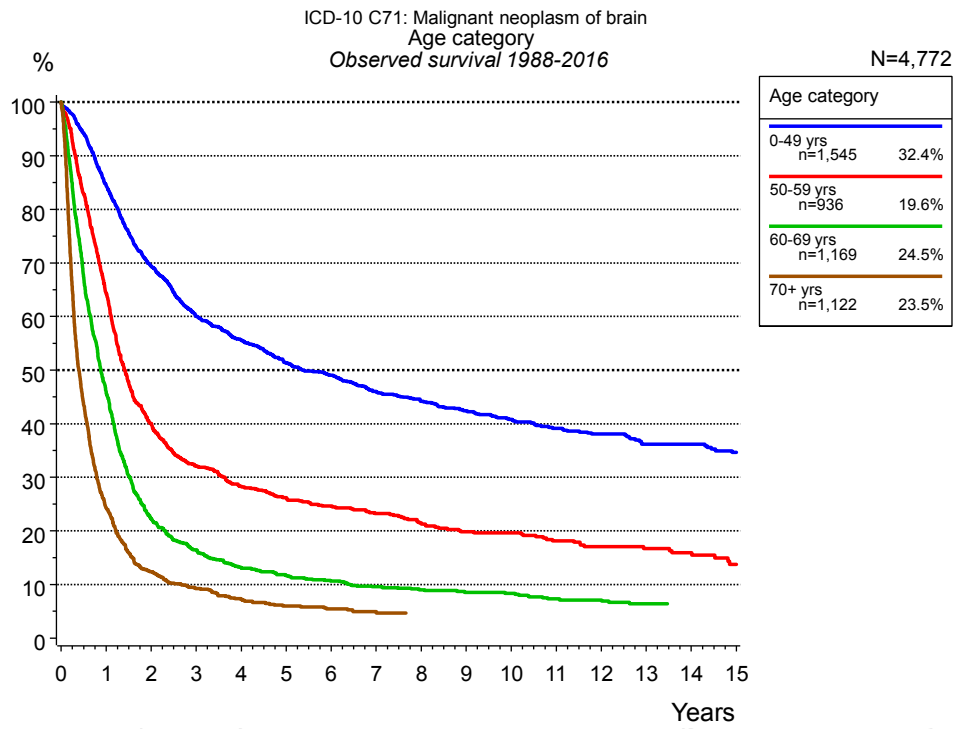


**Figure 2c.** Conditional relative 2 / 5-year survival of patients with brain cancer by sex. For 4,772 of 4,772 cases diagnosed between 1988 and 2016 valid data could be obtained for this item.

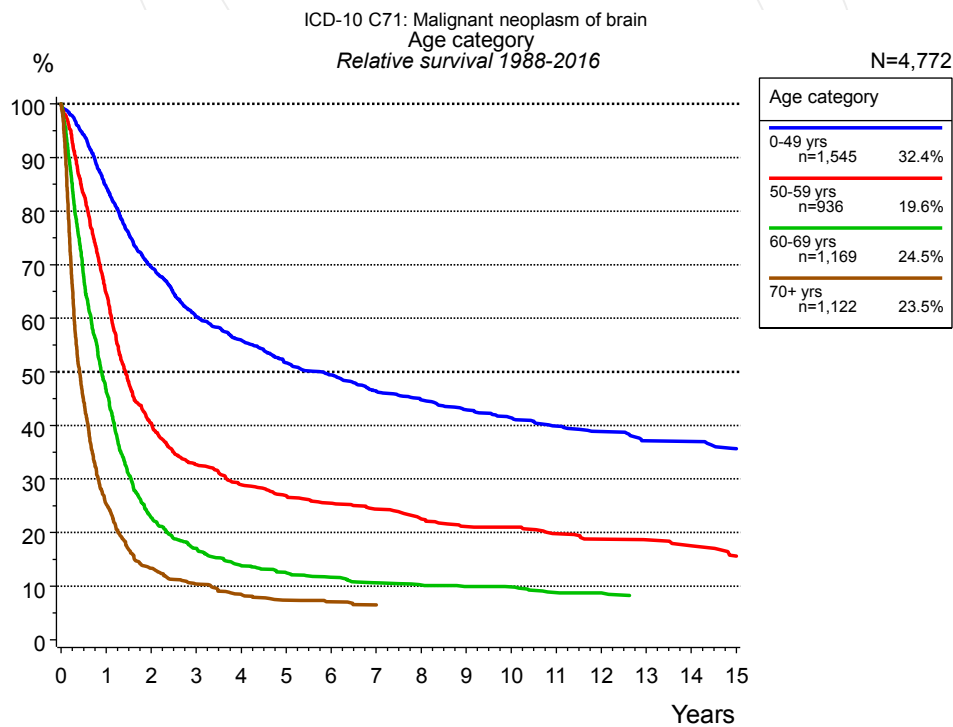
Years	Sex					
	n	Male		n	Female	
		Cond. surv. % 2 yrs	Cond. surv. % 5 yrs		Cond. surv. % 2 yrs	Cond. surv. % 5 yrs
0	2,657	38.7	26.6	2,115	40.7	28.0
1	1,477	54.4	42.5	1,142	60.3	47.8
2	919	74.7	58.9	761	75.0	64.5
3	697	83.7	68.3	596	81.6	73.7
4	573	85.9	71.3	481	89.5	80.1
5	481	85.6	75.0	401	93.5	84.7
6	407	87.3	76.2	362	92.8	82.8
7	331	90.3	80.6	320	92.9	83.3
8	276	91.7	82.8	267	93.9	81.5
9	232	91.8	86.1	233	92.4	82.6
10	202	92.0	86.3	210	91.9	78.5

**Table 2d.** Conditional relative 2 / 5-year survival of patients with brain cancer by sex for period 1988-2016 (N=4,772).

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 83.7% (n=697).



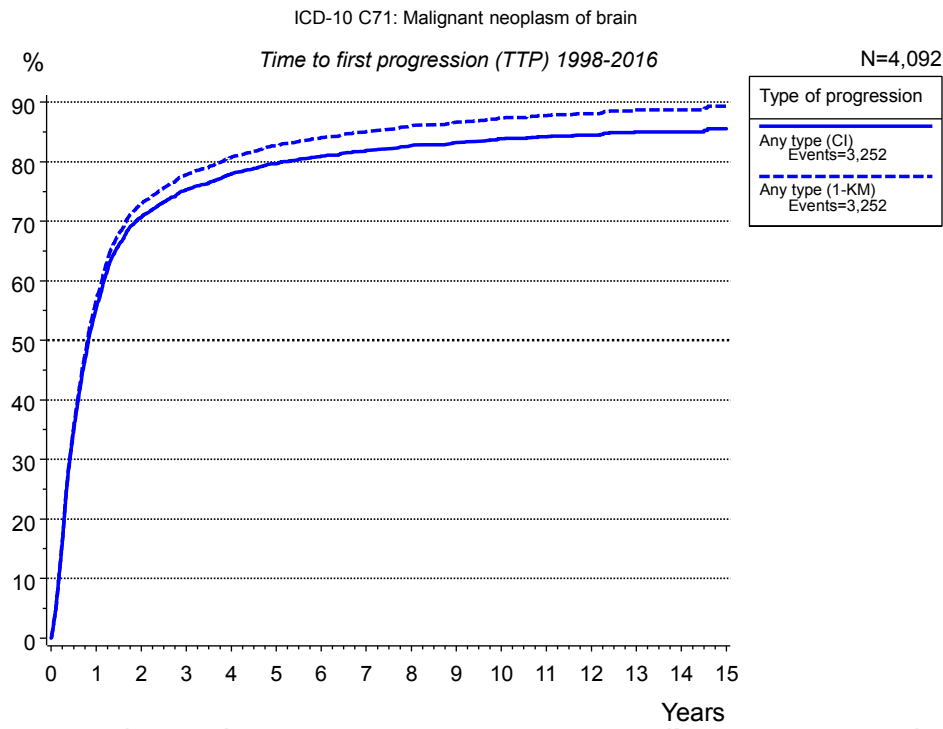
**Figure 3a.** Observed survival of patients with brain cancer by age category. Included in the evaluation are 4,772 cases diagnosed between 1988 and 2016.



**Figure 3b.** Relative survival of patients with brain cancer by age category. Included in the evaluation are 4,772 cases diagnosed between 1988 and 2016.

Years	Age category							
	0-49 yrs n=1,545		50-59 yrs n=936		60-69 yrs n=1,169		70+ yrs n=1,122	
	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	84.5	84.6	64.3	64.7	46.2	46.7	24.2	25.3
2	69.3	69.5	40.0	40.4	22.3	22.8	12.4	13.4
3	60.0	60.3	32.1	32.7	16.5	17.1	9.2	10.4
4	55.7	55.9	28.3	28.9	13.1	13.8	7.2	8.5
5	51.4	51.7	26.2	26.9	11.7	12.5	6.0	7.4
6	49.0	49.4	24.6	25.5	10.7	11.7	5.4	7.1
7	46.0	46.4	23.2	24.4	9.6	10.6	4.9	6.5
8	44.2	44.7	21.5	22.6	9.0	10.2		
9	42.4	42.9	19.8	21.1	8.5	9.9		
10	40.8	41.4	19.6	21.0	8.4	9.9		
11	39.2	39.9	18.1	19.8	7.3	8.8		
12	38.1	38.9	17.1	18.8	7.1	8.7		
13	36.2	37.1	16.7	18.7	6.4	8.2		
14	36.2	37.0	15.9	17.5				
15	34.6	35.6	13.7	15.6				

**Table 3c.** Observed (obs.) and relative (rel.) survival of patients with brain cancer by age category for period 1988-2016 (N=4,772).

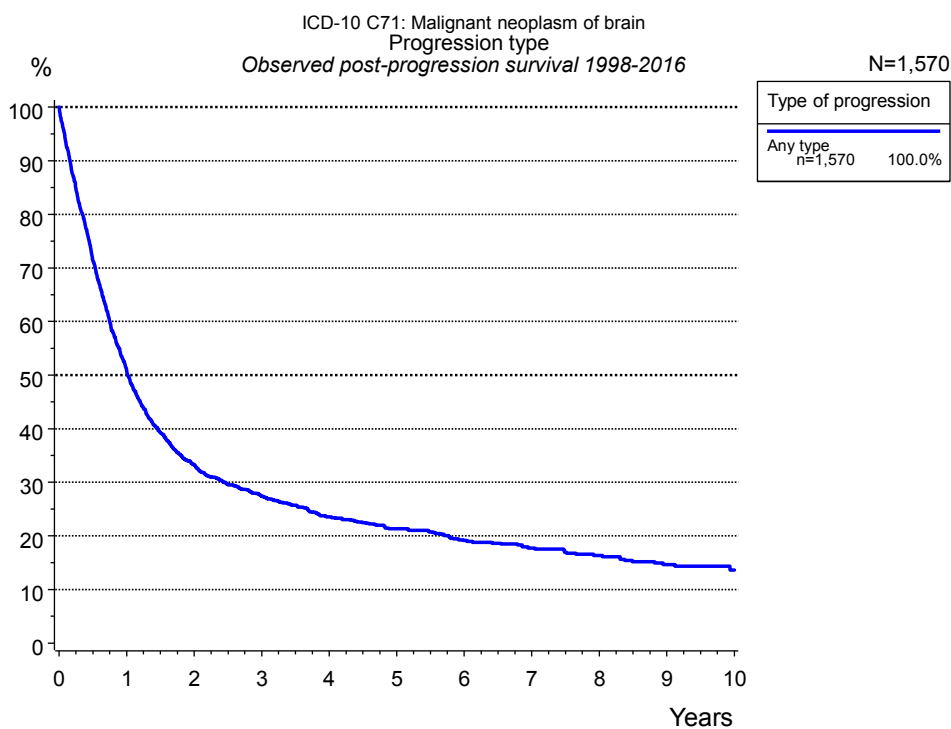


**Figure 5a.** Time to first progression of 4,092 patients with brain cancer diagnosed between 1998 and 2016 (in solid cancers M0 only) estimated by cumulative incidence function (CI, solid line) accounting for death as competing risk and by inverse Kaplan-Meier estimate (1-KM, dashed line). The frequency of events may be underestimated due to underreporting.

Years	Type of progression	
	Any type (CI)	Any type (1-KM)
	n=4,092 %	n=4,092 %
0	0.0	0.0
1	55.6	56.9
2	70.7	72.9
3	75.3	77.8
4	77.9	80.7
5	79.7	82.7
6	81.0	84.1
7	81.9	85.1
8	82.7	86.0
9	83.3	86.7
10	83.9	87.3
11	84.2	87.7
12	84.5	88.1
13	85.0	88.7
14	85.0	88.7
15	85.5	89.3

**Table 5b.** Time to first progression of patients with brain cancer for period 1998-2016 (N=4,092).



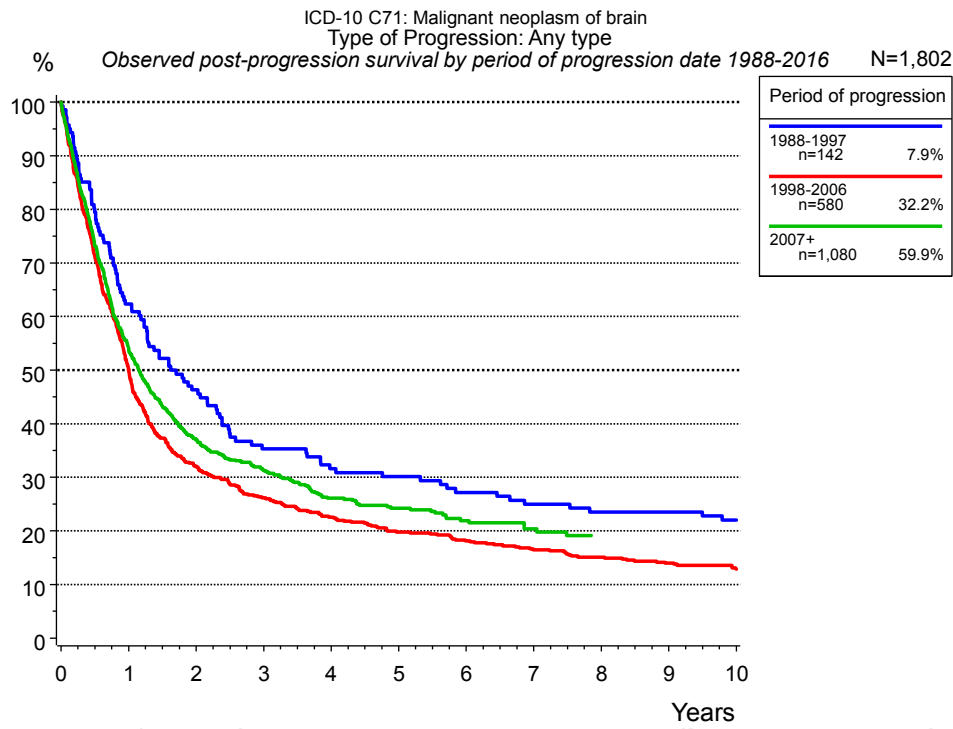


**Figure 5c.** Observed post-progression survival of 1,570 patients with brain cancer diagnosed between 1998 and 2016. These 1,570 patients with documented progression events during their course of disease represent 38.2 % of the totally 4,106 evaluated cases. Patients with cancer relapse documented via death certificates only were excluded (n=1,696, 41.3 %).

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=1,570	
Years	%
0	100.0
1	50.9
2	33.2
3	27.4
4	23.5
5	21.3
6	19.1
7	17.7
8	16.3
9	14.6
10	13.6

**Table 5d.** Observed post-progression survival of patients with brain cancer for period 1998-2016 (N=1,570).



**Figure 5e.** Observed post-progression (any type) survival of 1,802 patients with brain cancer diagnosed between 1988 and 2016 by period of progression.

Years	Period of progression		
	1988-1997 n=142 %	1998-2006 n=580 %	2007+ n=1,080 %
0	100.0	100.0	100.0
1	62.3	50.1	54.0
2	46.3	31.9	37.0
3	35.3	26.2	31.3
4	31.6	22.5	26.1
5	30.1	19.8	24.2
6	27.2	18.1	21.9
7	25.0	16.4	20.4
8	23.5	15.1	
9	23.5	14.0	
10	22.0	12.9	

**Table 5f.** Observed post-progression (any type) survival of patients with brain cancer for period 1988-2016 by period of progression (N=1,802).

## 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

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