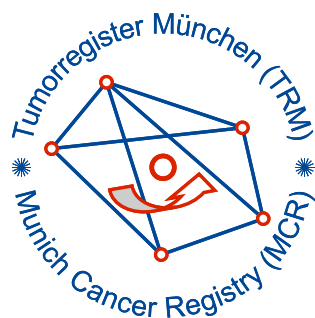


# Munich Cancer Registry



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

## ICD-10 C15-C26: GI cancer

### Survival

Year of diagnosis	1988-1997	1998-2019
Patients	15,299	111,769
Diseases	15,594	115,842
Cases evaluated	13,747	82,221
Creation date	01/27/2021	
Database export	01/07/2021	
Population	4.92 m	



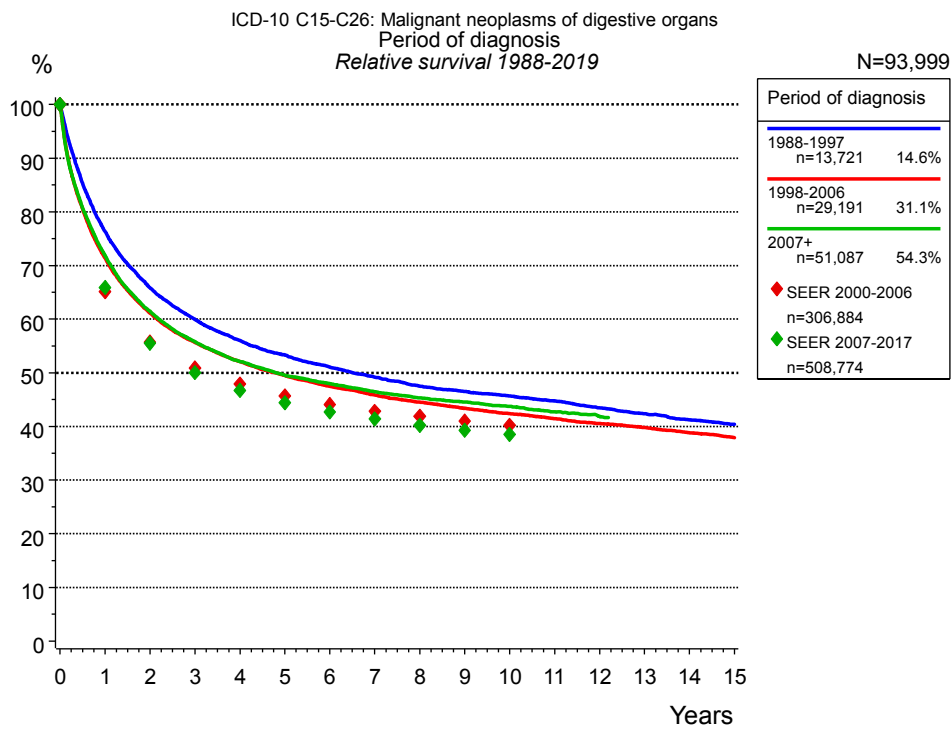
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<https://www.tumorregister-muenchen.de/en>

<https://www.tumorregister-muenchen.de/en/facts/surv/sC1526E-ICD-10-C15-C26-GI-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
3a	Observed survival by age category (chart)	5
3b	Relative survival by age category (chart)	5
3c	Survival by age category (table)	6
4a	Relative survival by ICD-10 classification (chart)	7
4b	Survival by ICD-10 classification (table)	7
4e	Relative survival by extent of disease (chart)	9
4f	Survival by extent of disease (table)	9
4g	Conditional survival by extent of disease (chart)	10
4h	Conditional survival by extent of disease (table)	10
5a	Time to first progression (chart)	11
5b	Time to first progression (table)	11
5c	Observed post-progression survival (chart)	13
5d	Observed post-progression survival (table)	13
5e	Observed post-progression survival by period of progression (chart)	14
5f	Observed post-progression survival by period of progression (table)	14



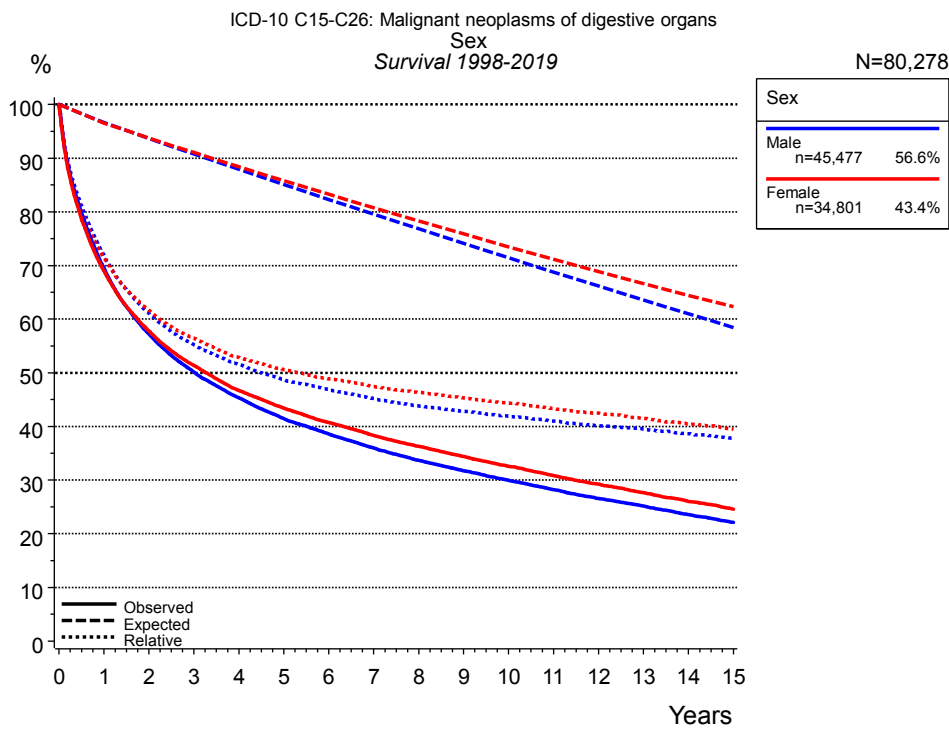
**Figure 1a.** Relative survival of patients with GI cancer by period of diagnosis. Included in the evaluation are 93,999 cases diagnosed between 1988 and 2019.

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 2017, 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=13,721		1998-2006 n=29,191		2007+ n=51,087	
	obs. %	rel. %	obs. %	rel. %	obs. %	rel. %
0	100.0	100.0	100.0	100.0	100.0	100.0
1	73.6	76.3	68.8	71.4	69.5	71.9
2	61.4	65.8	57.1	61.1	57.7	61.5
3	54.1	59.9	50.3	55.6	50.9	55.8
4	48.9	56.0	45.6	52.1	46.1	52.1
5	45.0	53.3	42.0	49.5	42.5	49.5
6	41.7	51.0	39.0	47.5	39.9	48.0
7	38.9	49.2	36.5	45.9	37.4	46.4
8	36.3	47.5	34.2	44.5	35.3	45.3
9	34.3	46.5	32.2	43.4	33.6	44.5
10	32.6	45.7	30.4	42.4	31.8	43.7
11	30.8	44.8	28.7	41.5	30.0	42.7
12	28.9	43.5	27.1	40.6	28.4	41.9
13	27.2	42.4	25.7	39.8		
14	25.6	41.2	24.1	38.8		
15	24.2	40.4	22.7	37.9		
Median	3.8		3.1		3.2	

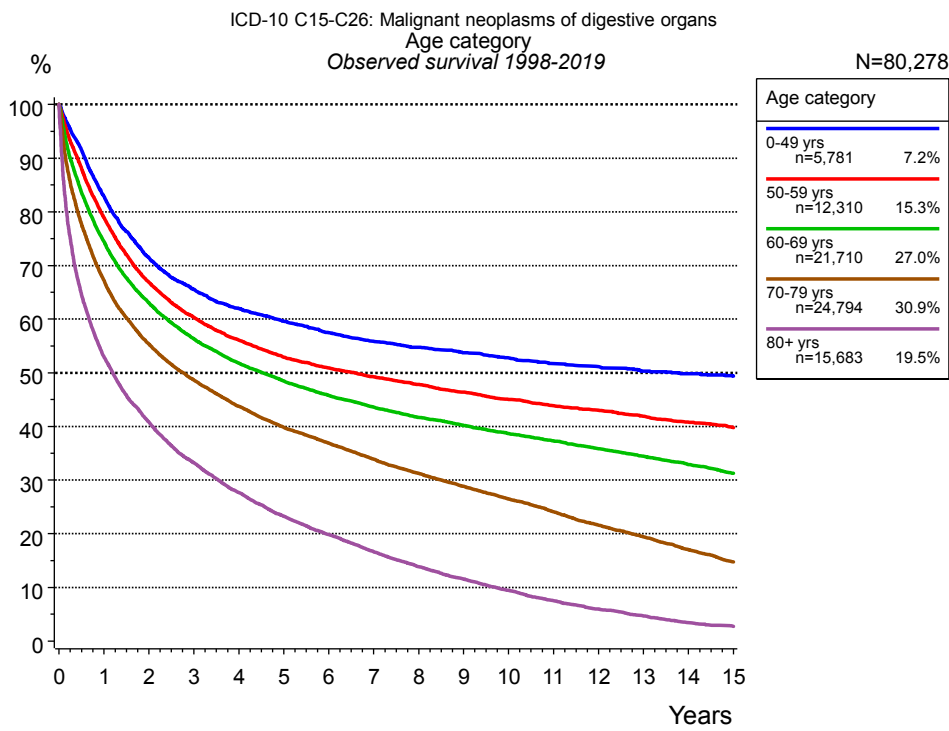
**Table 1b.** Observed (obs.) and relative (rel.) survival of patients with GI cancer by period of diagnosis for period 1988-2019 (N=93,999).



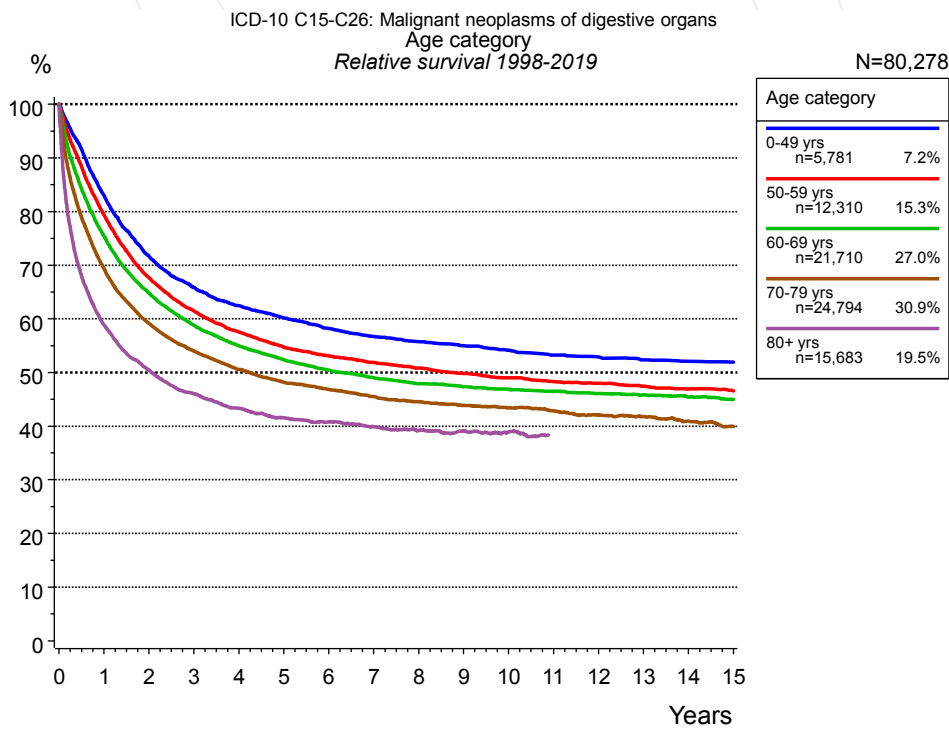
**Figure 2a.** Survival of patients with GI cancer by sex. Included in the evaluation are 80,278 cases diagnosed between 1998 and 2019.

Years	Sex			
	Male n=45,477		Female n=34,801	
	obs. %	rel. %	obs. %	rel. %
0	100.0	100.0	100.0	100.0
1	69.5	72.0	68.9	71.4
2	57.2	61.1	57.8	61.7
3	50.1	55.2	51.4	56.4
4	45.3	51.6	46.7	52.9
5	41.4	48.7	43.4	50.6
6	38.6	46.9	40.7	48.9
7	36.0	45.2	38.3	47.4
8	33.7	43.8	36.3	46.4
9	31.7	42.8	34.4	45.3
10	29.9	41.9	32.6	44.3
11	28.2	41.0	30.8	43.3
12	26.6	40.1	29.3	42.5
13	25.1	39.5	27.6	41.5
14	23.5	38.6	26.0	40.4
15	22.1	37.8	24.6	39.4
Median	3.0		3.3	

**Table 2b.** Observed (obs.) and relative (rel.) survival of patients with GI cancer by sex for period 1998-2019 (N=80,278).



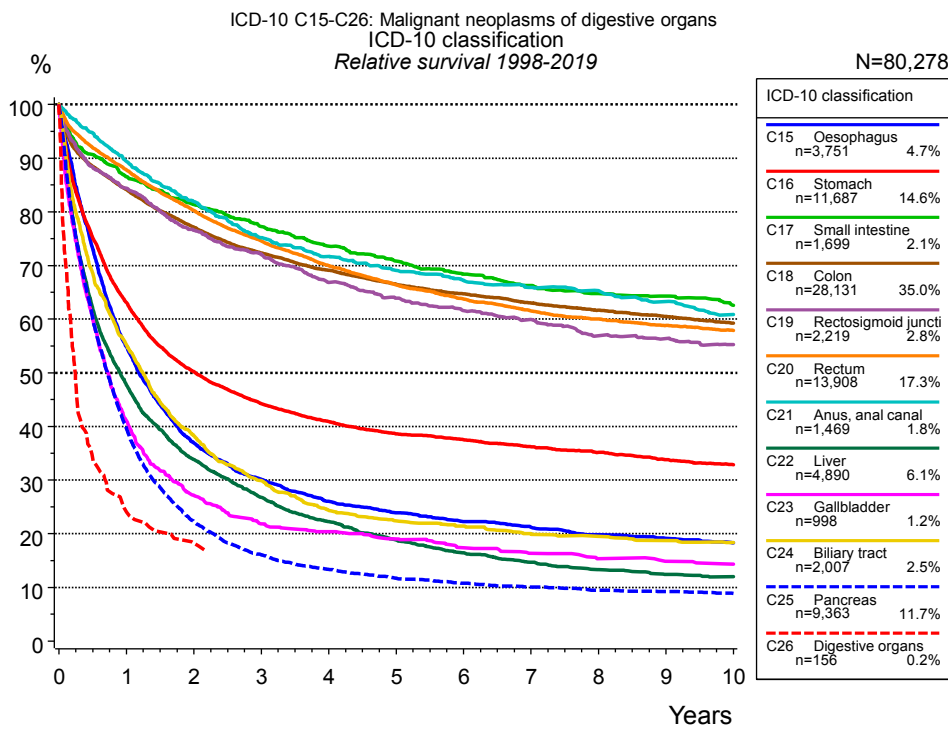
**Figure 3a.** Observed survival of patients with GI cancer by age category. Included in the evaluation are 80,278 cases diagnosed between 1998 and 2019.



**Figure 3b.** Relative survival of patients with GI cancer by age category. Included in the evaluation are 80,278 cases diagnosed between 1998 and 2019.

Years	Age category									
	0-49 yrs n=5,781		50-59 yrs n=12,310		60-69 yrs n=21,710		70-79 yrs n=24,794		80+ yrs n=15,683	
	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	82.9	83.0	78.9	79.4	74.5	75.5	67.2	69.4	53.0	58.9
2	71.5	71.7	66.9	67.7	63.0	64.8	55.4	59.2	40.8	50.5
3	65.5	65.9	60.3	61.4	56.3	58.8	48.7	54.0	33.2	46.0
4	62.0	62.4	56.1	57.5	51.8	55.0	43.7	50.6	27.7	43.4
5	59.6	60.2	52.9	54.7	48.5	52.4	39.8	48.2	23.3	41.6
6	57.5	58.2	50.9	53.1	45.8	50.4	36.9	46.8	19.8	40.8
7	55.8	56.7	49.2	51.8	43.6	49.0	33.9	45.5	16.6	39.8
8	54.7	55.8	47.8	50.8	41.7	48.0	31.3	44.6	13.9	39.2
9	53.8	55.0	46.4	49.8	40.2	47.4	28.8	43.9	11.5	39.1
10	52.7	54.2	45.0	49.0	38.7	46.8	26.5	43.4	9.4	39.0
11	51.7	53.3	43.9	48.3	37.3	46.5	24.1	42.8	7.5	38.5
12	51.1	52.9	43.0	48.0	35.9	46.1	21.6	42.0	5.9	38.4
13	50.3	52.4	41.9	47.5	34.4	45.8	19.4	41.8	4.7	39.0
14	49.8	52.1	40.8	46.9	32.9	45.4	17.0	40.8	3.3	37.1
15	49.3	52.0	39.8	46.6	31.2	45.0	14.7	39.9	2.7	40.7
Median	13.8		6.6		4.5		2.8		1.2	

**Table 3c.** Observed (obs.) and relative (rel.) survival of patients with GI cancer by age category for period 1998-2019 (N=80,278).



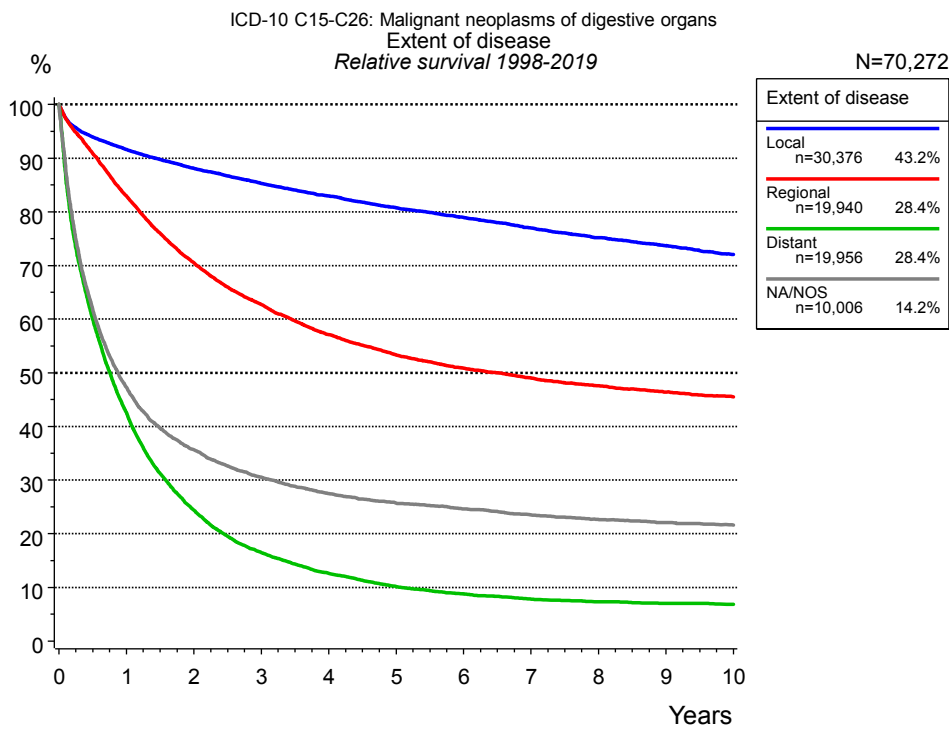
**Figure 4a.** Relative survival of patients with GI cancer by ICD-10 classification. Included in the evaluation are 80,278 cases diagnosed between 1998 and 2019.

Years	ICD-10 classification														
	C15 Oesophagus		C16 Stomach		C17 Small intestine		C18 Colon		C19 Rectosigmoid junction		C20 Rectum		C21 Anus, anal canal		
	n=3,751	n=11,687	n=1,699	n=28,131	n=2,219	n=13,908	n=1,469	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	100.0
1	53.5	54.8	60.6	63.1	84.6	86.5	80.9	84.1	81.7	84.4	85.2	87.8	87.2	89.4	
2	35.3	36.9	46.7	50.2	77.8	81.3	71.6	77.1	71.9	76.5	75.7	80.3	78.1	81.9	
3	28.2	30.2	39.9	44.3	72.4	77.2	64.8	72.3	65.9	72.1	68.5	74.5	70.2	75.2	
4	23.8	26.0	35.7	40.9	67.7	73.6	59.7	69.1	59.4	66.8	62.6	70.0	65.6	71.7	
5	21.4	23.9	32.7	38.6	63.7	70.8	55.4	66.5	55.0	63.9	57.7	66.4	61.9	69.1	
6	19.4	22.3	30.7	37.5	60.2	68.4	52.0	64.7	51.4	61.6	54.0	63.8	59.1	67.2	
7	18.1	21.2	28.7	36.2	57.2	66.3	48.8	63.0	48.4	59.9	50.6	61.5	56.8	65.9	
8	16.5	19.9	26.9	35.2	54.6	64.8	46.0	61.7	44.5	56.9	48.0	60.0	55.2	65.3	
9	15.5	19.1	25.0	33.8	53.1	64.3	43.4	60.5	42.7	56.4	45.6	58.8	52.3	63.3	
10	14.4	18.3	23.4	32.9	50.5	62.5	40.9	59.3	40.4	55.3	43.5	57.9	49.3	60.8	
Median	1.1	1.7	10.2	6.6	6.5	7.2	9.6								

ICD-10 classification										
<i>cont'd</i>	C22 Liver n=4,890		C23 Gallbladder n=998		C24 Biliary tract n=2,007		C25 Pancreas n=9,363		C26 Digestive organs n=156	
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	46.4	47.7	39.3	41.0	53.3	55.2	38.6	39.7	23.7	24.1
2	32.1	33.8	25.2	27.1	36.0	38.2	21.2	22.3	17.2	18.2
3	24.8	26.8	19.7	21.9	27.5	29.9	15.0	16.1		
4	20.1	22.3	17.8	20.4	21.8	24.4	12.1	13.3		
5	16.6	18.8	16.2	19.0	19.6	22.4	10.4	11.7		
6	14.2	16.4	14.3	17.3	18.3	21.4	9.4	10.8		
7	12.4	14.7	12.9	16.3	16.5	20.0	8.5	10.0		
8	10.9	13.3	11.6	15.3	15.7	19.5	7.9	9.4		
9	10.0	12.4	10.8	14.9	14.6	18.7	7.5	9.2		
10	9.4	12.0	10.1	14.3	13.9	18.3	7.0	8.9		
Median	0.9		0.7		1.2		0.7		0.2	

**Table 4b.** Observed (obs.) and relative (rel.) survival of patients with GI cancer by ICD-10 classification for period 1998-2019 (N=80,278).

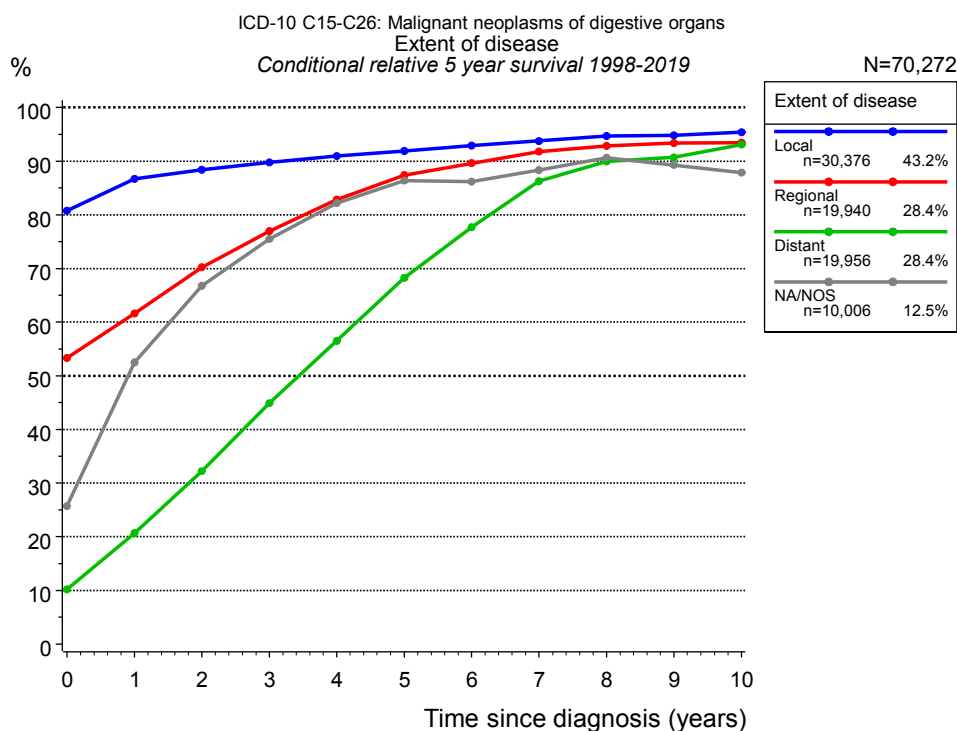




**Figure 4e.** Relative survival of patients with GI cancer by extent of disease. For 70,644 of 80,278 cases diagnosed between 1998 and 2019 valid data could be obtained for this item. For a total of 70,272 cases an evaluable classification was established. The grey line represents the subgroup of 10,006 patients with missing values regarding extent of disease (12.5 % of 80,278 patients, the percent values of all other categories are related to n=70,272).

Years	Extent of disease							
	Local n=30,376		Regional n=19,940		Distant n=19,956		NA/NOS n=10,006	
	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	88.5	91.6	80.4	82.9	41.3	42.6	44.9	47.3
2	82.4	88.1	66.5	70.5	23.1	24.4	32.6	35.7
3	77.2	85.3	57.5	62.7	15.3	16.5	27.0	30.5
4	72.6	82.9	50.9	57.1	11.5	12.6	23.5	27.5
5	68.3	80.8	46.2	53.3	9.0	10.1	21.4	25.7
6	64.6	78.9	42.8	50.8	7.6	8.8	19.9	24.6
7	60.8	77.0	40.1	49.0	6.7	7.8	18.5	23.5
8	57.3	75.2	37.7	47.6	6.1	7.3	17.3	22.7
9	54.1	73.7	35.7	46.4	5.7	7.1	16.4	22.1
10	51.0	72.0	33.9	45.5	5.4	6.8	15.6	21.6
Median	10.4		4.2		0.7		0.8	

**Table 4f.** Observed (obs.) and relative (rel.) survival of patients with GI cancer by extent of disease for period 1998-2019 (N=70,272).

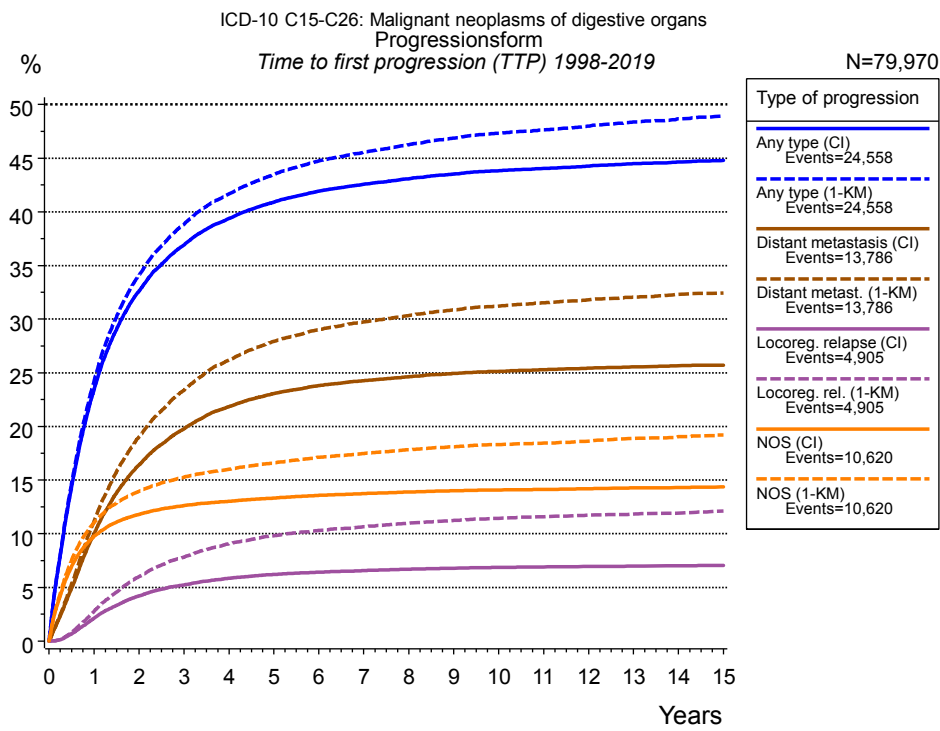


**Figure 4g.** Conditional relative 5-year survival of patients with GI cancer by extent of disease. For 70,644 of 80,278 cases diagnosed between 1998 and 2019 valid data could be obtained for this item. For a total of 70,272 cases an evaluable classification was established. The grey line represents the subgroup of 10,006 patients with missing values regarding extent of disease (12.5 % of 80,278 patients, the percent values of all other categories are related to n=70,272).

Years	Extent of disease							
	Local		Regional		Distant		NA/NOS	
	n	Cond. surv. % 5 yrs	n	Cond. surv. % 5 yrs	n	Cond. surv. % 5 yrs	n	Cond. surv. % 5 yrs
0	30,376	80.8	19,940	53.3	19,956	10.1	10,006	25.7
1	25,250	86.7	15,209	61.6	7,723	20.7	4,275	52.5
2	22,314	88.4	11,845	70.2	4,037	32.2	2,959	66.8
3	19,714	89.7	9,594	76.9	2,471	44.9	2,320	75.5
4	17,461	91.0	7,890	82.8	1,701	56.5	1,928	82.2
5	15,381	91.9	6,664	87.4	1,217	68.2	1,678	86.4
6	13,469	92.9	5,696	89.6	930	77.7	1,459	86.2
7	11,666	93.7	4,865	91.8	718	86.2	1,269	88.4
8	10,042	94.7	4,124	92.8	586	90.0	1,095	90.7
9	8,567	94.8	3,472	93.4	474	90.7	951	89.3
10	7,245	95.4	2,911	93.4	381	93.1	823	87.9

**Table 4h.** Conditional relative 5-year survival of patients with GI cancer by extent of disease for period 1998-2019 (N=70,272).

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 4e). 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 89.7% (n=19,714).

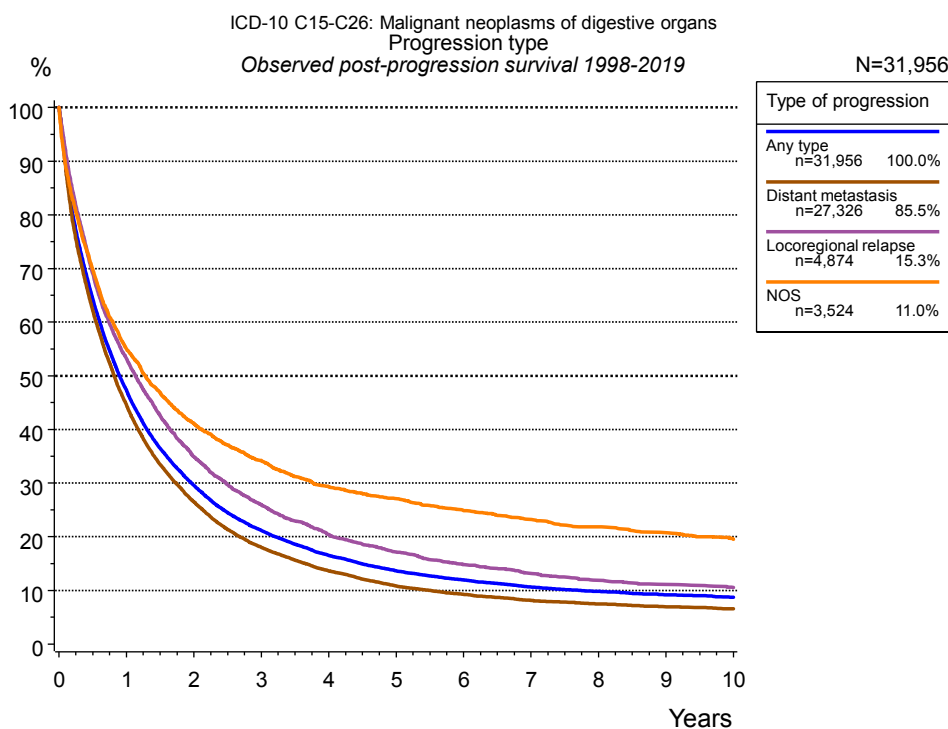


**Figure 5a.** Time to first progression of 79,970 patients with GI cancer diagnosed between 1998 and 2019 (in solid cancers M0 only) estimated by cumulative incidence function (CI, solid line) accounting for death as competing risk and by inverse Kaplan-Meier estimate (1-KM, dashed line). The frequency of events may be underestimated due to underreporting.

	Type of progression							
	Any type (CI)	Any type (1-KM)	Distant metastasis (CI)	Distant metast. (1-KM)	Locoreg. relapse (CI)	Locoreg. rel. (1-KM)	NOS (CI)	
N	60,548	60,548	60,557	60,557	79,970	79,970	79,961	
Events	24,517	24,517	13,769	13,769	4,891	4,891	10,604	
compet.	11,588		20,936		46,350		40,571	
Years	%	%	%	%	%	%	%	%
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	23.4	24.2	10.0	11.1	2.1	2.8	9.8	
2	32.6	34.1	16.4	19.0	4.2	6.0	11.8	
3	36.9	38.8	19.8	23.4	5.2	7.8	12.6	
4	39.4	41.7	21.8	26.2	5.9	9.1	13.0	
5	40.9	43.5	23.1	27.9	6.2	9.8	13.3	
6	41.9	44.7	23.8	29.0	6.4	10.3	13.6	
7	42.6	45.6	24.3	29.7	6.6	10.6	13.7	
8	43.1	46.3	24.6	30.3	6.7	11.0	13.9	
9	43.5	46.9	24.9	30.9	6.8	11.2	14.0	
10	43.8	47.3	25.1	31.2	6.9	11.4	14.1	
11	44.0	47.6	25.3	31.5	6.9	11.6	14.1	
12	44.3	48.0	25.4	31.8	7.0	11.7	14.2	
13	44.5	48.4	25.6	32.1	7.0	11.8	14.3	
14	44.7	48.7	25.7	32.3	7.0	11.9	14.3	
15	44.8	48.9	25.7	32.4	7.1	12.1	14.4	

Type of progression	
<i>cont'd</i>	NOS (1-KM)
N	79,961
Events	10,604
compet.	
Years	%
0	0.0
1	11.0
2	13.9
3	15.3
4	16.0
5	16.6
6	17.1
7	17.5
8	17.8
9	18.1
10	18.3
11	18.4
12	18.6
13	18.9
14	19.0
15	19.2

**Table 5b.** Time to first progression of patients with GI cancer for period 1998-2019 (N=79,970), also showing the total of progression events (Events) and of deaths as competing risk (compet.).

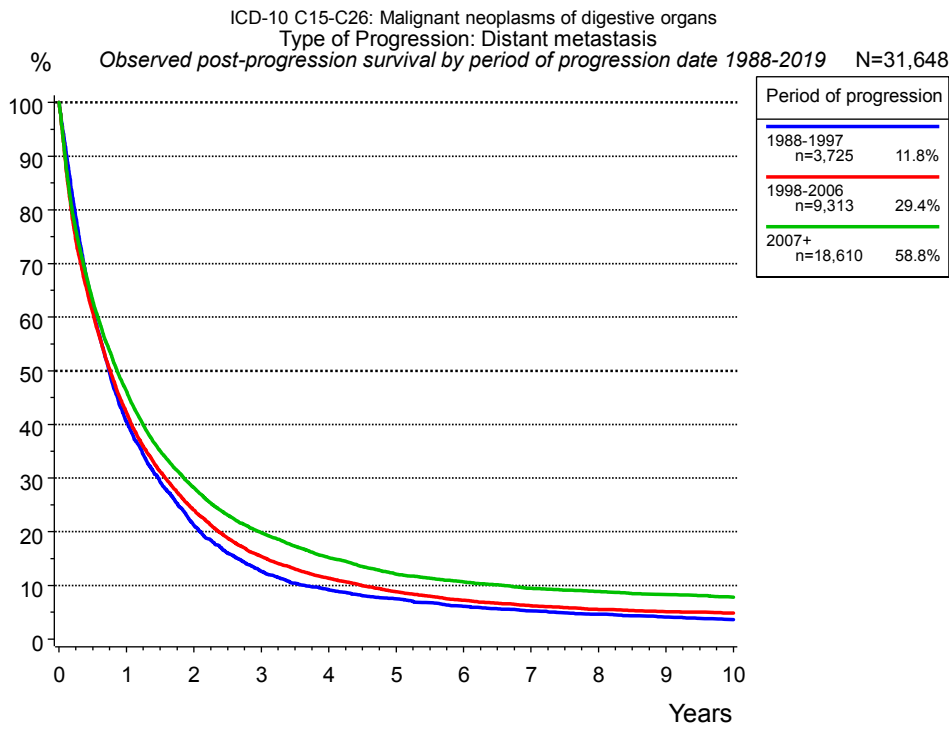


**Figure 5c.** Observed post-progression survival of 31,956 patients with GI cancer diagnosed between 1998 and 2019. These 31,956 patients with documented progression events during their course of disease represent 40.0 % of the totally 79,970 evaluated cases (incl. M1, n=19,422, 24.3 %). Patients with cancer relapse documented via death certificates only were excluded (n=12,024, 15.0 %). 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=31,956 %	Distant metastasis n=27,326 %	Locoregional relapse n=4,874 %	NOS n=3,524 %
0	100.0	100.0	100.0	100.0
1	47.3	44.6	53.2	55.0
2	29.6	26.5	34.9	41.0
3	21.1	18.0	26.0	34.2
4	16.5	13.6	20.4	29.3
5	13.6	10.8	17.1	27.1
6	11.9	9.3	14.8	24.9
7	10.6	8.1	13.1	23.2
8	9.8	7.5	11.9	21.8
9	9.2	6.9	11.0	20.7
10	8.7	6.5	10.5	19.6

**Table 5d.** Observed post-progression survival of patients with GI cancer for period 1998-2019 (N=31,956).



**Figure 5e.** Observed post-progression (distant metastasis) survival of 31,648 patients with GI cancer diagnosed between 1988 and 2019 by period of progression.

Years	Period of progression		
	1988-1997 n=3,725 %	1998-2006 n=9,313 %	2007+ n=18,610 %
0	100.0	100.0	100.0
1	40.5	42.3	46.2
2	21.2	24.0	28.2
3	12.6	15.4	19.8
4	9.1	11.3	15.1
5	7.5	8.8	12.1
6	6.1	7.2	10.6
7	5.2	6.2	9.4
8	4.6	5.5	8.9
9	4.1	5.1	8.3
10	3.6	4.8	7.8

**Table 5f.** Observed post-progression (distant metastasis) survival of patients with GI cancer for period 1988-2019 by period of progression (N=31,648).

## 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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