

# Munich Cancer Registry



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## ICD-10 C40, C41: Bone cancer

### Survival

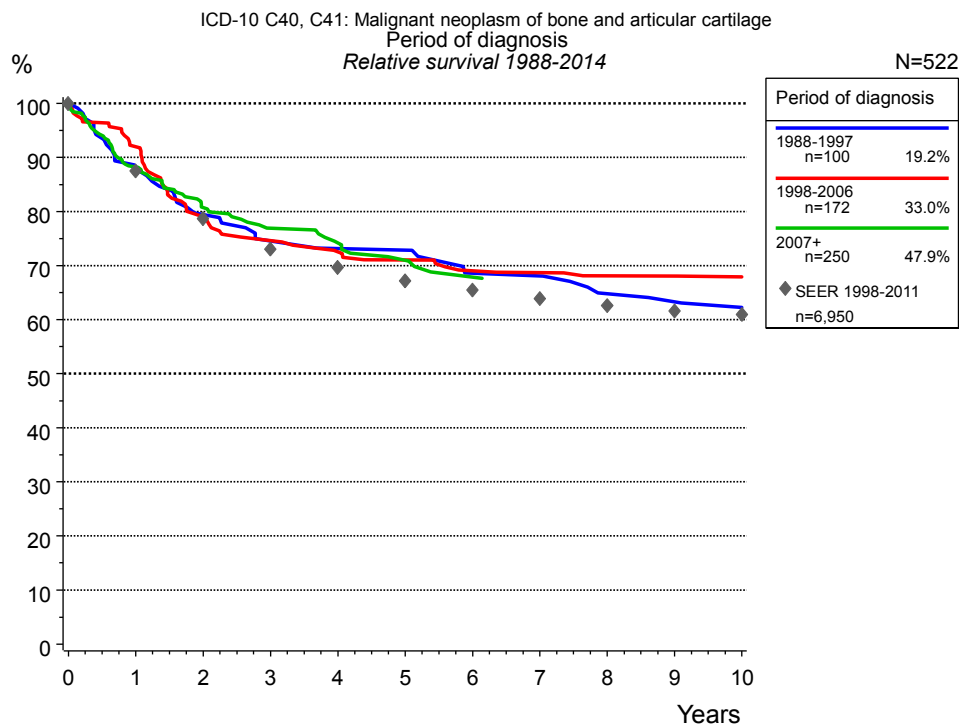
Year of diagnosis	1988-1997	1998-2014
Patients	105	520
Diseases	105	522
Cases evaluated	102	425
Creation date	03/02/2016	
Export date	12/23/2015	
Population	4.64 m	



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

<http://www.tumorregister-muenchen.de/en/facts/surv/sC4041E-ICD-10-C40-C41-Bone-cancer-survival.pdf>



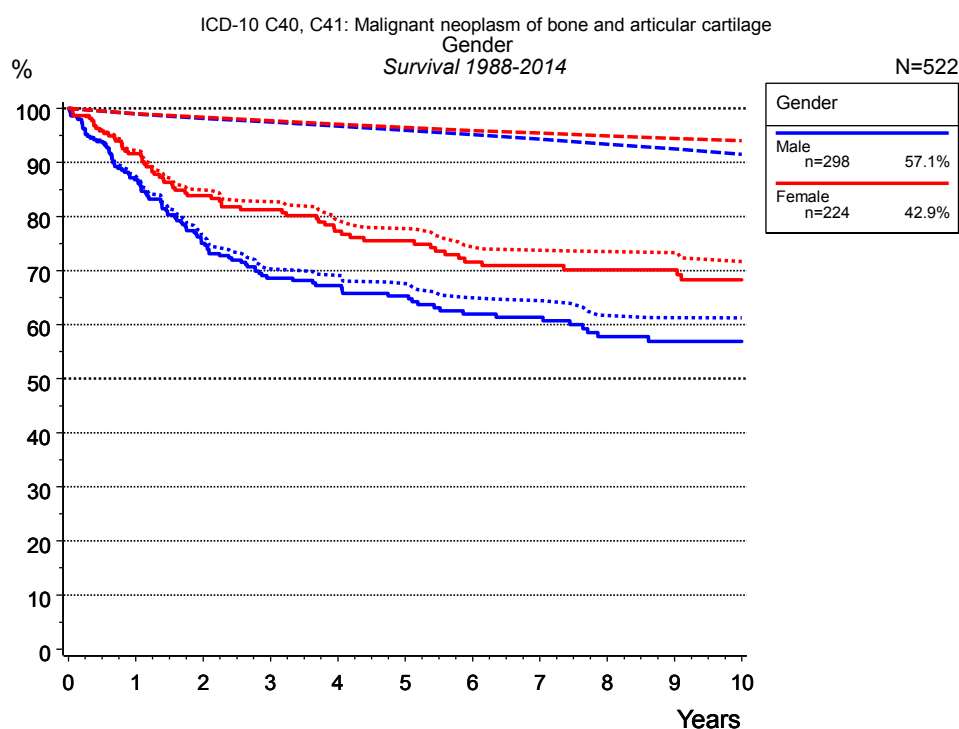
**Figure 1a.** Relative survival of patients with bone cancer by period of diagnosis. Included in the evaluation are 522 cases diagnosed between 1988 and 2014.

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 1998 to 2011, and are represented by gray 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=100		1998-2006 n=172		2007+ n=250	
	obs. %	rel. %	obs. %	rel. %	obs. %	rel. %
0	100.0	100.0	100.0	100.0	100.0	100.0
1	87.9	88.3	91.3	92.0	87.6	88.2
2	78.7	79.4	78.0	79.0	79.5	80.8
3	73.5	74.5	72.9	74.6	75.1	76.9
4	71.4	73.2	70.3	72.5	72.3	74.2
5	71.4	72.9	68.3	71.0	69.2	70.9
6	65.9	68.6	65.7	69.0	66.2	67.9
7	65.9	68.1	65.0	68.7		
8	61.5	64.8	63.7	68.1		
9	60.4	63.3	63.7	68.1		
10	59.3	62.3	63.0	67.9		

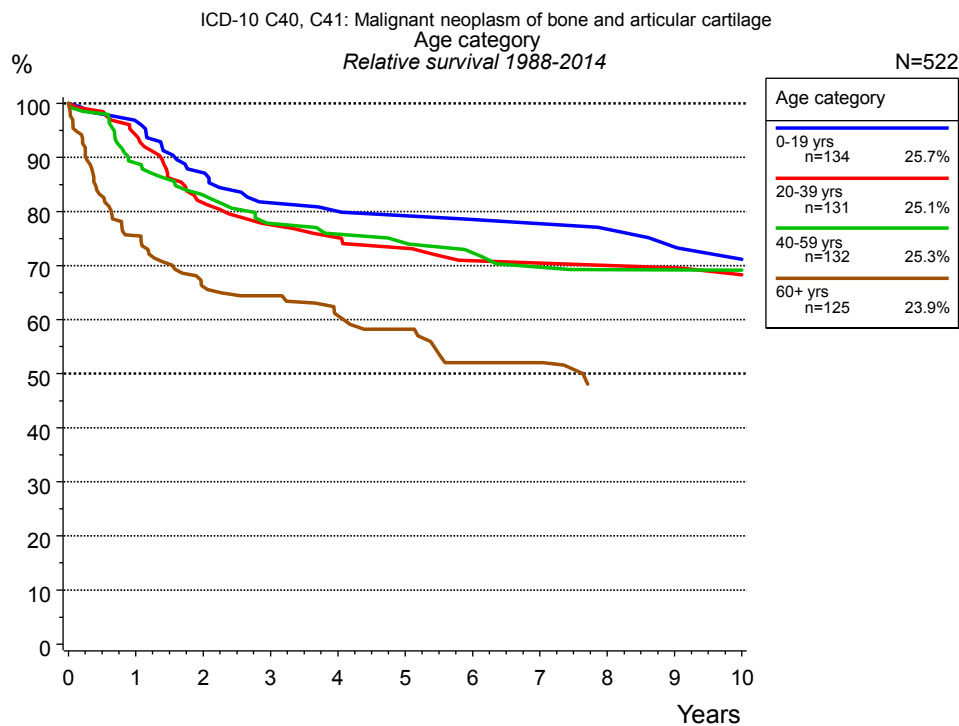
**Table 1b.** Observed (obs.) and relative (rel.) survival of patients with bone cancer by period of diagnosis for period 1988-2014 (N=522).



**Figure 2a.** Survival of patients with bone cancer by gender. Included in the evaluation are 522 cases diagnosed between 1988 and 2014.

Years	Gender			
	Male n=298		Female n=224	
	obs. %	rel. %	obs. %	rel. %
0	100.0	100.0	100.0	100.0
1	86.8	87.5	91.6	92.2
2	75.1	76.3	83.8	84.9
3	68.6	70.3	81.3	82.8
4	67.3	69.1	77.3	79.3
5	65.3	67.6	75.5	77.7
6	62.0	65.0	71.6	74.3
7	61.4	64.4	70.9	73.8
8	57.8	61.7	70.1	73.5
9	56.9	61.3	70.1	73.3
10	56.9	61.3	68.3	71.6

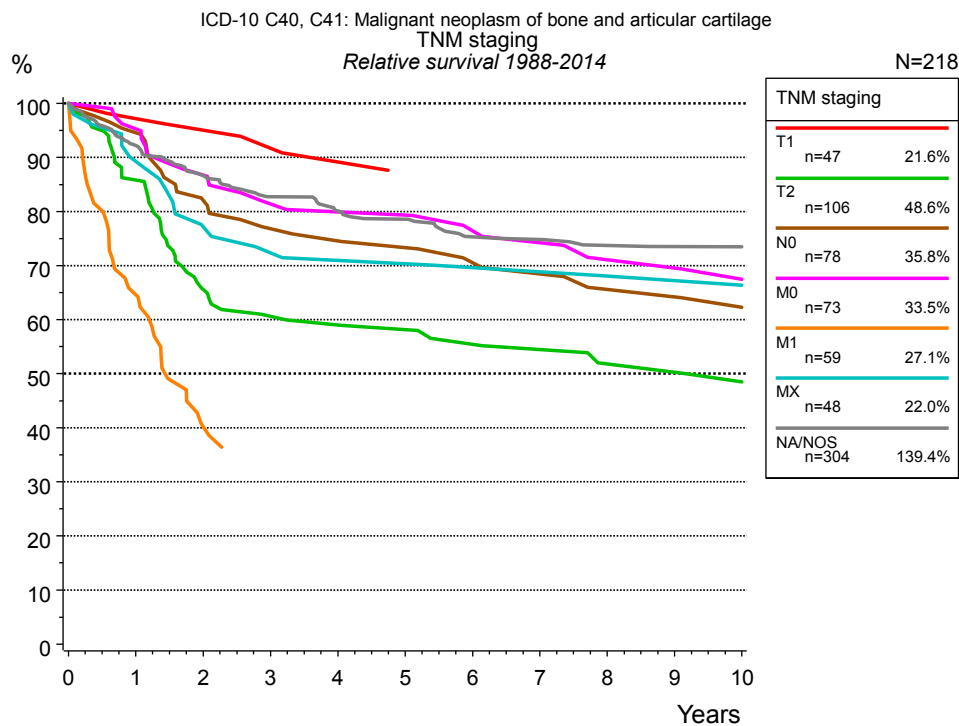
**Table 2b.** Observed (obs.) and relative (rel.) survival of patients with bone cancer by gender for period 1988-2014 (N=522).



**Figure 3a.** Relative survival of patients with bone cancer by age category. Included in the evaluation are 522 cases diagnosed between 1988 and 2014.

Years	Age category							
	0-19 yrs n=134		20-39 yrs n=131		40-59 yrs n=132		60+ yrs n=125	
	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	96.9	96.7	95.2	94.1	89.0	89.0	73.4	75.5
2	87.9	87.1	82.0	81.6	82.4	83.0	62.0	66.1
3	81.7	81.6	77.6	77.5	76.7	77.8	59.2	64.4
4	80.8	80.0	75.8	75.1	74.5	75.8	53.9	60.8
5	79.8	79.2	73.8	73.2	73.3	74.1	50.6	58.3
6	78.5	78.5	70.7	70.9	70.6	72.4	43.4	52.0
7	78.5	77.8	70.7	70.4	67.8	69.7	43.4	52.0
8	76.9	76.7	70.7	70.0	66.2	69.3	37.3	48.1
9	75.0	73.4	70.7	69.6	66.2	69.2	37.3	48.1
10	73.1	71.2	68.9	68.3	66.2	69.1	37.3	48.1

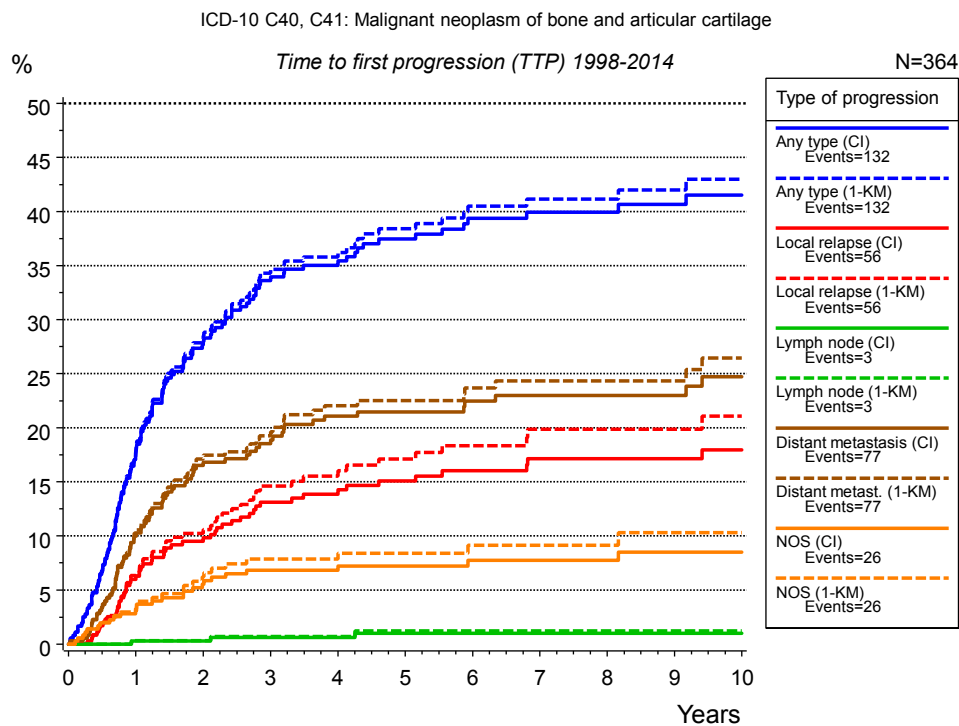
**Table 3b.** Observed (obs.) and relative (rel.) survival of patients with bone cancer by age category for period 1988-2014 (N=522).



**Figure 4a.** Relative survival of patients with bone cancer by TNM staging. For 219 of 522 cases diagnosed between 1988 and 2014 valid data could be obtained for this item. For a total of 218 cases an evaluable classification was established. The accumulated percentage exceeds the 100% value because patients are potentially considered in more than one subgroup. The grey line represents the subgroup of 304 patients with missing values regarding TNM staging (58.2 % of 522 patients, the percent values of all other categories are related to n=218).

TNM staging														
Years	T1 n=47		T2 n=106		N0 n=78		M0 n=73		M1 n=59		MX n=48		NA/NOS n=304	
	obs. %	rel. %	obs. %	rel. %	obs. %	rel. %	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	100.0	100.0	100.0	100.0	100.0	100.0
1	97.8	97.2	85.4	85.8	94.8	94.6	95.7	95.3	65.2	64.6	89.2	89.2	91.4	92.2
2	95.3	95.1	64.6	65.6	81.2	82.1	86.9	86.8	40.0	40.2	76.2	77.2	85.3	86.6
3	92.3	91.7	59.3	60.6	75.5	76.8	80.4	81.4			71.7	72.4	80.8	82.7
4	88.8	89.1	58.1	59.0	74.0	74.5	78.6	79.9			69.4	70.9	77.9	80.1
5			56.8	58.2	72.3	73.4	78.6	79.3			69.4	70.3	76.1	78.6
6			53.9	55.5	68.5	70.6	74.4	76.4			66.6	69.6	72.1	75.3
7			52.3	54.5	66.6	68.5	72.3	74.2			66.6	68.8	71.6	74.8
8			48.7	51.8	62.5	65.6	67.8	71.1			63.4	68.0	69.7	73.7
9			48.7	50.3	62.5	64.2	67.8	69.6			63.4	67.2	68.9	73.5
10			46.6	48.5	60.4	62.3	65.4	67.5			63.4	66.3	68.9	73.5

**Table 4b.** Observed (obs.) and relative (rel.) survival of patients with bone cancer by TNM staging for period 1988-2014 (N=411).

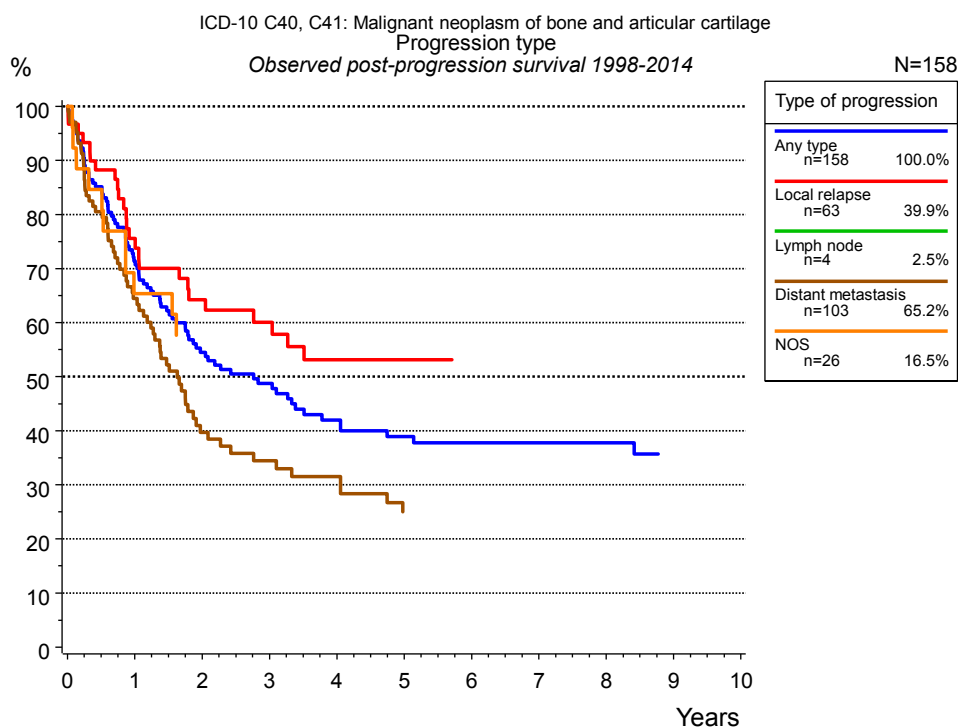


**Figure 5a.** Time to first progression of 364 patients with bone cancer diagnosed between 1998 and 2014 (M0 only in solid cancers) estimated by cumulative incidence function (CI, solid line) accounting for death as competing risk and by inverse Kaplan-Meier estimate (1-KM, dashed line). The frequency of events may be underestimated due to underreporting.

Years	Type of progression						
	Any type (CI)	Any type (1-KM)	Local relapse (CI)	Local relapse (1-KM)	Lymph node (CI)	Lymph node (1-KM)	Distant metastasis (CI)
	n=364 %	n=364 %	n=364 %	n=364 %	n=364 %	n=364 %	n=364 %
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	17.6	17.9	6.3	6.6	0.3	0.3	10.0
2	27.7	28.2	9.5	10.2	0.3	0.3	16.5
3	33.6	34.3	13.1	14.6	0.6	0.7	18.5
4	35.0	35.8	13.9	15.5	0.6	0.7	21.1
5	37.5	38.4	15.1	17.1	1.0	1.2	21.5
6	39.4	40.5	16.0	18.4	1.0	1.2	22.5
7	39.9	41.1	17.1	19.9	1.0	1.2	23.0
8	39.9	41.1	17.1	19.9	1.0	1.2	23.0
9	40.7	42.0	17.1	19.9	1.0	1.2	23.0
10	41.5	43.0	18.0	21.1	1.0	1.2	24.7

<i>cont'd</i>	Type of progression		
	Distant metast. (1- KM)	NOS (CI)	NOS (1-KM)
	n=364	n=364	n=364
Years	%	%	%
0	0.0	0.0	0.0
1	10.3	3.1	3.3
2	17.1	5.5	6.2
3	19.3	6.8	7.9
4	22.1	6.8	7.9
5	22.5	7.2	8.4
6	23.7	7.7	9.1
7	24.3	7.7	9.1
8	24.3	7.7	9.1
9	24.3	8.5	10.3
10	26.5	8.5	10.3

**Table 5b.** Time to first progression of patients with bone cancer for period 1998-2014 (N=364).



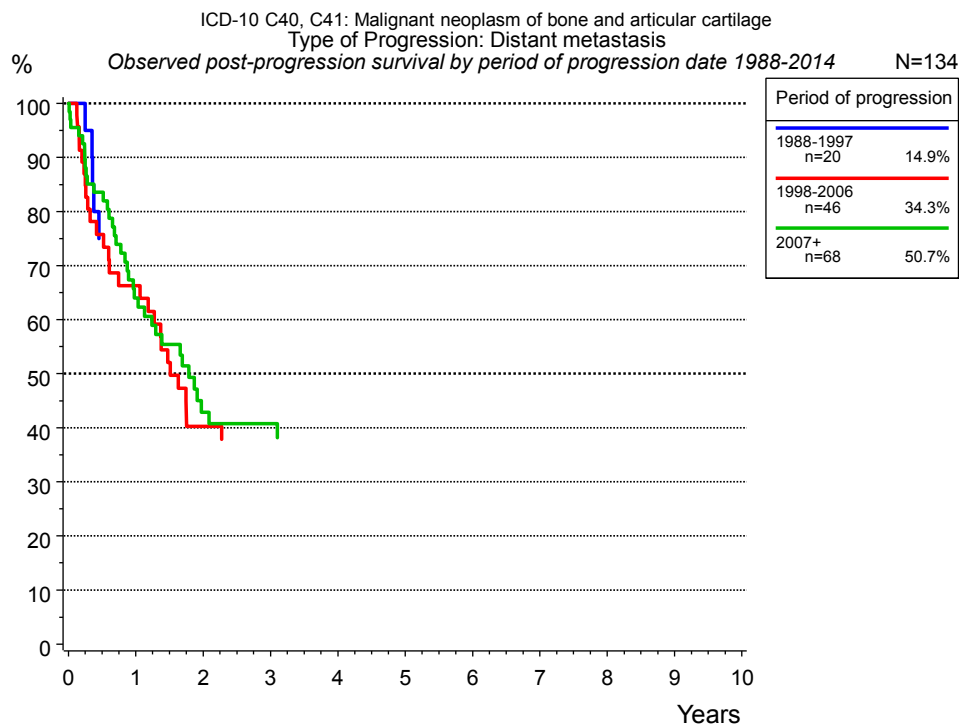
**Figure 5c.** Observed post-progression survival of 158 patients with bone cancer diagnosed between 1998 and 2014. These 158 patients with documented progression events during their course of disease represent 38.0% of the totally 416 evaluated cases (incl. M1, n=52, 12.5%). Patients with cancer relapse documented via death certificates only were excluded (n=26, 6.3%). Multiple progression types on different sites are included in the evaluation even when not occurring synchronously. The NOS (not otherwise specified) class is included under the condition, that it is the one and only progression type during the course of disease. Subgroups with sample size <15 are dropped from the chart.

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.

Years	Type of progression				
	Any type n=158 %	Local relapse n=63 %	Lymph node n=4 %	Distant metastasis n=103 %	NOS n=26 %
0	100.0	100.0	100.0	100.0	100.0
1	71.4	75.6	100.0	64.5	65.4
2	54.5	64.3	100.0	39.7	57.7
3	48.7	60.1	100.0	34.5	
4	42.0	53.1		31.5	
5	38.9	53.1		25.0	
6	37.8	53.1		25.0	
7	37.8	53.1		25.0	
8	37.8	53.1		25.0	
9	35.7	53.1		25.0	
10		53.1			

**Table 5d.** Observed post-progression survival of patients with bone cancer for period 1998-2014 (N=158).





**Figure 5e.** Observed post-progression (distant metastasis) survival of 134 patients with bone cancer diagnosed between 1988 and 2014 by period of progression.

Years	Period of progression		
	1988-1997 n=20 %	1998-2006 n=46 %	2007+ n=68 %
0	100.0	100.0	100.0
1		66.3	64.0
2		40.3	42.9
3			40.7
4			38.2

**Table 5f.** Observed post-progression (distant metastasis) survival of patients with bone cancer for period 1988-2014 by period of progression (N=134).

## 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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**Index of figures and tables**

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