

# Munich Cancer Registry



- ▶ Incidence and Mortality
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## ST: Sarcoma (morph.)

### Survival

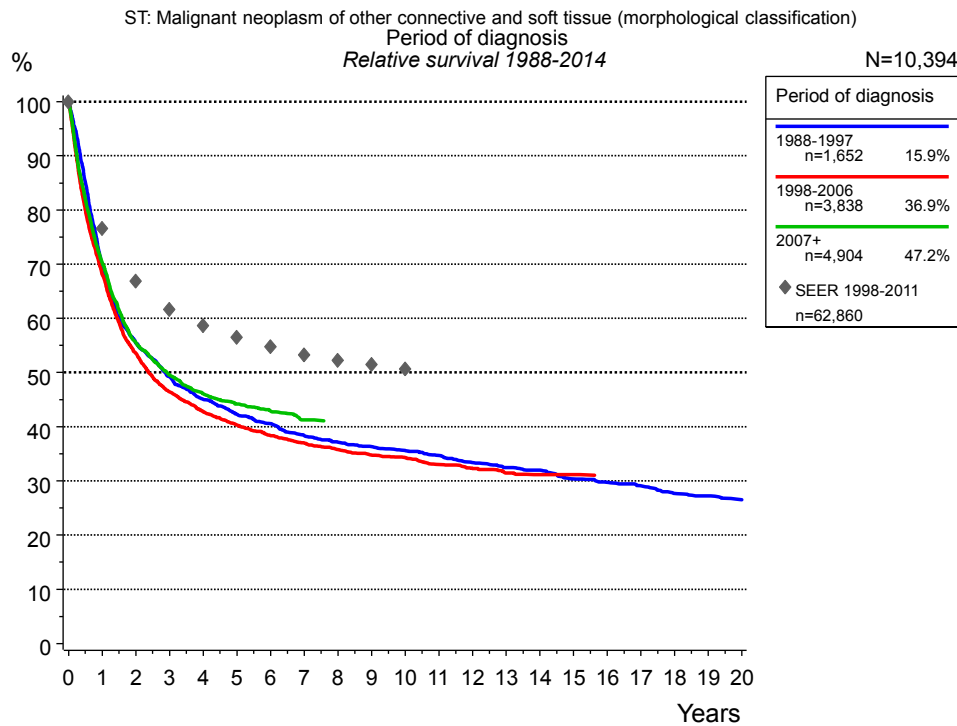
Year of diagnosis	1988-1997	1998-2014
Patients	1,791	10,739
Diseases	1,799	10,793
Cases evaluated	1,658	8,796
Creation date	04/11/2016	
Export date	12/23/2015	
Population	4.64 m	



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

[http://www.tumorregister-muenchen.de/en/facts/surv/shST\\_\\_E-ST-Sarcoma-morph.-survival.pdf](http://www.tumorregister-muenchen.de/en/facts/surv/shST__E-ST-Sarcoma-morph.-survival.pdf)



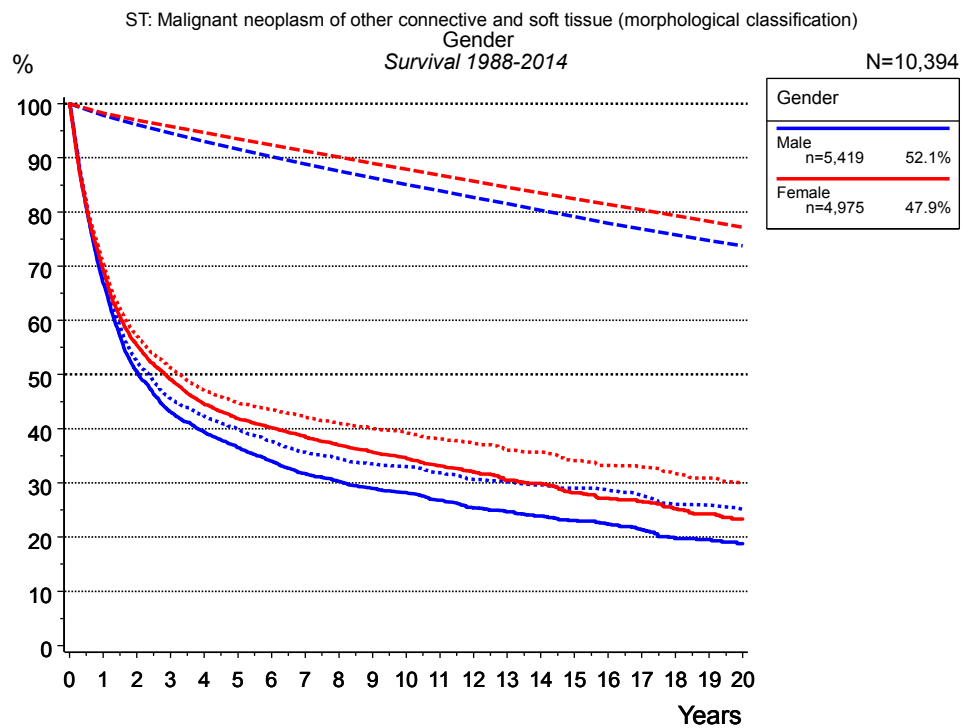
**Figure 1a.** Relative survival of patients with sarcoma (morph.) by period of diagnosis. Included in the evaluation are 10,394 cases diagnosed between 1988 and 2014.

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=1,652		1998-2006 n=3,838		2007+ n=4,904	
	obs. %	rel. %	obs. %	rel. %	obs. %	rel. %
0	100.0	100.0	100.0	100.0	100.0	100.0
1	68.5	69.7	66.8	68.1	68.8	70.3
2	53.7	55.4	51.7	53.5	53.5	55.5
3	47.1	49.2	44.3	46.5	47.0	49.5
4	42.6	45.1	40.3	42.8	43.2	46.1
5	39.4	42.3	37.4	40.3	40.8	44.2
6	37.3	40.6	35.1	38.4	39.0	42.9
7	34.9	38.4	33.5	37.0	37.0	41.3
8	33.3	37.1	31.9	35.8		
9	32.2	36.4	30.6	34.8		
10	31.1	35.6	29.8	34.3		
11	29.9	34.7	28.3	33.0		
12	28.4	33.4	27.3	32.3		
13	27.3	32.5	26.2	31.5		
14	26.6	32.0	25.6	31.2		
15	24.9	30.4	25.5	31.2		
16	24.0	29.8				
17	23.2	29.1				
18	21.8	27.7				
19	21.2	27.2				
20	20.4	26.6				

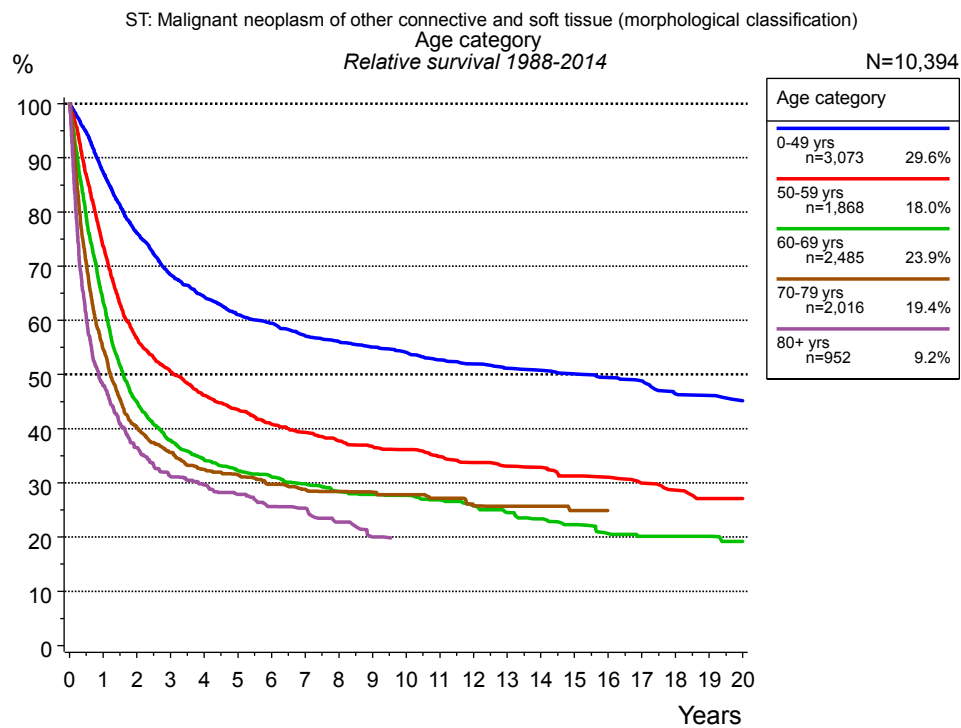
**Table 1b.** Observed (obs.) and relative (rel.) survival of patients with sarcoma (morph.) by period of diagnosis for period 1988-2014 (N=10,394).



**Figure 2a.** Survival of patients with sarcoma (morph.) by gender. Included in the evaluation are 10,394 cases diagnosed between 1988 and 2014.

Years	Gender			
	Male n=5,419		Female n=4,975	
	obs. %	rel. %	obs. %	rel. %
0	100.0	100.0	100.0	100.0
1	66.8	68.3	69.3	70.5
2	50.6	52.6	55.4	57.1
3	43.1	45.6	49.1	51.2
4	39.4	42.4	44.6	47.1
5	36.5	39.9	41.9	44.8
6	34.0	37.7	40.2	43.5
7	31.7	35.7	38.6	42.2
8	30.2	34.5	37.0	41.0
9	29.0	33.5	35.7	40.1
10	28.2	33.1	34.6	39.3
11	26.8	31.9	33.1	38.1
12	25.4	30.6	32.0	37.3
13	24.6	30.2	30.5	36.0
14	23.9	29.6	30.0	35.7
15	23.1	29.1	28.2	34.1
16	22.4	28.7	27.2	33.2
17	21.4	27.7	26.6	32.9
18	19.7	26.0	25.3	31.7
19	19.5	25.9	24.3	30.9
20	18.8	25.1	23.4	30.0

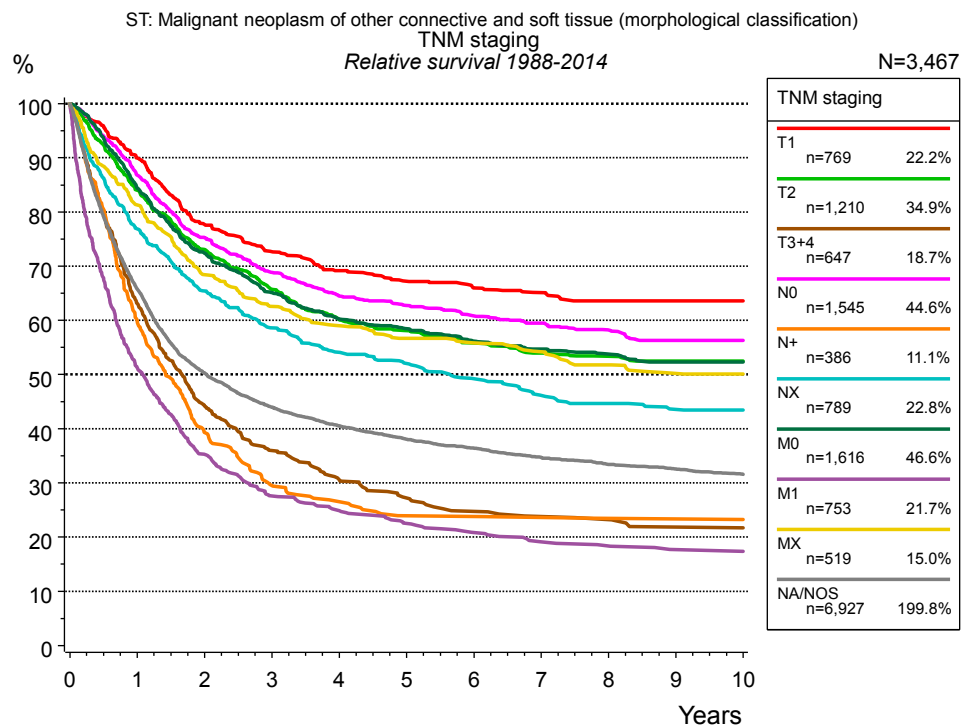
**Table 2b.** Observed (obs.) and relative (rel.) survival of patients with sarcoma (morph.) by gender for period 1988-2014 (N=10,394).



**Figure 3a.** Relative survival of patients with sarcoma (morph.) by age category. Included in the evaluation are 10,394 cases diagnosed between 1988 and 2014.

Years	Age category									
	0-49 yrs n=3,073		50-59 yrs n=1,868		60-69 yrs n=2,485		70-79 yrs n=2,016		80+ yrs n=952	
	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
1	87.1	87.3	73.2	73.7	62.6	63.4	52.9	54.7	43.3	47.9
2	75.9	76.1	56.1	56.7	43.7	44.9	37.7	40.2	29.6	36.5
3	68.1	68.4	49.7	50.6	36.3	37.9	32.2	35.6	22.5	31.2
4	64.1	64.4	45.0	46.1	32.4	34.3	28.2	32.5	18.8	29.6
5	60.7	61.0	42.2	43.6	30.0	32.2	26.0	31.5	15.4	27.9
6	59.0	59.4	39.3	40.9	28.4	31.1	23.5	29.8	12.4	25.6
7	56.7	57.1	37.4	39.3	26.7	29.8	21.6	28.8	10.7	25.4
8	55.4	56.0	35.6	37.7	24.9	28.4	20.5	28.4	8.0	22.8
9	54.3	55.0	34.4	36.8	23.9	27.9	18.7	28.3	5.7	20.0
10	53.3	54.1	33.5	36.2	23.2	27.7	17.3	27.8		
11	51.8	52.7	31.9	34.9	21.9	26.9	15.5	27.2		
12	50.9	51.9	30.5	33.8	20.4	25.8	13.3	25.7		
13	50.0	51.1	29.5	33.1	18.7	24.5	12.3	25.7		
14	49.5	50.8	29.1	32.9	17.3	23.4	11.4	25.7		
15	48.7	50.1	27.2	31.3	15.9	22.3	9.5	24.9		
16	47.9	49.4	26.7	31.1	14.0	20.6	8.6	24.9		
17	47.3	48.8	25.1	30.0	12.9	20.1	8.6	24.9		
18	44.7	46.4	23.6	28.7	12.5	20.1				
19	44.4	46.1	21.9	27.1	12.0	20.1				
20	43.3	45.2	21.9	27.1	10.5	19.2				

**Table 3b.** Observed (obs.) and relative (rel.) survival of patients with sarcoma (morph.) by age category for period 1988-2014 (N=10,394).

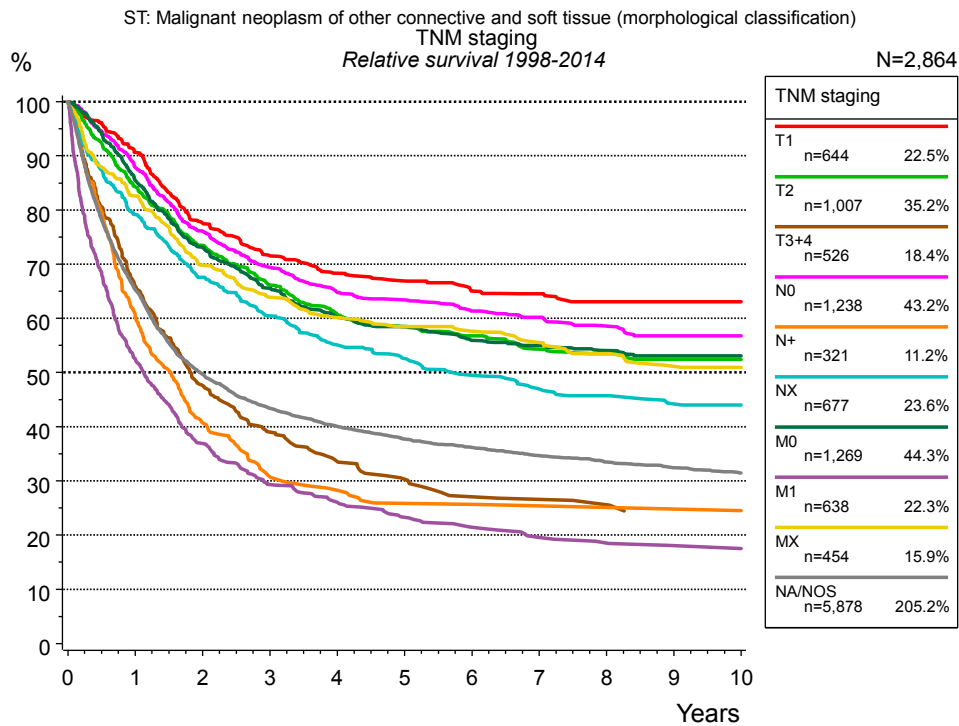


**Figure 4a.** Relative survival of patients with sarcoma (morph.) by TNM staging. For 3,470 of 10,394 cases diagnosed between 1988 and 2014 valid data could be obtained for this item. For a total of 3,467 cases an evaluable classification was established. The accumulated percentage exceeds the 100% value because patients are potentially considered in more than one subgroup. The grey line represents the subgroup of 6,927 patients with missing values regarding TNM staging (66.6 % of 10,394 patients, the percent values of all other categories are related to n=3,467).

TNM staging														
Years	T1 n=769		T2 n=1,210		T3+4 n=647		N0 n=1,545		N+ n=386		NX n=789		M0 n=1,616	
	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	88.1	90.0	82.3	84.0	61.6	63.1	85.3	86.8	58.4	59.5	74.8	76.9	82.8	84.4
2	74.7	77.7	70.4	73.1	42.3	44.2	72.8	75.2	38.1	39.3	62.3	65.4	69.9	72.3
3	68.8	72.7	62.2	65.7	33.8	36.0	65.6	68.9	28.4	29.5	54.6	58.6	61.9	65.2
4	64.4	69.2	56.2	60.1	28.1	30.5	60.5	64.5	25.4	26.5	49.4	54.1	56.4	60.3
5	61.7	67.2	53.2	58.1	24.7	27.2	58.0	62.8	22.4	23.9	46.5	52.1	54.0	58.5
6	59.6	66.0	50.4	55.8	22.2	24.7	55.4	60.8	22.4	23.8	43.1	49.3	51.1	56.2
7	57.9	65.1	48.0	54.0	20.9	23.8	53.6	59.5	22.0	23.6	39.5	46.2	49.1	54.7
8	56.0	63.6	46.6	53.4	20.4	23.2	51.5	58.2	21.5	23.5	37.9	44.7	47.5	53.8
9	54.9	63.6	45.4	52.5	18.8	21.9	49.4	56.3	21.5	23.3	36.0	43.6	45.8	52.3
10	54.3	63.6	44.9	52.5	18.8	21.7	48.8	56.3	21.5	23.2	35.7	43.4	45.2	52.3

<i>cont'd</i>	TNM staging					
	M1 n=753		MX n=519		NA/NOS n=6,927	
	obs. %	rel. %	obs. %	rel. %	obs. %	rel. %
Years						
0	100.0	100.0	100.0	100.0	100.0	100.0
1	50.2	51.2	79.3	81.3	64.5	65.7
2	34.1	35.3	65.3	68.4	48.6	50.2
3	26.4	27.6	58.5	62.6	42.0	44.0
4	23.9	24.9	54.2	59.0	38.3	40.6
5	21.2	22.5	50.9	56.7	35.4	38.1
6	19.4	20.8	49.1	55.8	33.5	36.4
7	17.6	19.1	46.9	54.2	31.6	34.7
8	17.1	18.4	44.2	51.8	30.0	33.4
9	16.2	17.7	41.8	50.2	28.9	32.6
10	16.2	17.4	41.4	50.1	27.6	31.6

**Table 4b.** Observed (obs.) and relative (rel.) survival of patients with sarcoma (morph.) by TNM staging for period 1988-2014 (N=3,467).



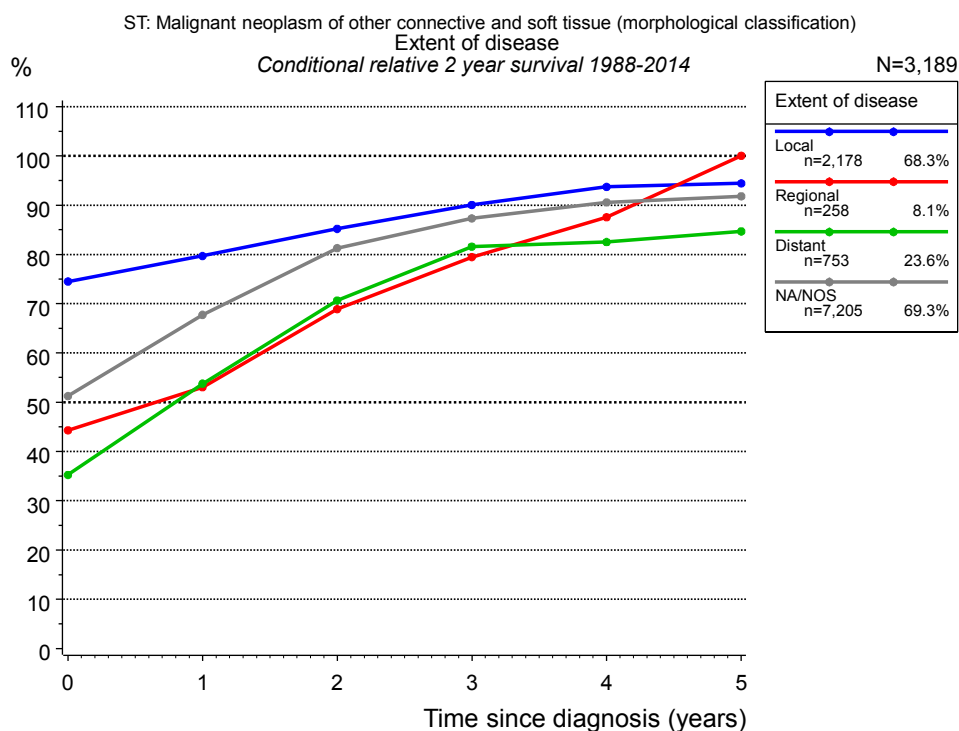
**Figure 4c.** Relative survival of patients with sarcoma (morph.) by TNM staging. For 2,867 of 8,742 cases diagnosed between 1998 and 2014 valid data could be obtained for this item. For a total of 2,864 cases an evaluable classification was established. The accumulated percentage exceeds the 100% value because patients are potentially considered in more than one subgroup. The grey line represents the subgroup of 5,878 patients with missing values regarding TNM staging (67.2 % of 8,742 patients, the percent values of all other categories are related to n=2,864).

TNM staging														
	T1 n=644		T2 n=1,007		T3+4 n=526		N0 n=1,238		N+ n=321		NX n=677		M0 n=1,269	
Years	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	88.7	90.6	82.6	84.3	64.4	65.9	86.4	87.9	59.1	60.1	77.1	79.2	83.8	85.4
2	74.4	77.6	70.8	73.5	45.6	47.6	73.6	76.1	39.5	40.7	64.3	67.6	70.6	73.1
3	67.6	71.6	62.6	66.2	36.7	39.0	66.2	69.4	29.8	30.8	56.3	60.4	62.3	65.5
4	63.4	68.3	56.6	60.6	31.1	33.6	60.9	64.8	27.2	28.3	50.4	55.1	56.5	60.3
5	61.2	66.9	53.5	58.5	27.6	30.3	58.7	63.4	24.4	25.9	47.1	52.6	54.2	58.5
6	58.4	65.1	51.1	56.8	24.3	27.1	56.0	61.4	24.4	25.7	43.3	49.5	51.0	56.0
7	57.2	64.5	48.2	54.3	23.7	26.6	54.3	60.2	23.8	25.4	40.3	47.0	49.6	55.0
8	55.2	63.1	46.7	53.5	22.9	25.6	52.0	58.5	23.1	25.1	38.9	45.7	48.1	54.0
9	54.4	63.1	45.1	52.5			50.1	56.8	23.1	24.8	36.7	44.2	46.9	53.1
10	54.0	63.1	45.1	52.5			50.1	56.8	23.1	24.5	36.2	44.0	46.7	53.1



<i>cont'd</i>	TNM staging					
	M1 n=638		MX n=454		NA/NOS n=5,878	
	obs. %	rel. %	obs. %	rel. %	obs. %	rel. %
Years						
0	100.0	100.0	100.0	100.0	100.0	100.0
1	51.4	52.5	80.5	82.6	64.0	65.3
2	35.6	36.9	66.8	69.8	48.0	49.7
3	28.1	29.4	59.9	63.9	41.4	43.4
4	25.0	26.1	55.4	60.2	37.8	40.1
5	21.9	23.3	52.7	58.5	35.1	37.8
6	20.0	21.5	50.8	57.7	33.2	36.2
7	18.0	19.6	48.2	55.6	31.5	34.7
8	17.3	18.6	45.7	53.5	29.9	33.5
9	16.4	18.1	42.7	51.2	28.7	32.5
10	16.4	17.6	42.2	51.0	27.4	31.5

**Table 4d.** Observed (obs.) and relative (rel.) survival of patients with sarcoma (morph.) by TNM staging for period 1998-2014 (N=2,864).

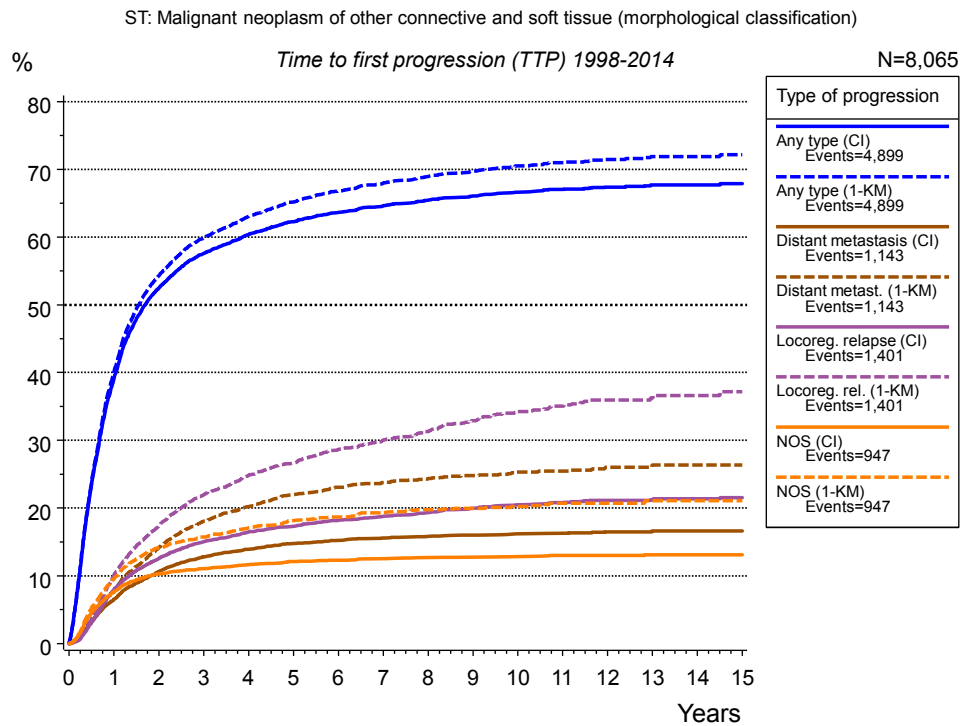


**Figure 4e.** Conditional relative 2-year survival of patients with sarcoma (morph.) by extent of disease. For 3,470 of 10,394 cases diagnosed between 1988 and 2014 valid data could be obtained for this item. For a total of 3,189 cases an evaluable classification was established. The grey line represents the subgroup of 7,205 patients with missing values regarding extent of disease (69.3% of 10,394 patients, the percent values of all other categories are related to n=3,189).

Years	Extent of disease							
	Local		Regional		Distant		NA/NOS	
	n	Cond. surv. % 2 yrs	n	Cond. surv. % 2 yrs	n	Cond. surv. % 2 yrs	n	Cond. surv. % 2 yrs
0	2,178	74.5	258	44.3	753	35.3	7,205	51.3
1	1,732	79.7	155	53.0	360	53.8	4,495	67.7
2	1,357	85.2	99	68.9	229	70.7	3,206	81.3
3	1,091	90.1	68	79.4	159	81.6	2,549	87.3
4	873	93.7	54	87.5	130	82.5	2,125	90.6
5	745	94.4	44	100.0	104	84.7	1,825	91.8

**Table 4f.** Conditional relative 2-year survival of patients with sarcoma (morph.) by extent of disease for period 1988-2014 (N=3,189).

Conditional relative survival rates refer to the relative survival probability, in this case for 2 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 4c). 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 extent of disease="Local", who are alive at least 3 years after cancer diagnosis, the conditional relative 2-year survival rate is 90.1% (n=1,091).

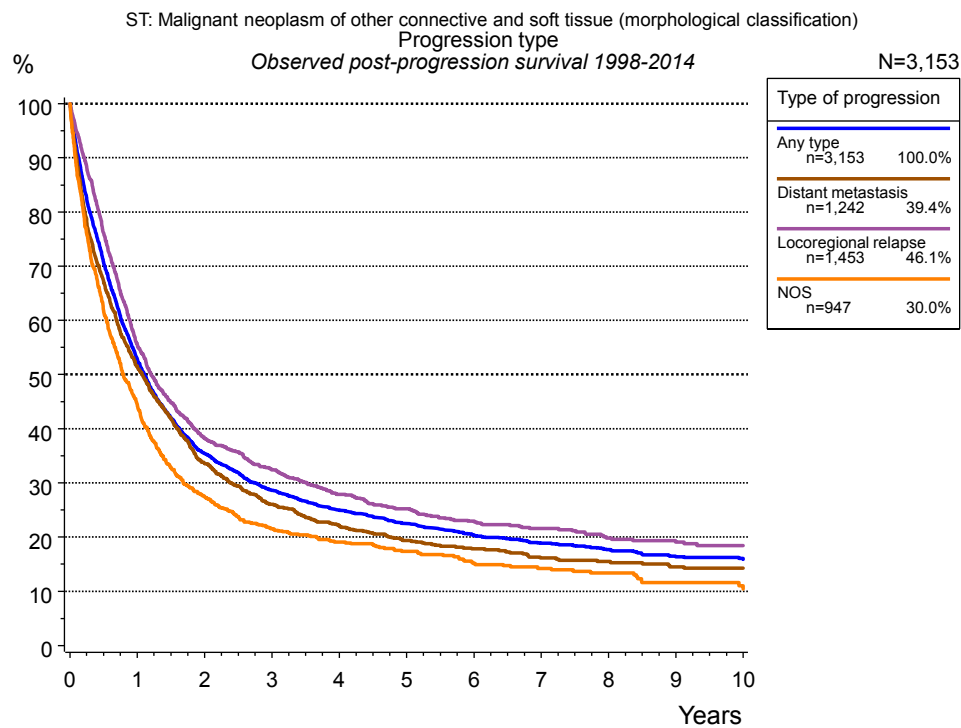


**Figure 5a.** Time to first progression of 8,065 patients with sarcoma (morph.) diagnosed between 1998 and 2014 (M0 only in solid cancers) estimated by cumulative incidence function (CI, solid line) accounting for death as competing risk and by inverse Kaplan-Meier estimate (1-KM, dashed line). The frequency of events may be underestimated due to underreporting.

Years	Type of progression						
	Any type (CI)	Any type (1-KM)	Distant metastasis (CI)	Distant metast. (1-KM)	Locoreg. relapse (CI)	Locoreg. rel. (1-KM)	NOS (CI)
	n=8,065 %	n=8,065 %	n=8,065 %	n=8,065 %	n=8,065 %	n=8,065 %	n=8,065 %
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	39.2	40.2	6.6	7.9	8.0	10.1	7.7
2	52.5	54.3	10.6	14.2	12.6	17.4	10.3
3	57.6	59.9	12.8	18.1	15.0	21.9	11.1
4	60.4	63.0	13.9	20.2	16.5	24.8	11.7
5	62.3	65.2	14.8	22.0	17.3	26.7	12.1
6	63.7	66.8	15.3	23.1	18.2	28.7	12.3
7	64.6	68.0	15.6	23.8	18.8	30.1	12.5
8	65.4	69.0	15.9	24.4	19.3	31.3	12.7
9	66.1	69.8	16.0	24.8	20.0	32.9	12.8
10	66.7	70.5	16.2	25.3	20.5	34.2	12.9
11	67.0	71.0	16.3	25.5	20.8	35.0	13.0
12	67.4	71.5	16.5	26.0	21.1	35.9	13.0
13	67.7	71.9	16.6	26.3	21.2	36.2	13.1
14	67.7	71.9	16.6	26.3	21.4	36.6	13.1
15	67.9	72.2	16.6	26.3	21.5	37.1	13.1

Type of progression	
<i>cont'd</i>	NOS (1-KM) n=8,065
Years	%
0	0.0
1	9.6
2	14.2
3	15.7
4	17.1
5	18.2
6	18.7
7	19.3
8	19.8
9	20.0
10	20.2
11	20.7
12	20.7
13	21.1
14	21.1
15	21.1

**Table 5b.** Time to first progression of patients with sarcoma (morph.) for period 1998-2014 (N=8,065).

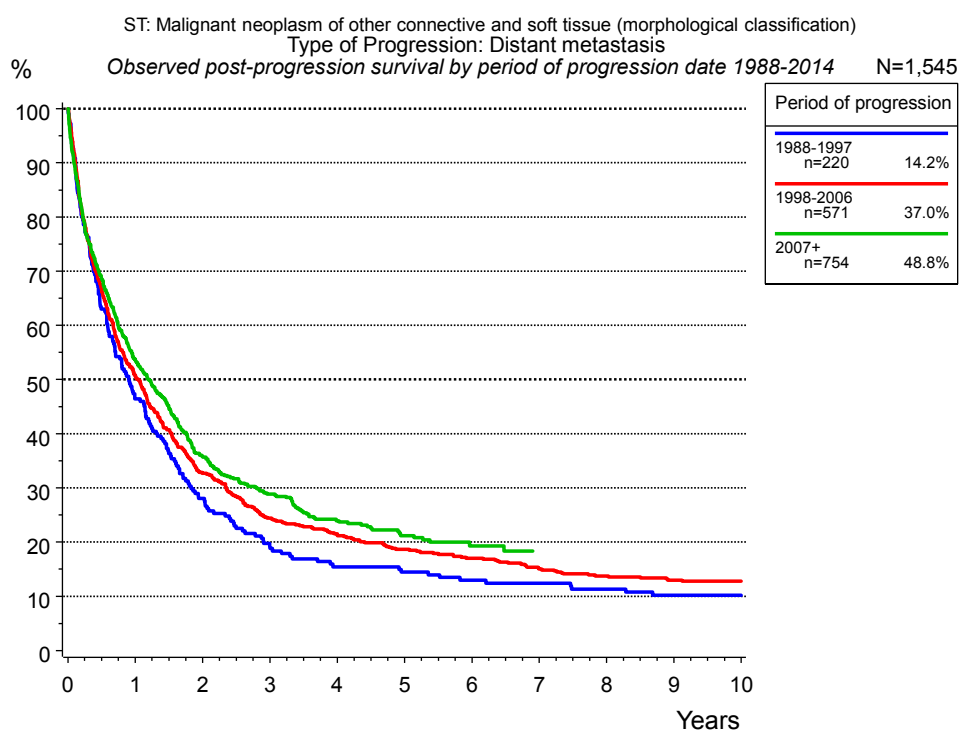


**Figure 5c.** Observed post-progression survival of 3,153 patients with sarcoma (morph.) diagnosed between 1998 and 2014. These 3,153 patients with documented progression events during their course of disease represent 36.3 % of the totally 8,678 evaluated cases (incl. M1, n=613, 7.1 %). Patients with cancer relapse documented via death certificates only were excluded (n=2,359, 27.2 %). 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.

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=3,153 %	Distant metastasis n=1,242 %	Locoregional relapse n=1,453 %	NOS n=947 %
0	100.0	100.0	100.0	100.0
1	52.8	51.4	55.5	44.4
2	35.4	33.5	38.2	27.4
3	28.7	26.0	32.4	21.6
4	25.0	22.2	27.9	19.1
5	22.5	19.4	25.3	17.4
6	20.4	17.8	22.9	15.1
7	18.9	16.1	21.6	14.2
8	17.7	15.5	19.8	13.4
9	16.4	14.5	19.1	11.6
10	15.9	14.3	18.4	10.4

**Table 5d.** Observed post-progression survival of patients with sarcoma (morph.) for period 1998-2014 (N=3,153).



**Figure 5e.** Observed post-progression (distant metastasis) survival of 1,545 patients with sarcoma (morph.) diagnosed between 1988 and 2014 by period of progression.

Years	Period of progression		
	1988-1997 n=220	1998-2006 n=571	2007+ n=754
	%	%	%
0	100.0	100.0	100.0
1	46.5	50.7	53.7
2	28.1	32.7	35.7
3	19.3	24.4	28.9
4	15.5	21.5	24.0
5	14.5	18.6	21.2
6	13.0	17.0	19.3
7	12.4	15.0	
8	11.4	13.8	
9	10.2	13.0	
10	10.2	12.8	

**Table 5f.** Observed post-progression (distant metastasis) survival of patients with sarcoma (morph.) for period 1988-2014 by period of progression (N=1,545).

## 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

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