Munich Cancer Registry

ICD-10 C67: Bladder cancer

Survival

Year of diagnosis	1988-1997	1998-2020
Patients	2,125	12,943
Diseases	2,125	12,950
Cases evaluated	1,803	8,238
Creation date	04/15/2022	
Database export	12/20/2021	
Population	4.92 m	

BERLIN

GERMANY

BAVARIA

MUNICH

Munich Cancer Registry
Cancer Registry Bavaria - Upper Bavaria Regional Center
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https://www.tumorregister-muenchen.de/en

Index of figures and tables

ICD-10 C67: Malignant neoplasm of bladder (invasive)
Period of diagnosis
Relative survival 1988-2020

N=9,923

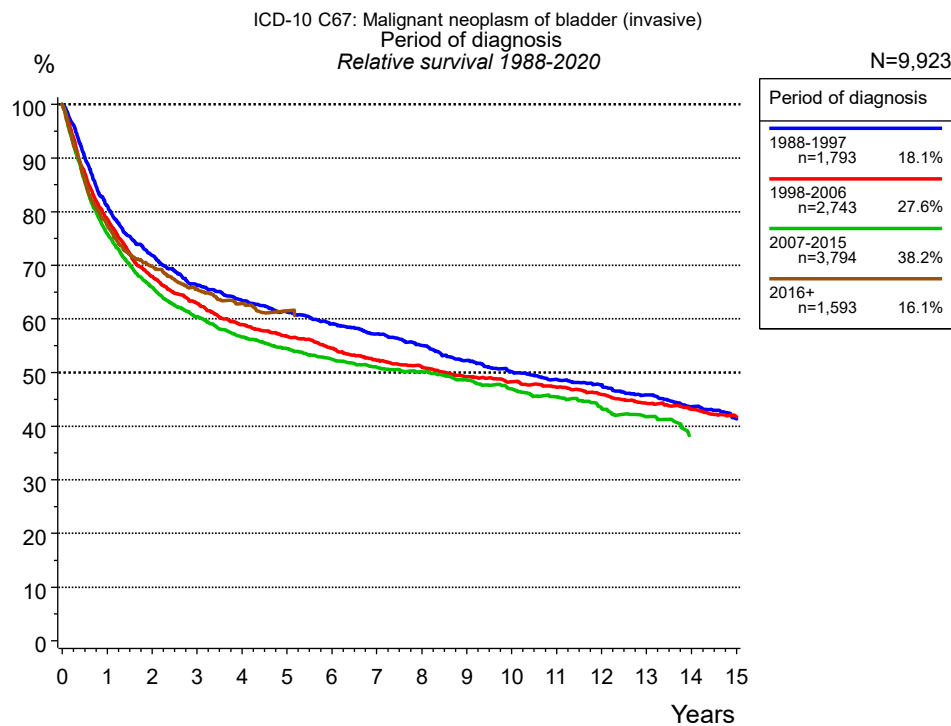| Period of diagnosis		
1988-1997 n=1,793		18.1%
1998-2006 n=2,743		27.6%
2007-2015 n=3,794		38.2%
2016+ n=1,593		16.1%

Figure 1a. Relative survival of patients with bladder cancer by period of diagnosis. Included in the evaluation are 9,923 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 to , 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.

	Period of diagnosis							
	1988-1997 n=1,793		1998-2006 n=2,743		2007-2015 n=3,794		2016+ n=1,593	
Years	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	77.2	81.2	75.0	78.6	72.5	75.9	74.1	77.4
2	65.2	71.9	62.2	67.8	60.5	65.9	64.1	69.8
3	57.6	66.3	55.5	62.9	53.4	60.4	58.0	65.6
4	53.0	63.5	50.0	58.9	48.2	56.6	53.6	62.9
5	49.1	61.3	46.4	56.8	44.6	54.5	50.9	61.5
6	45.4	59.1	43.0	54.6	41.3	52.4		
7	42.2	57.2	39.6	52.3	38.6	51.0		
8	39.0	55.1	37.2	51.0	36.4	50.1		
9	35.6	52.2	34.6	49.2	33.9	48.6		
10	32.9	50.2	32.7	48.3	31.4	47.0		
11	30.7	48.7	30.7	47.2	29.2	45.4		
12	29.0	47.7	28.6	45.9	26.7	43.3		
13	26.7	45.8	26.6	44.3	24.6	41.8		
14	24.4	43.6	24.8	43.1				
15	22.2	41.3	22.9	41.7				
Median	4.7		4.0		3.6		5.2	

Table 1b. Observed (obs.) and relative (rel.) survival of patients with bladder cancer by period of diagnosis for period 1988-2020 (N=9,923).
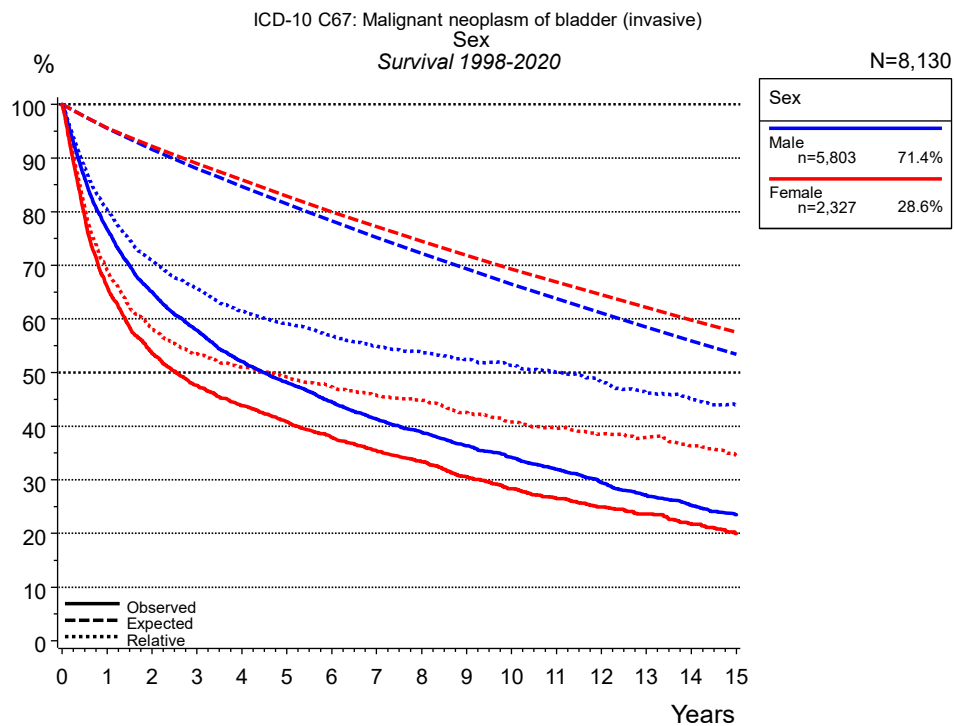
ICD-10 C67: Malignant neoplasm of bladder (invasive)
Sex
Survival 1998-2020

Figure 2a. Survival of patients with bladder cancer by sex. Included in the evaluation are 8,130 cases diagnosed between 1998 and 2020.

	Sex			
	Male n=5,803		Female n=2,327	
Years	obs. %	rel. %	obs. %	rel. %
0	100.0	100.0	100.0	100.0
1	76.7	80.4	66.0	69.1
2	65.0	70.9	53.6	58.1
3	57.9	65.7	47.6	53.5
4	52.0	61.4	43.9	51.0
5	48.2	59.1	40.8	49.2
6	44.5	56.9	38.0	47.4
7	41.3	54.9	35.4	45.8
8	38.9	53.8	33.4	44.8
9	36.3	52.4	30.6	42.6
10	34.1	51.3	28.3	40.8
11	31.9	50.1	26.5	39.6
12	29.5	48.2	24.9	38.6
13	27.1	46.2	23.6	37.9
14	25.2	45.0	21.8	36.3
15	23.5	43.9	19.9	34.5
Median	4.5		2.5	

Table 2b. Observed (obs.) and relative (rel.) survival of patients with bladder cancer by sex for period 1998-2020 (N=8,130).

ICD-10 C67: Malignant neoplasm of bladder (invasive)
Age category
Observed survival 1998-2020

Figure 3a. Observed survival of patients with bladder cancer by age category. Included in the evaluation are 8,130 cases diagnosed between 1998 and 2020.

ICD-10 C67: Malignant neoplasm of bladder (invasive)
Age category
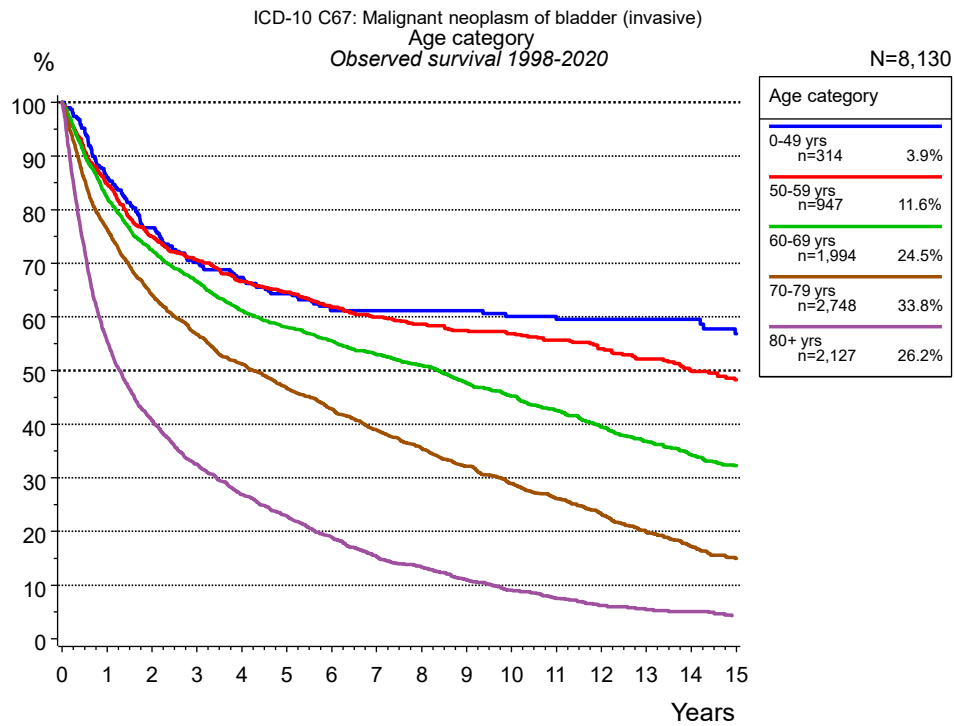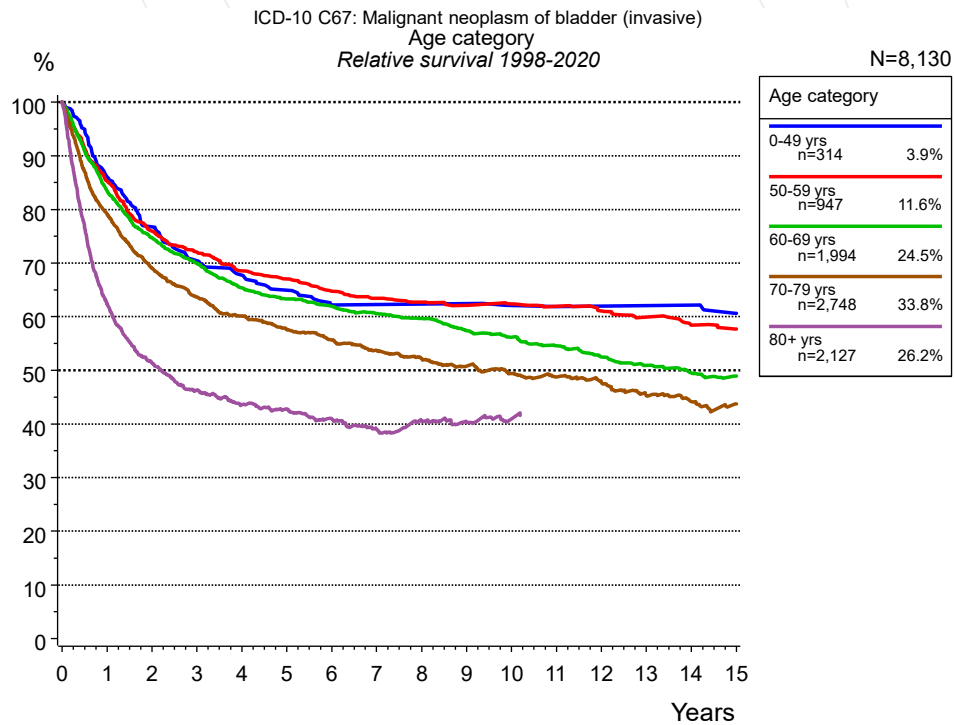*Relative survival 1998-2020*

Figure 3b. Relative survival of patients with bladder cancer by age category. Included in the evaluation are 8,130 cases diagnosed between 1998 and 2020.

	Age category									
	0-49 yrs n=314		50-59 yrs n=947		60-69 yrs n=1,994		70-79 yrs n=2,748		80+ yrs n=2,127	
Years	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	86.0	86.0	84.8	85.3	82.3	83.5	76.3	79.0	55.6	62.4
2	76.6	76.7	75.0	76.0	72.5	74.8	64.1	69.0	40.8	51.3
3	70.2	70.5	70.6	72.0	66.6	69.9	56.8	63.7	32.6	46.4
4	67.3	67.7	66.6	68.5	61.1	65.4	51.2	60.1	26.8	43.6
5	64.4	64.9	64.6	67.1	58.1	63.3	46.8	57.6	22.9	42.7
6	61.2	62.2	61.8	64.8	55.5	61.9	42.8	55.7	18.9	40.9
7	61.2	62.3	60.0	63.5	53.0	60.5	38.9	53.7	15.3	38.9
8	61.2	62.4	58.7	62.7	50.9	59.6	35.5	52.1	13.3	40.5
9	61.2	62.5	57.5	62.2	47.7	57.4	32.1	50.8	10.9	40.3
10	60.1	62.1	56.9	62.4	45.3	56.2	29.0	49.4	9.0	40.9
11	59.5	61.9	55.7	61.9	42.5	54.5	26.1	48.8	7.5	43.4
12	59.5	62.0	54.1	61.1	39.5	52.5	23.3	47.7	6.2	45.8
13	59.5	62.1	52.1	59.9	36.9	50.9	20.0	45.3	5.4	53.1
14	59.5	62.2	49.8	58.4	34.4	49.5	17.2	44.1	5.1	65.8
15	56.9	60.6	48.3	57.7	32.3	48.9	15.0	43.7		
Median	21.0		14.0		8.4		4.3		1.3	

Table 3c. Observed (obs.) and relative (rel.) survival of patients with bladder cancer by age category for period 1998-2020 (N=8,130).

ICD-10 C67: Malignant neoplasm of bladder (invasive)
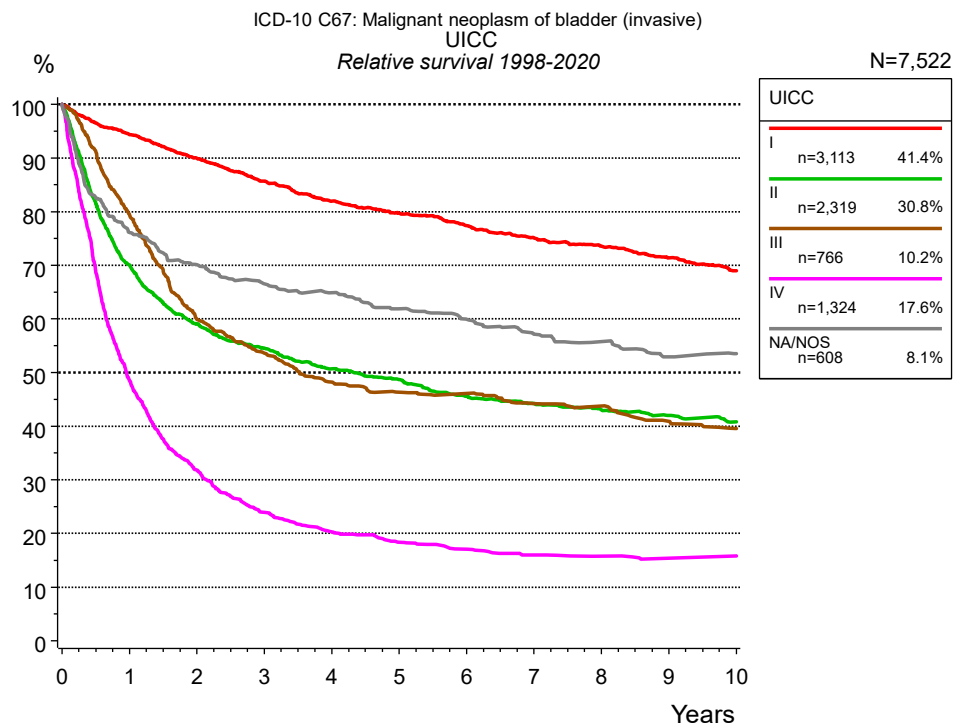UICC
Relative survival 1998-2020

Figure 4a. Relative survival of patients with bladder cancer by UICC. For 7,646 of 8,130 cases diagnosed between 1998 and 2020 valid data could be obtained for this item. For a total of 7,522 cases an evaluable classification was established. The grey line represents the subgroup of 608 patients with missing values regarding UICC (7.5 % of 8,130 patients, the percent values of all other categories are related to n=7,522).

	UICC									
	I n=3,113		II n=2,319		III n=766		IV n=1,324		NA/NOS n=608	
Years	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	90.2	94.3	66.0	70.0	76.8	79.3	47.0	48.5	72.5	76.1
2	82.5	90.0	53.1	59.0	56.2	59.9	30.1	31.9	64.1	70.1
3	75.5	85.7	47.1	54.6	49.0	53.6	22.1	23.9	58.6	66.5
4	69.4	82.0	42.0	50.7	42.8	48.2	18.3	20.3	55.0	64.9
5	64.9	79.7	38.7	48.7	39.8	46.3	16.1	18.4	50.6	61.9
6	60.5	77.4	34.8	45.6	38.4	46.1	14.6	17.1	47.1	59.9
7	56.4	75.1	32.5	44.2	35.5	44.2	13.3	16.0	43.2	57.2
8	53.0	73.5	30.4	43.1	34.2	43.8	12.7	15.8	40.8	55.8
9	49.4	71.4	28.4	42.0	30.9	40.9	12.0	15.4	37.3	52.9
10	45.8	69.0	26.5	40.8	28.8	39.6	12.0	15.8	36.4	53.5
Median	8.8		2.4		2.8		0.9		5.2	

Table 4b. Observed (obs.) and relative (rel.) survival of patients with bladder cancer by UICC for period 1998-2020 (N=7,522).

ICD-10 C67: Malignant neoplasm of bladder (invasive)
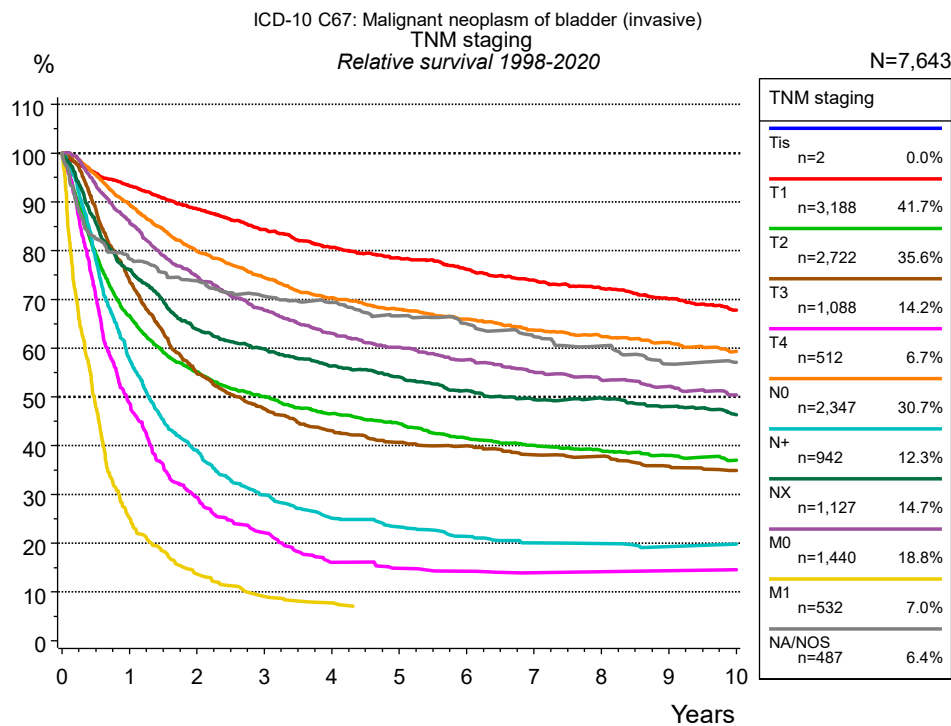TNM staging
Relative survival 1998-2020

N=7,643

Figure 4e. Relative survival of patients with bladder cancer by TNM staging. For 7,646 of 8,130 cases diagnosed between 1998 and 2020 valid data could be obtained for this item. For a total of 7,643 cases an evaluable classification was established. The accumulated percentage exceeds the 100 % value because patients are potientially considered in more than one subgroup. The grey line represents the subgroup of 487 patients with missing values regarding TNM staging (6.0 % of 8,130 patients, the percent values of all other categories are related to n=7,643). Subgroups with sample size <20 are omitted from the chart.

| | TNM staging | | | | | | | | | | | | | |
| | T1 n=3,188 | | T2 n=2,722 | | T3 n=1,088 | | T4 n=512 | | N0 n=2,347 | | N+ n=942 | | NX n=1,127 | |
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	89.2	93.3	63.1	66.6	71.5	73.7	47.0	48.7	86.9	89.5	56.1	57.6	71.8	76.1
2	81.3	88.6	49.9	55.1	51.8	54.8	27.5	29.4	75.2	79.8	37.1	39.0	57.3	63.8
3	74.4	84.4	43.6	50.1	43.8	47.6	20.1	22.2	68.1	74.5	27.7	29.9	51.4	59.9
4	68.3	80.7	38.9	46.5	38.5	43.1	14.2	16.1	62.4	70.3	22.7	25.2	46.1	56.3
5	63.9	78.5	35.7	44.5	35.3	40.7	12.8	14.9	58.4	67.9	20.5	23.4	42.4	54.1
6	59.6	76.1	32.1	41.6	33.6	39.9	12.0	14.3	54.8	66.0	18.5	21.4	38.5	51.3
7	55.5	73.9	29.8	40.1	31.0	38.1	11.2	13.9	51.2	63.7	16.7	20.0	35.4	49.4
8	52.1	72.2	27.9	39.0	30.0	37.8	11.2	14.1	48.6	62.4	16.1	19.9	34.2	49.7
9	48.5	70.1	26.0	38.0	27.5	35.8	10.9	14.3	45.9	61.1	15.1	19.3	31.5	48.0
10	45.1	67.8	24.3	37.0	25.9	34.9	10.9	14.6	43.0	59.3	15.1	19.8	29.1	46.3
Median	8.6		2.0		2.2		0.9		7.5		1.2		3.2	

	TNM staging					
cont'd	M0		M1		NA/NOS	
	n=1,440		n=532		n=487	
Years	obs. %	rel. %	obs. %	rel. %	obs. %	rel. %
0	100.0	100.0	100.0	100.0	100.0	100.0
1	83.1	85.9	24.3	25.1	74.8	78.4
2	70.0	74.7	12.9	13.7	67.7	73.8
3	61.5	67.8	8.5	9.1	62.5	70.7
4	55.4	63.0	7.1	7.7	59.0	69.4
5	51.2	60.1			54.4	66.6
6	47.4	57.6			51.1	65.0
7	43.9	55.1			47.2	62.4
8	41.2	53.5			44.3	60.5
9	38.8	52.2			40.1	56.7
10	36.2	50.4			38.9	57.1
Median	5.3		0.5		6.2	

Table 4f. Observed (obs.) and relative (rel.) survival of patients with bladder cancer by TNM staging for period 1998-2020 (N=7,643).

ICD-10 C67: Malignant neoplasm of bladder (invasive)
Extent of disease
Conditional relative 5 year survival 1998-2020   N=7,634
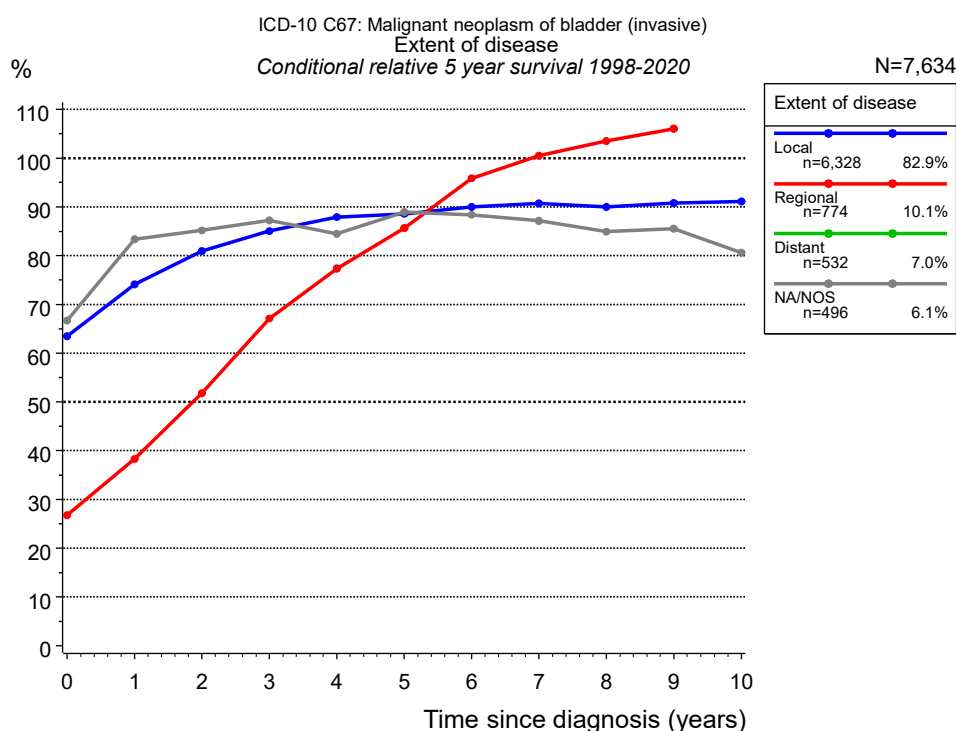

Figure 4i. Conditional relative 5-year survival of patients with bladder cancer by extent of disease. For 7,646 of 8,130 cases diagnosed between 1998 and 2020 valid data could be obtained for this item. For a total of 7,634 cases an evaluable classification was established. The grey line represents the subgroup of 496 patients with missing values regarding extent of disease (6.1 % of 8,130 patients, the percent values of all other categories are related to n=7,634).

	Extent of disease							
	Local		Regional		Distant		NA/NOS	
		Cond. surv. %		Cond. surv. %		Cond. surv. %		Cond. surv. %
Years	n	5 yrs	n	5 yrs	n	5 yrs	n	5 yrs
0	6,328	63.5	774	26.8	532		496	66.6
1	4,879	74.1	470	38.3			361	83.4
2	4,042	80.9	308	51.8			322	85.2
3	3,439	85.0	216	67.1			284	87.3
4	2,950	87.9	163	77.4			252	84.5
5	2,575	88.6	130	85.7			225	89.0
6	2,239	90.0	110	95.9			201	88.4
7	1,937	90.7	83	100.5			180	87.1
8	1,672	90.0	69	103.5			164	84.9
9	1,429	90.8	54	106.0			144	85.5
10	1,213	91.1					133	80.6

Table 4j. Conditional relative 5-year survival of patients with bladder cancer by extent of disease for period 1998-2020 (N=7,634).

Conditional relative survival rates refer to the relative survival probability, in this case for 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 4g). 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 5-year survival rate is 85.0% (n=3,439).
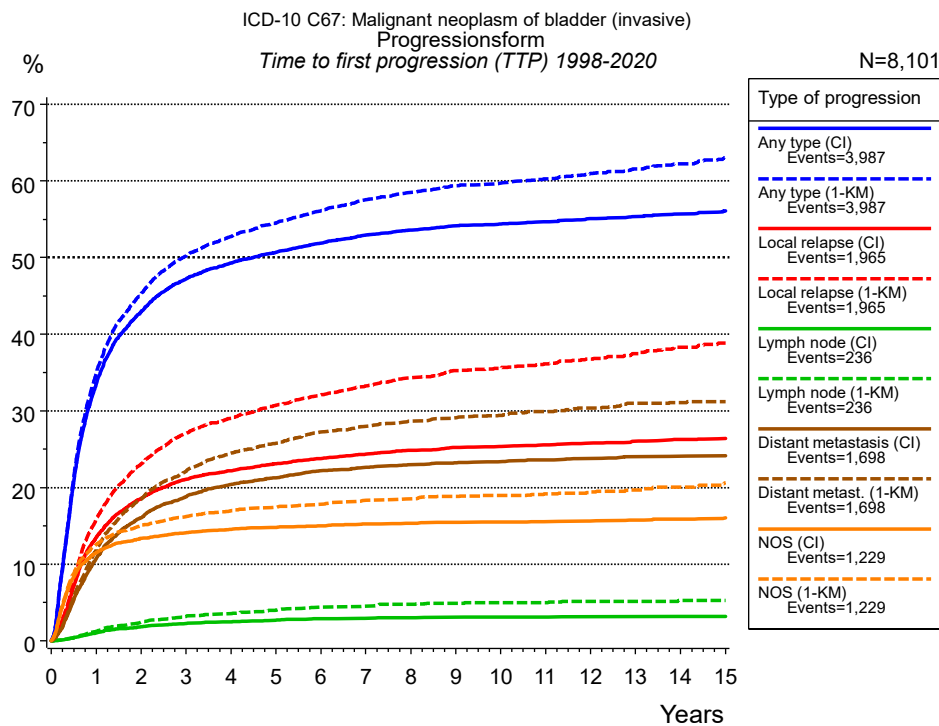
ICD-10 C67: Malignant neoplasm of bladder (invasive)
Progressionsform
Time to first progression (TTP) 1998-2020   N=8,101

Figure 5a. Time to first progression of 8,101 patients with bladder 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)	Local relapse (CI)	Local relapse (1-KM)	Lymph node (CI)	Lymph node (1-KM)	Distant metastasis (CI)
N	7,598	7,598	8,099	8,099	8,100	8,100	7,601
Events	3,977	3,977	1,961	1,961	234	234	1,690
compet.	1,543		3,864		5,050		3,184
Years	%	%	%	%	%	%	%
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	33.6	34.9	13.5	15.9	1.0	1.3	10.7
2	42.9	45.3	18.5	23.0	1.8	2.4	16.1
3	47.2	50.2	21.1	27.1	2.3	3.2	18.8
4	49.3	52.7	22.2	29.0	2.5	3.6	20.4
5	50.7	54.6	23.1	30.7	2.7	4.0	21.3
6	51.9	56.1	23.8	32.0	2.9	4.4	22.2
7	52.9	57.6	24.4	33.3	3.0	4.6	22.6
8	53.6	58.5	24.8	34.3	3.0	4.7	23.0
9	54.2	59.4	25.2	35.2	3.1	4.9	23.2
10	54.4	59.7	25.4	35.6	3.1	5.0	23.4
11	54.7	60.3	25.6	36.1	3.1	5.0	23.6
12	55.1	61.0	25.8	36.7	3.2	5.1	23.8
13	55.4	61.6	26.0	37.5	3.2	5.1	24.0
14	55.7	62.3	26.3	38.3	3.2	5.3	24.1
15	56.1	63.0	26.4	38.9	3.2	5.3	24.1

	Type of progression		
cont'd	Distant metast. (1-KM)	NOS (CI)	NOS (1-KM)
N	7,601	8,100	8,100
Events	1,690	1,227	1,227
compet.		4,126	
Years	%	%	%
0	0.0	0.0	0.0
1	11.9	11.5	12.6
2	18.4	13.4	15.1
3	22.1	14.1	16.2
4	24.5	14.6	17.0
5	25.8	14.8	17.4
6	27.3	15.0	17.8
7	28.0	15.2	18.3
8	28.7	15.3	18.5
9	29.1	15.5	18.8
10	29.4	15.5	18.9
11	29.9	15.6	19.1
12	30.3	15.7	19.4
13	31.0	15.8	19.7
14	31.1	15.9	20.0
15	31.2	16.0	20.6

Table 5b. Time to first progression of patients with bladder cancer for period 1998-2020 (N=8,101), also showing the total of progression events (Events) and of deaths as competing risk (compet.).
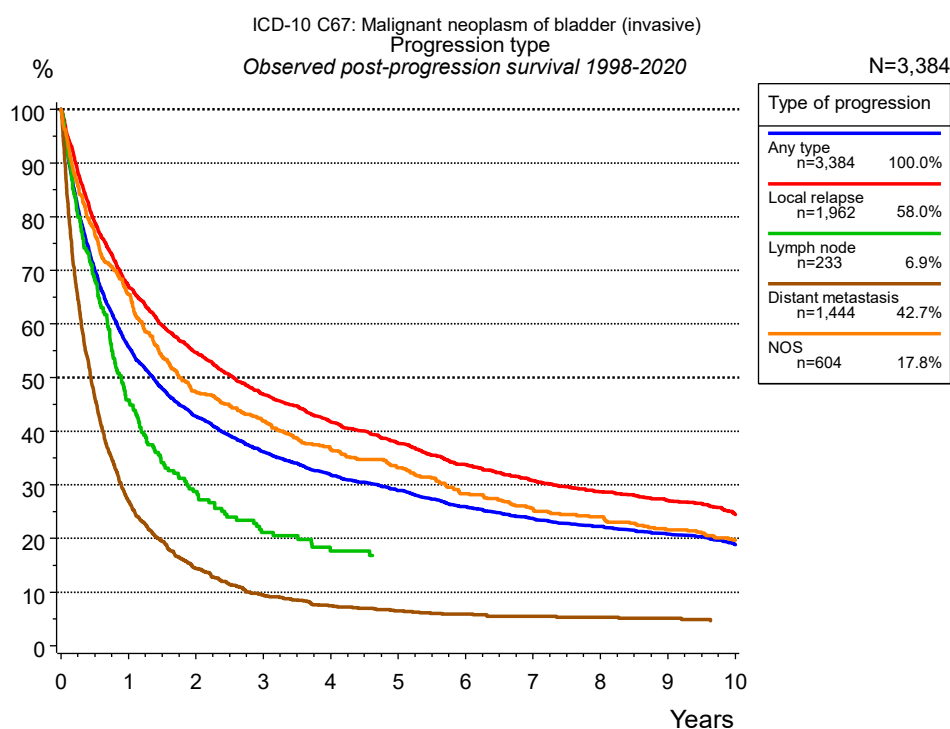
ICD-10 C67: Malignant neoplasm of bladder (invasive)
Progression type
Observed post-progression survival 1998-2020

N=3,384

Type of progression		
Any type n=3,384		100.0%
Local relapse n=1,962		58.0%
Lymph node n=233		6.9%
Distant metastasis n=1,444		42.7%
NOS n=604		17.8%

Figure 5c. Observed post-progression survival of 3,384 patients with bladder cancer diagnosed between 1998 and 2020. These 3,384 patients with documented progression events during their course of disease represent 41.8 % of the totally 8,101 evaluated cases (incl. M1, n=503, 6.2 %). Patients with cancer relapse documented via death certificates only were excluded (n=1,106, 13.7 %). Multiple progression types on different sites are included in the evaluation even when not occuring 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 potientially considered in more than one subgroup.

	Type of progression				
	Any type	Local relapse	Lymph node	Distant metastasis	NOS
	n=3,384	n=1,962	n=233	n=1,444	n=604
Years	%	%	%	%	%
0	100.0	100.0	100.0	100.0	100.0
1	55.8	67.1	45.8	27.0	65.5
2	42.7	54.6	28.7	14.4	47.3
3	36.1	46.9	21.1	9.4	41.9
4	31.9	41.7	17.6	7.4	36.7
5	28.9	37.7	16.8	6.5	33.2
6	25.9	33.7		5.9	28.4
7	23.7	30.8		5.5	25.4
8	22.2	28.7		5.3	24.0
9	20.8	27.1		5.1	21.6
10	18.8	24.5			19.7

Table 5d. Observed post-progression survival of patients with bladder cancer for period 1998-2020 (N=3,384).

ICD-10 C67: Malignant neoplasm of bladder (invasive)
Type of Progression: Distant metastasis
Observed post-progression survival by period of progression date 1988-2020   N=1,629
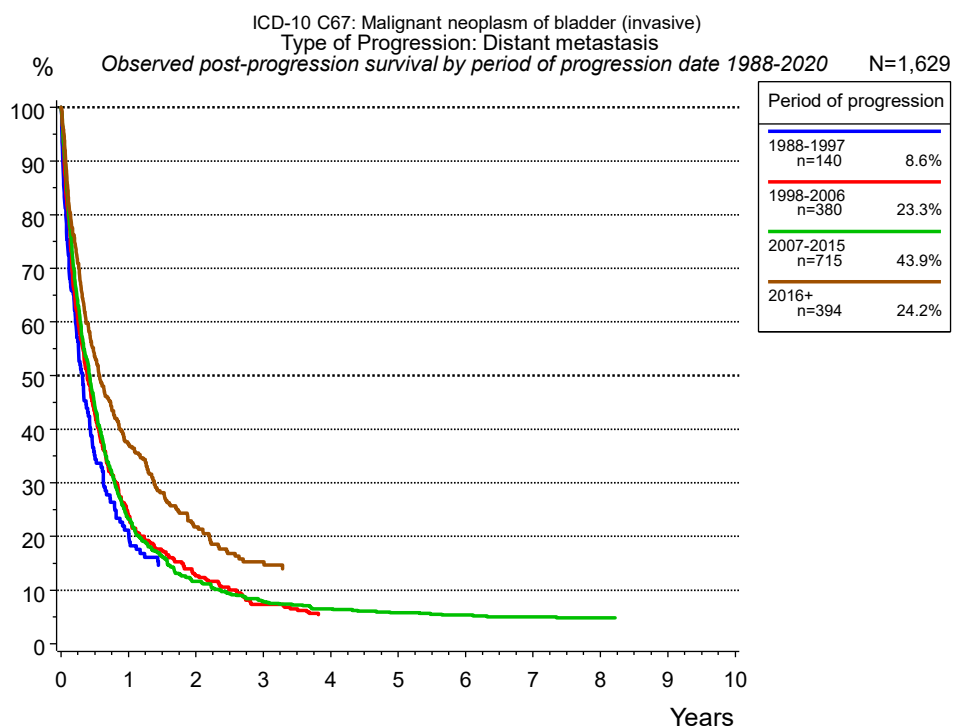

Figure 5e. Observed post-progression (distant metastasis) survival of 1,629 patients with bladder cancer diagnosed between 1988 and 2020 by period of progression.

	Period of progression			
	1988-1997 n=140	1998-2006 n=380	2007-2015 n=715	2016+ n=394
Years	%	%	%	%
0	100.0	100.0	100.0	100.0
1	20.5	23.9	23.2	37.4
2		12.6	11.6	21.8
3		7.3	7.8	15.3
4			6.5	
5			5.8	
6			5.4	
7			5.0	
8			4.8	

Table 5f. Observed post-progression (distant metastasis) survival of patients with bladder cancer for period 1988-2020 by period of progression (N=1,629).

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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