Munich Cancer Registry

ICD-10 C15-C26: GI cancer

Survival

Year of diagnosis	1988-1997	1998-2020
Patients	15,303	116,994
Diseases	15,598	121,337
Cases evaluated	13,751	86,204
Creation date	04/15/2022	
Database export	12/20/2021	
Population	4.92 m	

BERLIN

GERMANY

BAVARIA

MUNICH

Munich Cancer Registry
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at Klinikum Grosshadern/IBE
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Munich, 81377
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https://www.tumorregister-muenchen.de/en
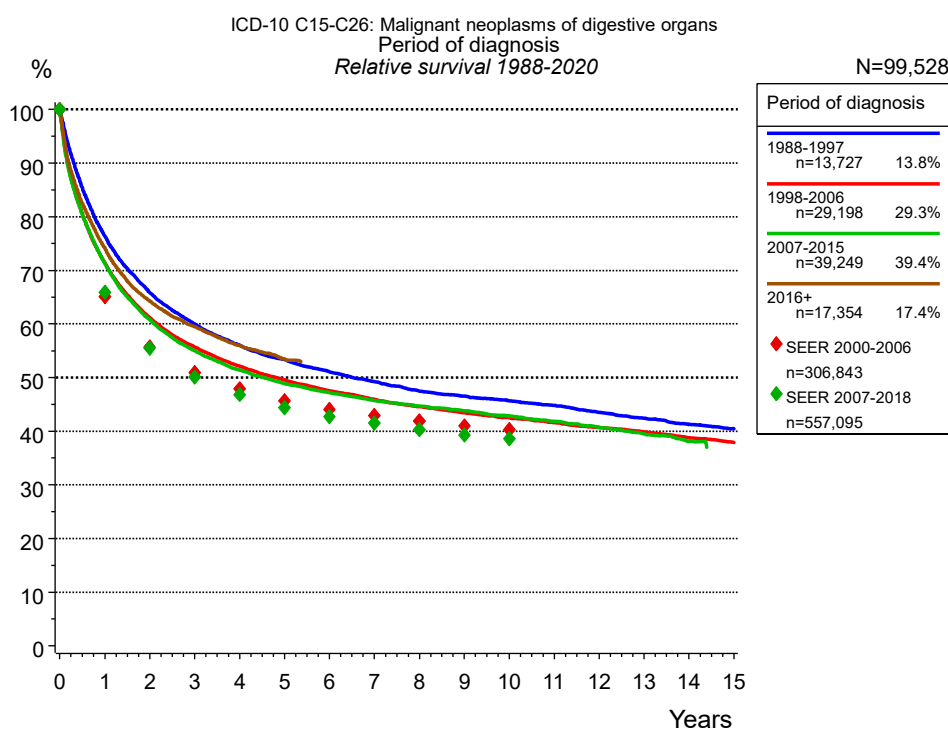
Index of figures and tables

Figure 1a. Relative survival of patients with GI cancer by period of diagnosis. Included in the evaluation are 99,528 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 2000 to 2018, 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=13,727 | | 1998-2006 n=29,198 | | 2007-2015 n=39,249 | | 2016+ n=17,354 | |
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	73.7	76.3	68.9	71.4	69.0	71.3	71.9	74.2
2	61.5	65.9	57.1	61.2	57.1	60.8	60.6	64.3
3	54.1	60.0	50.4	55.7	50.1	55.0	54.4	59.5
4	48.9	56.0	45.7	52.2	45.4	51.4	49.7	56.0
5	45.1	53.4	42.0	49.6	41.9	48.9	46.0	53.4
6	41.7	51.1	39.1	47.6	39.2	47.2		
7	38.9	49.2	36.5	46.0	36.8	45.7		
8	36.3	47.5	34.3	44.6	34.8	44.7		
9	34.3	46.5	32.3	43.5	33.0	43.8		
10	32.6	45.7	30.5	42.5	31.2	42.8		
11	30.9	44.8	28.8	41.6	29.4	41.8		
12	29.0	43.5	27.2	40.7	27.6	40.7		
13	27.3	42.4	25.7	39.9	25.8	39.5		
14	25.6	41.3	24.1	38.8	23.9	38.1		
15	24.2	40.5	22.7	37.9				
Median	3.8		3.1		3.0		3.9	

Table 1b. Observed (obs.) and relative (rel.) survival of patients with GI cancer by period of diagnosis for period 1988-2020 (N=99,528).

ICD-10 C15-C26: Malignant neoplasms of digestive organs
Sex
Survival 1998-2020

Figure 2a. Survival of patients with GI cancer by sex. Included in the evaluation are 85,801 cases diagnosed between 1998 and 2020.

	Sex			
	Male		Female	
	n=48,669		n=37,132	
Years	obs. %	rel. %	obs. %	rel. %
0	100.0	100.0	100.0	100.0
1	69.7	72.1	69.3	71.8
2	57.4	61.3	58.1	62.0
3	50.4	55.5	51.8	56.9
4	45.5	51.7	47.2	53.4
5	41.7	48.9	44.0	51.2
6	38.7	47.0	41.2	49.4
7	36.1	45.4	38.9	48.0
8	33.9	44.1	36.8	47.0
9	31.9	43.0	34.9	45.9
10	30.1	42.1	33.0	44.8
11	28.3	41.1	31.3	43.9
12	26.6	40.1	29.7	42.9
13	25.0	39.3	28.0	41.9
14	23.3	38.2	26.3	40.7
15	21.8	37.4	24.9	39.9
Median	3.1		3.4	

Table 2b. Observed (obs.) and relative (rel.) survival of patients with GI cancer by sex for period 1998-2020 (N=85,801).

ICD-10 C15-C26: Malignant neoplasms of digestive organs
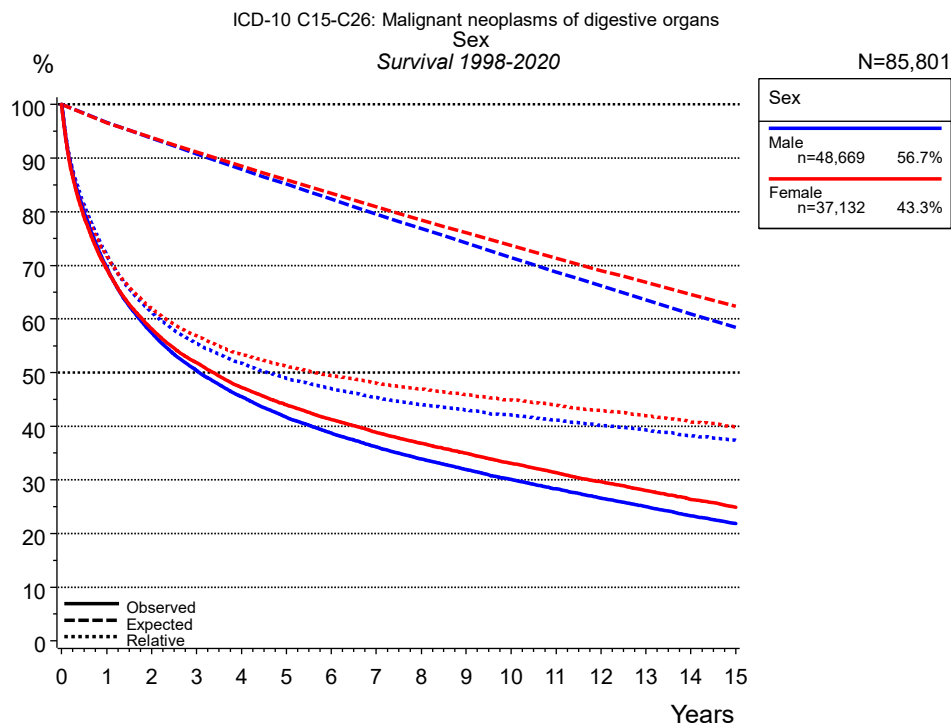Age category
Observed survival 1998-2020

Figure 3a. Observed survival of patients with GI cancer by age category. Included in the evaluation are 85,801 cases diagnosed between 1998 and 2020.

ICD-10 C15-C26: Malignant neoplasms of digestive organs
Age category
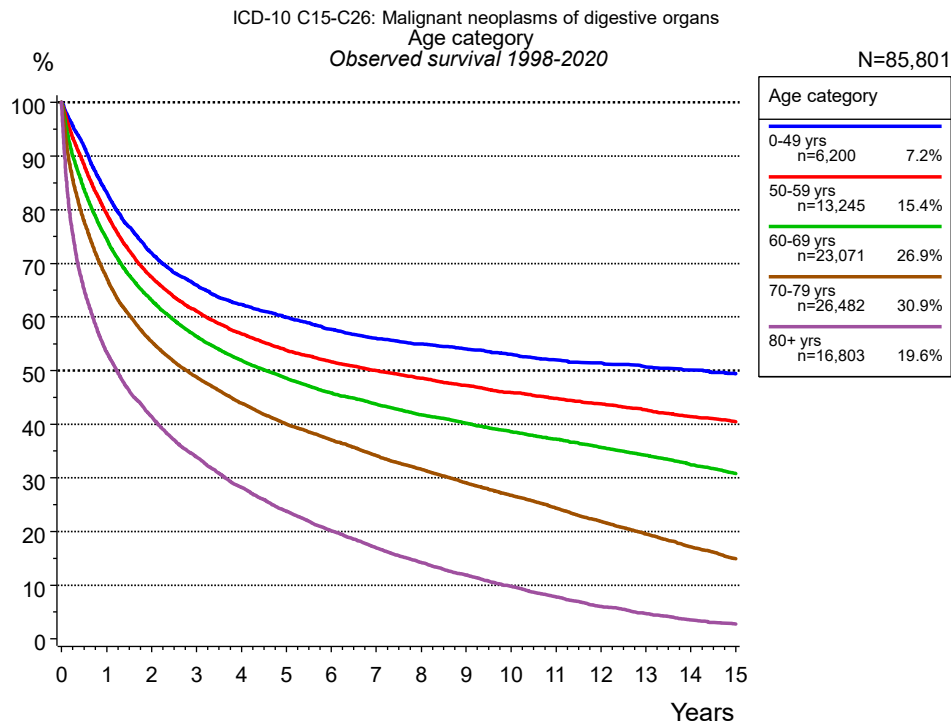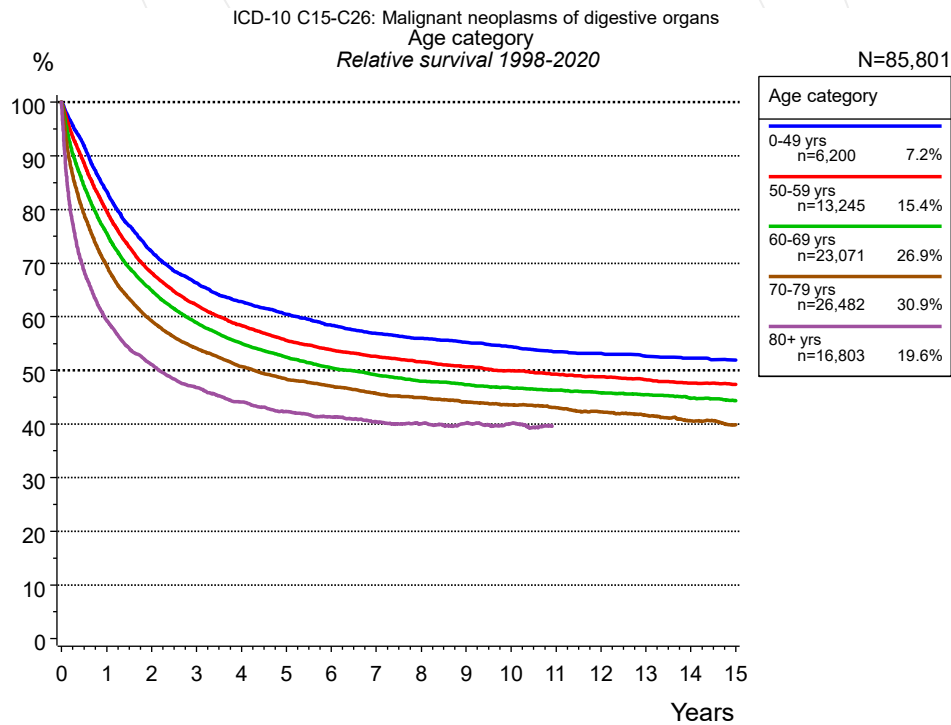*Relative survival 1998-2020*

Figure 3b. Relative survival of patients with GI cancer by age category. Included in the evaluation are 85,801 cases diagnosed between 1998 and 2020.

Years	\<0-49 yrs n=6,200\> obs. %	rel. %	\<50-59 yrs n=13,245\> obs. %	rel. %	\<60-69 yrs n=23,071\> obs. %	rel. %	\<70-79 yrs n=26,482\> obs. %	rel. %	\<80+ yrs n=16,803\> obs. %	rel. %
0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1	83.2	83.4	79.3	79.7	74.6	75.6	67.4	69.5	53.4	59.3
2	71.9	72.2	67.4	68.2	63.1	64.9	55.4	59.2	41.4	51.1
3	65.9	66.3	61.0	62.2	56.4	58.8	48.8	54.1	33.8	46.8
4	62.3	62.8	56.9	58.4	51.9	55.0	43.9	50.7	28.2	44.1
5	59.9	60.5	53.7	55.6	48.6	52.5	40.0	48.4	23.8	42.3
6	57.7	58.4	51.6	53.8	45.8	50.5	37.1	47.1	20.2	41.3
7	56.0	56.9	50.0	52.6	43.7	49.1	34.1	45.7	16.9	40.3
8	55.0	56.0	48.6	51.6	41.7	48.0	31.6	44.9	14.2	40.1
9	54.0	55.2	47.2	50.7	40.2	47.3	29.1	44.1	11.9	40.2
10	53.0	54.4	45.9	49.9	38.6	46.7	26.7	43.5	9.8	40.1
11	51.9	53.5	44.8	49.3	37.2	46.3	24.3	43.0	7.8	39.6
12	51.4	53.2	43.8	48.8	35.7	45.8	21.9	42.2	6.0	39.0
13	50.6	52.6	42.6	48.3	34.2	45.5	19.5	41.6	4.7	39.3
14	50.1	52.3	41.4	47.6	32.4	44.8	17.1	40.6	3.5	38.5
15	49.4	52.0	40.5	47.4	30.8	44.4	14.9	39.9	2.7	41.1
Median	14.3		7.0		4.5		2.8		1.2	

The header above the table reads: **Age category**, with columns grouped as 0-49 yrs (n=6,200), 50-59 yrs (n=13,245), 60-69 yrs (n=23,071), 70-79 yrs (n=26,482), 80+ yrs (n=16,803), each with obs. % and rel. % sub-columns.

Table 3c. Observed (obs.) and relative (rel.) survival of patients with GI cancer by age category for period 1998-2020 (N=85,801).

ICD-10 C15-C26: Malignant neoplasms of digestive organs
ICD-10 classification
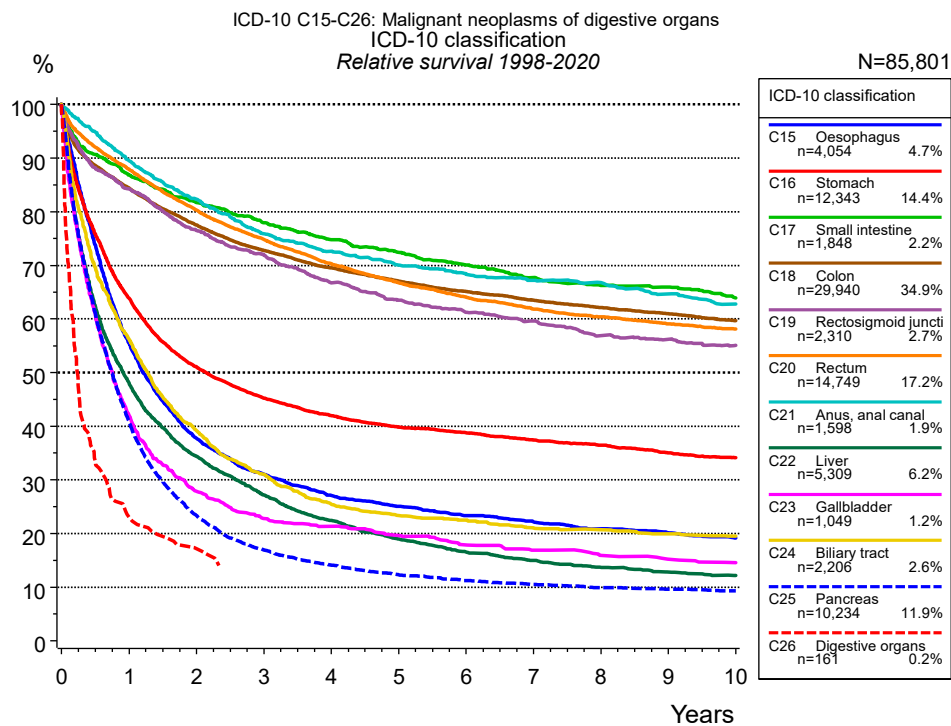*Relative survival 1998-2020*

Figure 4a. Relative survival of patients with GI cancer by ICD-10 classification. Included in the evaluation are 85,801 cases diagnosed between 1998 and 2020.

	ICD-10 classification													
	C15 Oesophagus		C16 Stomach		C17 Small intestine		C18 Colon		C19 Rectosigmoid junction		C20 Rectum		C21 Anus, anal canal	
	n=4,054		n=12,343		n=1,848		n=29,940		n=2,310		n=14,749		n=1,598	
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	54.0	55.4	61.3	63.8	84.9	86.8	81.2	84.4	81.5	84.2	85.3	87.9	87.3	89.5
2	36.1	37.7	47.5	51.0	78.2	81.7	72.0	77.5	71.9	76.5	75.8	80.3	78.5	82.3
3	29.1	31.0	40.8	45.3	73.1	78.0	65.2	72.8	65.8	71.9	68.7	74.8	70.9	75.9
4	24.8	27.1	36.7	42.0	68.7	74.8	60.1	69.6	59.3	66.7	62.9	70.3	66.5	72.6
5	22.4	25.0	33.7	39.8	65.1	72.4	55.9	67.1	54.6	63.5	58.1	66.7	62.8	70.0
6	20.3	23.3	31.8	38.8	61.6	70.1	52.4	65.1	51.0	61.2	54.3	64.1	60.1	68.4
7	18.9	22.2	29.7	37.4	58.3	67.7	49.2	63.5	48.2	59.6	50.9	61.9	57.9	67.2
8	17.4	20.9	28.0	36.5	55.8	66.3	46.4	62.2	44.5	56.9	48.3	60.4	56.4	66.8
9	16.3	20.2	26.0	35.1	54.3	66.0	43.8	61.0	42.6	56.2	45.9	59.1	53.5	64.7
10	15.1	19.2	24.4	34.2	51.4	63.9	41.2	59.7	40.3	55.1	43.7	58.1	50.9	62.8
Median	1.2		1.7		10.7		6.7		6.4		7.3		10.2	

	ICD-10 classification									
cont'd	C22 Liver		C23 Gallbladder		C24 Biliary tract		C25 Pancreas		C26 Digestive organs	
	n=5,309		n=1,049		n=2,206		n=10,234		n=161	
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	46.7	47.9	40.2	41.9	54.3	56.1	39.7	40.8	22.6	23.0
2	32.6	34.3	25.9	27.9	36.8	39.1	22.2	23.3	16.2	17.1
3	25.2	27.2	20.5	22.8	28.5	31.1	15.7	16.9		
4	20.2	22.4	18.7	21.3	22.8	25.5	12.8	14.1		
5	16.7	19.0	16.7	19.7	20.4	23.4	11.0	12.3		
6	14.2	16.5	14.7	17.9	19.1	22.5	9.8	11.2		
7	12.5	15.0	13.3	16.9	17.4	21.1	8.9	10.5		
8	11.2	13.7	12.1	15.9	16.6	20.7	8.2	9.9		
9	10.2	12.8	11.1	15.2	15.5	19.9	7.7	9.6		
10	9.5	12.2	10.3	14.6	14.7	19.5	7.3	9.3		
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 1998-2020 (N=85,801).

ICD-10 C15-C26: Malignant neoplasms of digestive organs
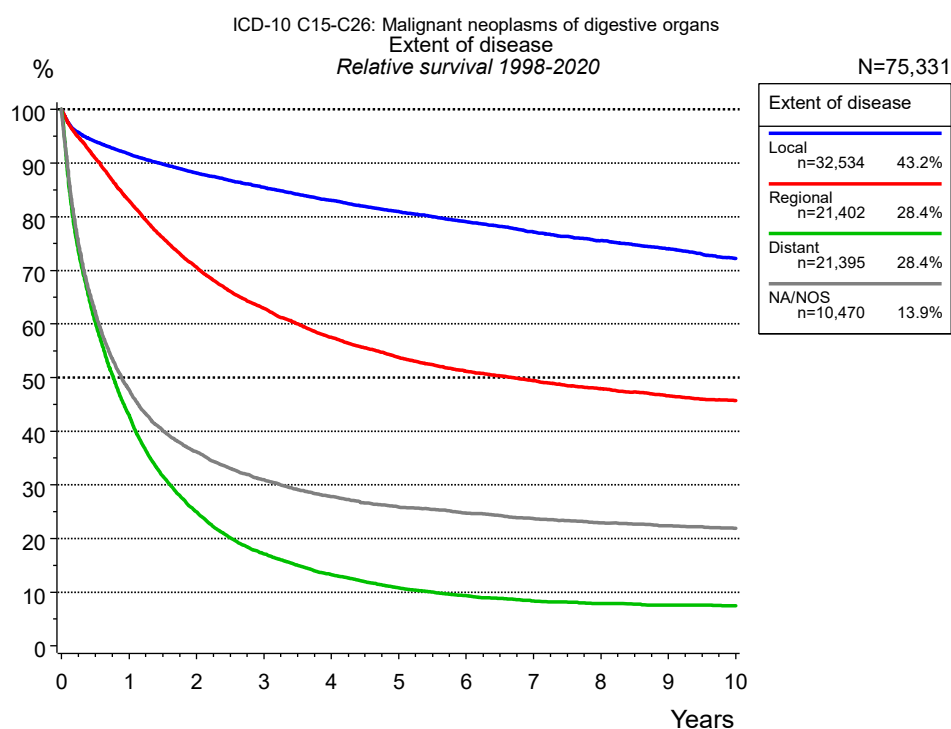Extent of disease
Relative survival 1998-2020

Figure 4e. Relative survival of patients with GI cancer by extent of disease. For 75,732 of 85,801 cases diagnosed between 1998 and 2020 valid data could be obtained for this item. For a total of 75,331 cases an evaluable classification was established. The grey line represents the subgroup of 10,470 patients with missing values regarding extent of disease (12.2 % of 85,801 patients, the percent values of all other categories are related to n=75,331).

	Extent of disease							
	Local n=32,534		Regional n=21,402		Distant n=21,395		NA/NOS n=10,470	
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	88.6	91.7	80.5	83.0	41.7	42.9	45.3	47.7
2	82.5	88.2	66.6	70.6	23.6	24.9	33.0	36.1
3	77.4	85.4	57.7	62.9	15.9	17.1	27.3	31.0
4	72.7	83.0	51.3	57.5	12.0	13.3	23.8	27.8
5	68.5	81.0	46.7	53.8	9.6	10.8	21.5	25.8
6	64.7	79.1	43.2	51.2	8.1	9.4	19.9	24.7
7	61.0	77.2	40.5	49.4	7.1	8.4	18.6	23.7
8	57.6	75.5	38.1	47.9	6.6	7.9	17.5	22.9
9	54.5	74.0	35.9	46.6	6.2	7.6	16.6	22.4
10	51.2	72.2	34.1	45.7	5.9	7.4	15.8	21.9
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 1998-2020 (N=75,331).

ICD-10 C15-C26: Malignant neoplasms of digestive organs
Extent of disease
Conditional relative 5 year survival 1998-2020   N=75,331
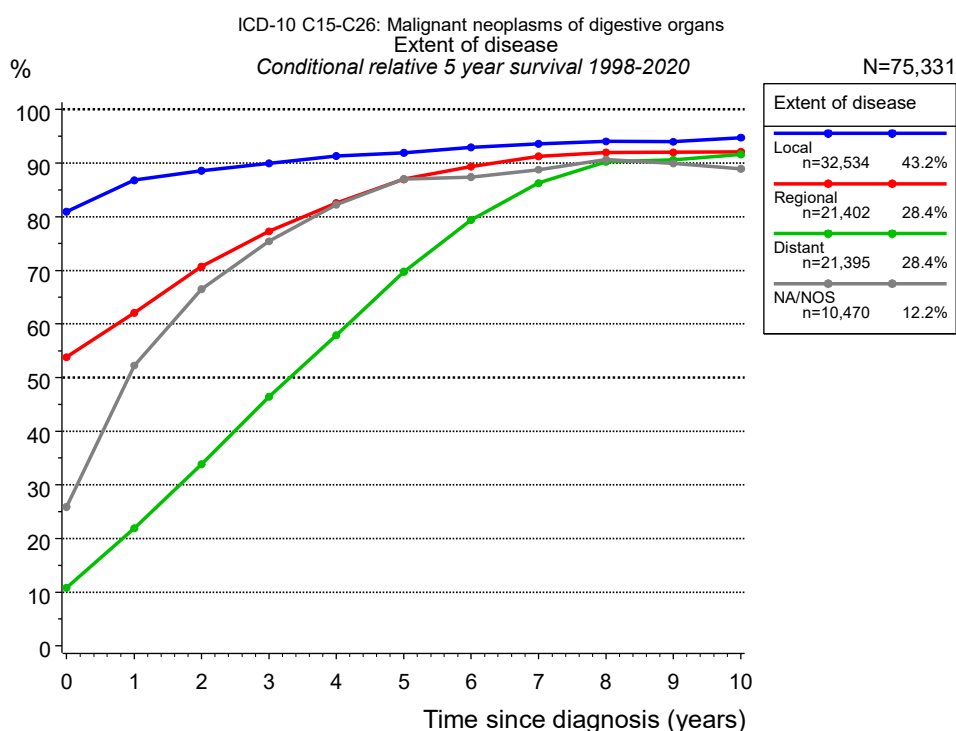

Figure 4g. Conditional relative 5-year survival of patients with GI cancer by extent of disease. For 75,732 of 85,801 cases diagnosed between 1998 and 2020 valid data could be obtained for this item. For a total of 75,331 cases an evaluable classification was established. The grey line represents the subgroup of 10,470 patients with missing values regarding extent of disease (12.2 % of 85,801 patients, the percent values of all other categories are related to n=75,331).

	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	32,534	81.0	21,402	53.8	21,395	10.8	10,470	25.8
1	27,912	86.8	16,751	62.0	8,682	21.9	4,629	52.3
2	24,999	88.6	13,301	70.7	4,687	33.8	3,297	66.5
3	22,320	90.0	10,975	77.3	2,921	46.5	2,607	75.4
4	19,839	91.3	9,131	82.6	2,012	57.9	2,157	82.3
5	17,533	91.9	7,723	87.0	1,463	69.8	1,845	87.0
6	15,550	92.9	6,625	89.4	1,132	79.4	1,631	87.4
7	13,677	93.6	5,770	91.2	893	86.3	1,459	88.8
8	11,991	94.1	5,022	92.0	745	90.2	1,279	90.7
9	10,426	94.0	4,332	92.0	612	90.6	1,129	90.0
10	8,982	94.8	3,706	92.1	524	91.6	997	88.9

Table 4h. Conditional relative 5-year survival of patients with GI cancer by extent of disease for period 1998-2020 (N=75,331).

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 90.0% (n=22,320).
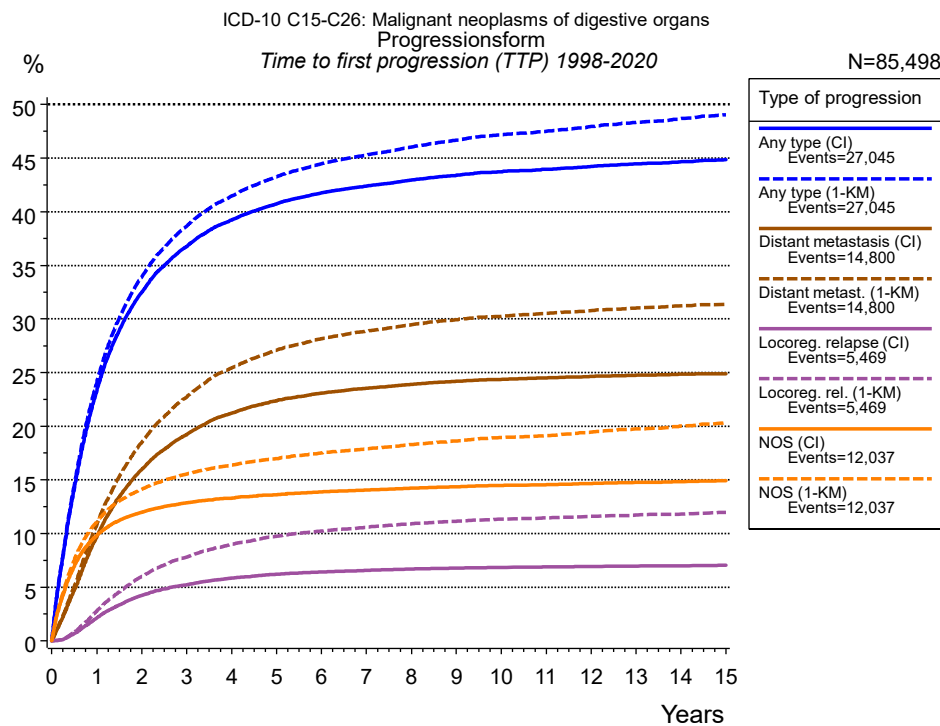
ICD-10 C15-C26: Malignant neoplasms of digestive organs
Progressionsform
Time to first progression (TTP) 1998-2020

Figure 5a. Time to first progression of 85,498 patients with GI 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)	Distant metastasis (CI)	Distant metast. (1-KM)	Locoreg. relapse (CI)	Locoreg. rel. (1-KM)	NOS (CI)
N	64,642	64,642	64,651	64,651	85,498	85,498	85,489
Events	26,949	26,949	14,774	14,774	5,445	5,445	11,978
compet.	13,255		23,972		51,564		44,979
Years	%	%	%	%	%	%	%
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	23.3	24.1	9.7	10.9	2.1	2.8	9.8
2	32.5	33.9	16.0	18.5	4.2	6.0	12.0
3	36.8	38.6	19.2	22.7	5.2	7.8	12.8
4	39.2	41.4	21.2	25.4	5.9	9.0	13.3
5	40.7	43.2	22.4	27.1	6.2	9.8	13.6
6	41.7	44.5	23.1	28.2	6.4	10.2	13.9
7	42.4	45.3	23.5	28.9	6.6	10.6	14.1
8	42.9	46.0	23.9	29.4	6.7	10.9	14.2
9	43.4	46.7	24.2	29.9	6.8	11.1	14.4
10	43.7	47.2	24.4	30.3	6.8	11.3	14.5
11	43.9	47.5	24.5	30.5	6.9	11.5	14.6
12	44.2	47.9	24.6	30.8	6.9	11.6	14.7
13	44.5	48.3	24.7	31.0	7.0	11.7	14.8
14	44.7	48.7	24.8	31.2	7.0	11.8	14.8
15	44.8	49.0	24.9	31.4	7.0	12.0	14.9

Type of progression	
cont'd	NOS (1-KM)
N	85,489
Events compet.	11,978
Years	%
0	0.0
1	11.1
2	14.1
3	15.5
4	16.4
5	17.0
6	17.5
7	17.9
8	18.3
9	18.6
10	19.0
11	19.1
12	19.4
13	19.8
14	20.0
15	20.3

Table 5b. Time to first progression of patients with GI cancer for period 1998-2020 (N=85,498), also showing the total of progression events (Events) and of deaths as competing risk (compet.).

ICD-10 C15-C26: Malignant neoplasms of digestive organs
Progression type
Observed post-progression survival 1998-2020   N=34,717
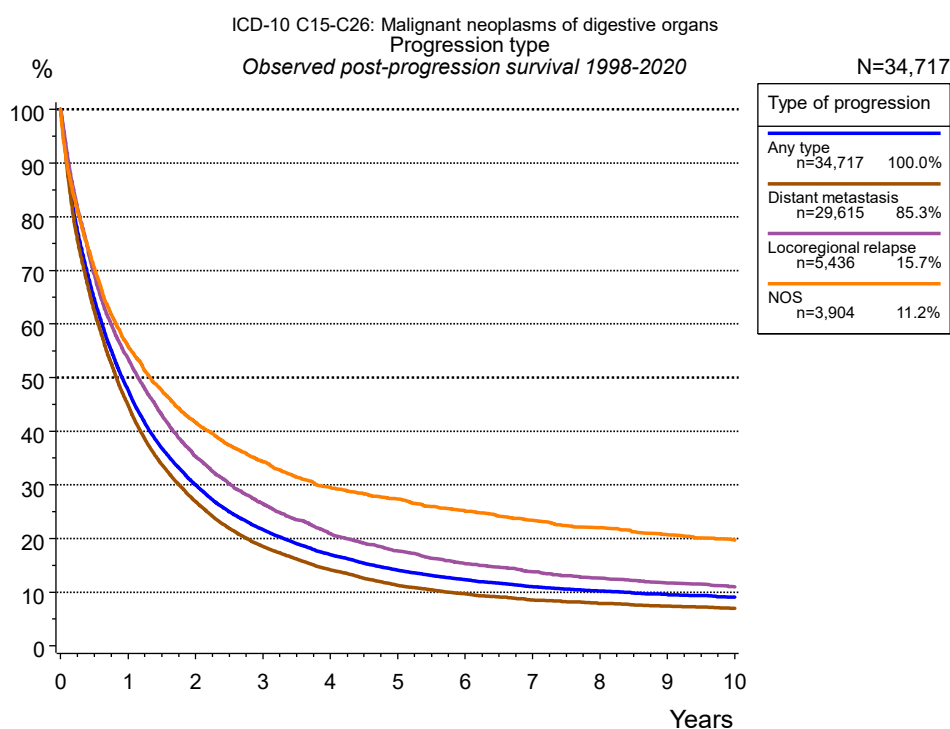
Figure 5c. Observed post-progression survival of 34,717 patients with GI cancer diagnosed between 1998 and 2020. These 34,717 patients with documented progression events during their course of disease represent 40.6 % of the totally 85,498 evaluated cases (incl. M1, n=20,856, 24.4 %). Patients with cancer relapse documented via death certificates only were excluded (n=13,184, 15.4 %). 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	Distant metastasis	Locoregional relapse	NOS
Years	n=34,717 %	n=29,615 %	n=5,436 %	n=3,904 %
0	100.0	100.0	100.0	100.0
1	47.6	44.9	53.5	55.8
2	30.0	26.9	35.3	41.6
3	21.6	18.6	26.5	34.4
4	17.0	14.2	20.9	29.5
5	14.1	11.3	17.6	27.4
6	12.3	9.7	15.3	25.1
7	11.0	8.6	13.8	23.4
8	10.2	7.9	12.6	22.0
9	9.5	7.4	11.7	20.7
10	9.1	7.0	11.0	19.7

Table 5d. Observed post-progression survival of patients with GI cancer for period 1998-2020 (N=34,717).

ICD-10 C15-C26: Malignant neoplasms of digestive organs
Type of Progression: Distant metastasis
Observed post-progression survival by period of progression date 1988-2020 N=33,942
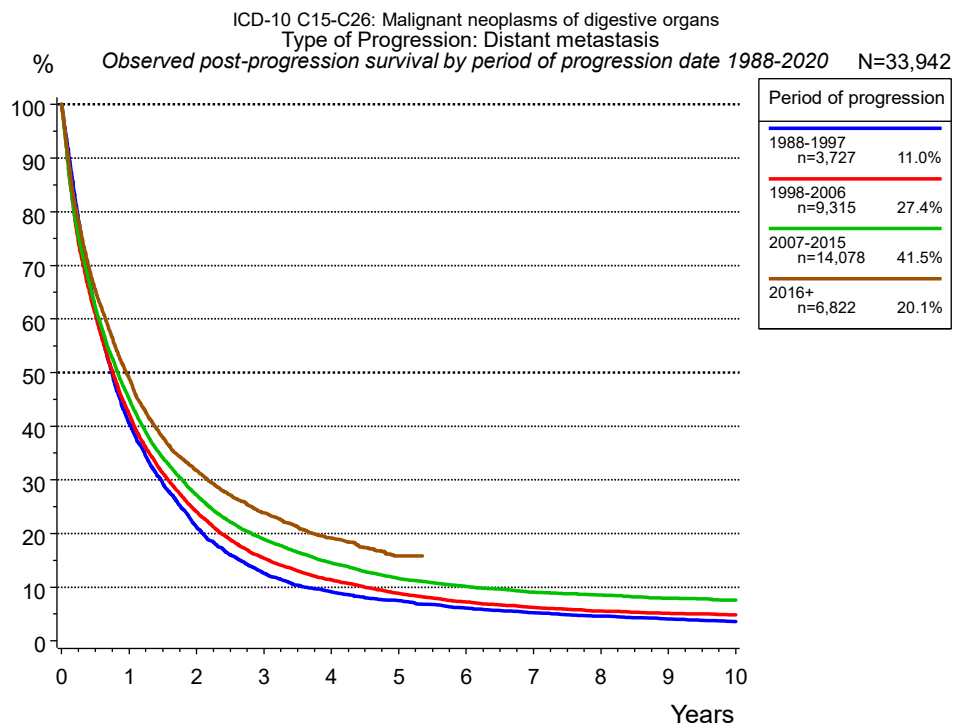

Figure 5e. Observed post-progression (distant metastasis) survival of 33,942 patients with GI cancer diagnosed between 1988 and 2020 by period of progression.

	Period of progression			
	1988-1997 n=3,727	1998-2006 n=9,315	2007-2015 n=14,078	2016+ n=6,822
Years	%	%	%	%
0	100.0	100.0	100.0	100.0
1	40.5	42.3	45.1	49.0
2	21.2	24.0	27.2	31.7
3	12.6	15.4	18.9	23.8
4	9.1	11.3	14.5	19.2
5	7.5	8.8	11.6	15.8
6	6.1	7.2	10.2	
7	5.2	6.2	9.1	
8	4.6	5.5	8.6	
9	4.1	5.1	8.0	
10	3.6	4.8	7.6	

Table 5f. Observed post-progression (distant metastasis) survival of patients with GI cancer for period 1988-2020 by period of progression (N=33,942).

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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