

# Munich Cancer Registry



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## ICD-10 C73: Thyroid cancer

### Survival

Year of diagnosis	1988-1997	1998-2019
Patients	963	8,883
Diseases	967	8,945
Cases evaluated	887	7,824
Creation date	01/27/2021	
Database export	01/07/2021	
Population	4.92 m	



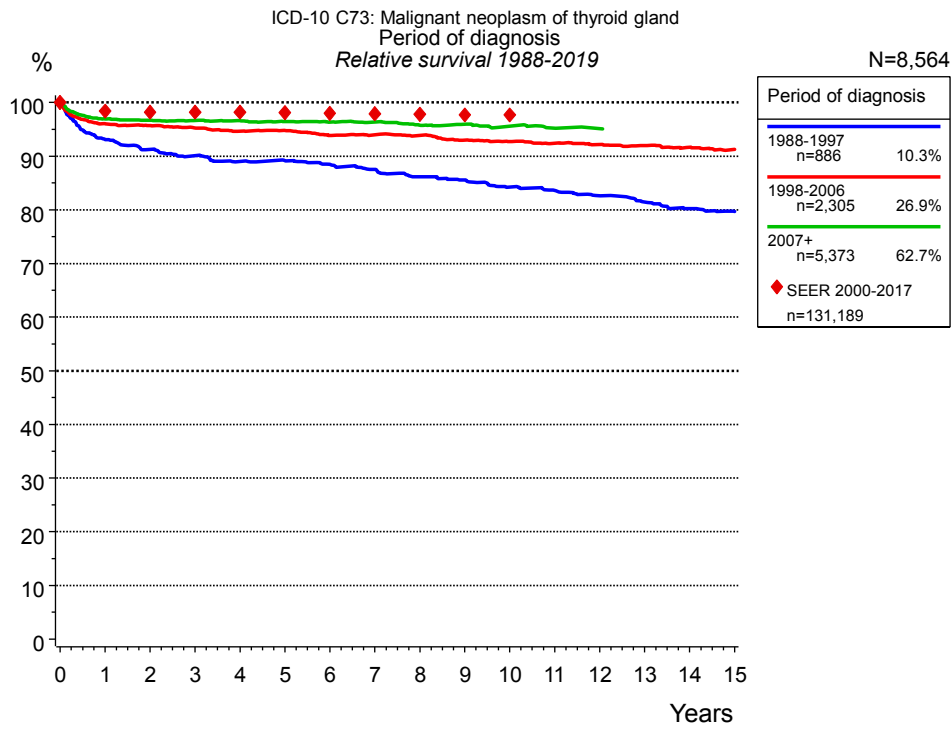
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<https://www.tumorregister-muenchen.de/en>

[https://www.tumorregister-muenchen.de/en/facts/surv/sC73\\_\\_E-ICD-10-C73-Thyroid-cancer-survival.pdf](https://www.tumorregister-muenchen.de/en/facts/surv/sC73__E-ICD-10-C73-Thyroid-cancer-survival.pdf)

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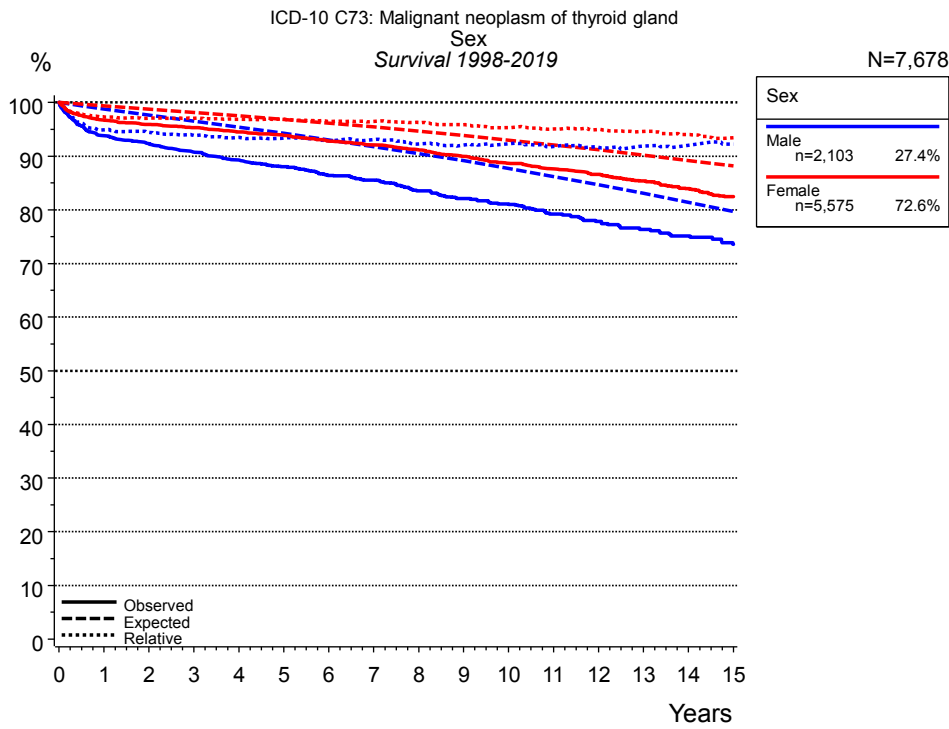
**Figure 1a.** Relative survival of patients with thyroid cancer by period of diagnosis. Included in the evaluation are 8,564 cases diagnosed between 1988 and 2019.

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=886		1998-2006 n=2,305		2007+ n=5,373	
	obs. %	rel. %	obs. %	rel. %	obs. %	rel. %
0	100.0	100.0	100.0	100.0	100.0	100.0
1	91.8	93.1	95.1	96.0	96.3	97.0
2	88.8	91.2	94.0	95.7	95.3	96.7
3	86.6	90.1	92.8	95.2	94.6	96.6
4	84.5	89.0	91.4	94.6	93.9	96.6
5	83.6	89.2	90.7	94.8	93.0	96.5
6	82.0	88.4	89.0	93.9	92.1	96.3
7	80.1	87.5	88.3	94.0	91.4	96.4
8	77.8	86.2	87.3	93.9	90.0	95.8
9	76.4	85.6	85.5	93.0	89.3	96.0
10	74.3	84.2	84.3	92.7	88.0	95.6
11	72.8	83.6	83.1	92.4	86.7	95.2
12	71.1	82.6	81.9	92.2	86.2	95.2
13	69.2	81.4	80.7	91.9		
14	67.2	80.2	79.4	91.6		
15	66.0	79.7	77.9	91.2		
Median	25.4					

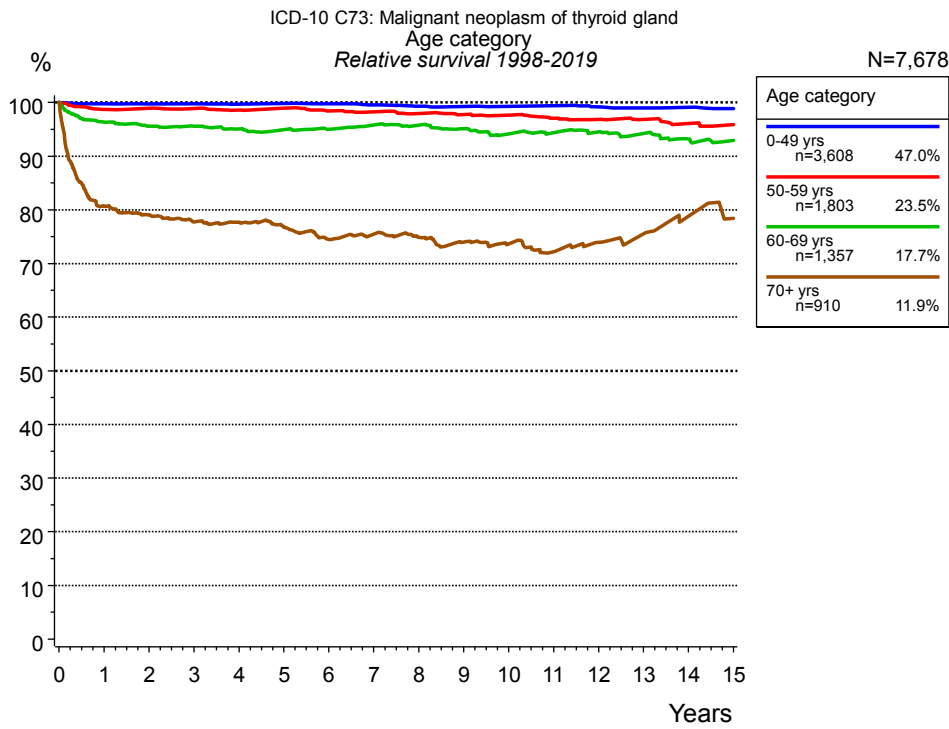
**Table 1b.** Observed (obs.) and relative (rel.) survival of patients with thyroid cancer by period of diagnosis for period 1988-2019 (N=8,564).



**Figure 2a.** Survival of patients with thyroid cancer by sex. Included in the evaluation are 7,678 cases diagnosed between 1998 and 2019.

Years	Sex			
	Male n=2,103		Female n=5,575	
	obs. %	rel. %	obs. %	rel. %
0	100.0	100.0	100.0	100.0
1	93.8	94.9	96.7	97.3
2	92.3	94.5	95.9	97.1
3	90.7	93.9	95.3	97.1
4	89.2	93.5	94.5	96.9
5	88.0	93.4	93.9	96.9
6	86.4	92.8	92.8	96.5
7	85.6	93.1	92.1	96.5
8	83.6	92.3	91.2	96.3
9	82.1	92.1	90.0	95.8
10	81.0	92.3	88.7	95.3
11	79.2	91.8	87.6	95.1
12	77.8	91.7	86.6	94.9
13	76.4	91.9	85.4	94.6
14	75.1	92.0	84.0	94.1
15	73.6	92.3	82.5	93.5
Median				

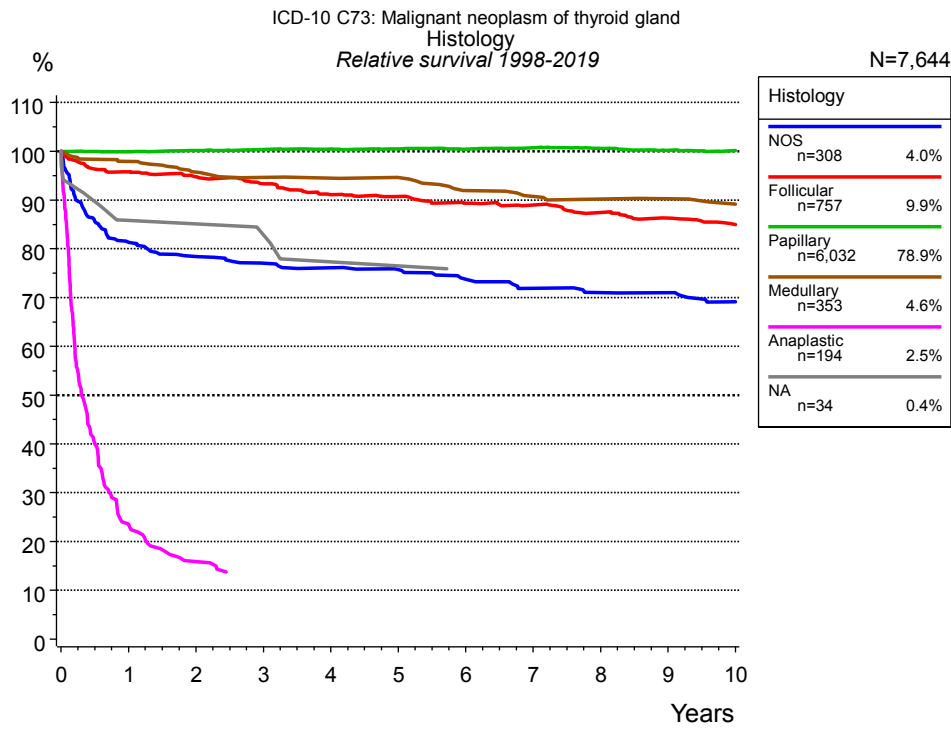
**Table 2b.** Observed (obs.) and relative (rel.) survival of patients with thyroid cancer by sex for period 1998-2019 (N=7,678).



**Figure 3a.** Relative survival of patients with thyroid cancer by age category. Included in the evaluation are 7,678 cases diagnosed between 1998 and 2019.

Years	Age category							
	0-49 yrs n=3,608		50-59 yrs n=1,803		60-69 yrs n=1,357		70+ yrs n=910	
	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	99.7	99.8	98.3	98.7	95.5	96.4	77.4	80.6
2	99.5	99.8	98.1	98.9	93.6	95.6	73.3	79.1
3	99.5	99.8	97.5	98.9	92.5	95.6	69.1	77.7
4	99.2	99.7	96.7	98.6	90.9	95.1	66.3	77.7
5	99.2	99.8	96.5	98.9	89.5	95.0	62.7	76.7
6	99.0	99.8	95.3	98.4	88.2	95.0	58.0	74.5
7	98.6	99.5	94.5	98.3	87.6	95.8	56.0	75.5
8	98.2	99.3	93.5	97.9	86.0	95.8	52.6	74.8
9	97.9	99.2	92.5	97.8	83.8	95.1	48.9	74.0
10	97.8	99.3	91.6	97.6	81.3	94.2	45.4	73.6
11	97.6	99.4	90.2	97.1	79.6	94.4	41.6	72.2
12	97.1	99.2	89.2	96.8	77.8	94.5	39.3	74.0
13	96.6	99.0	88.1	96.8	75.3	94.2	37.0	75.5
14	96.5	99.1	86.5	96.1	72.3	93.2	34.8	78.8
15	95.9	98.9	85.2	95.9	69.5	92.9	31.5	78.4
Median							8.5	

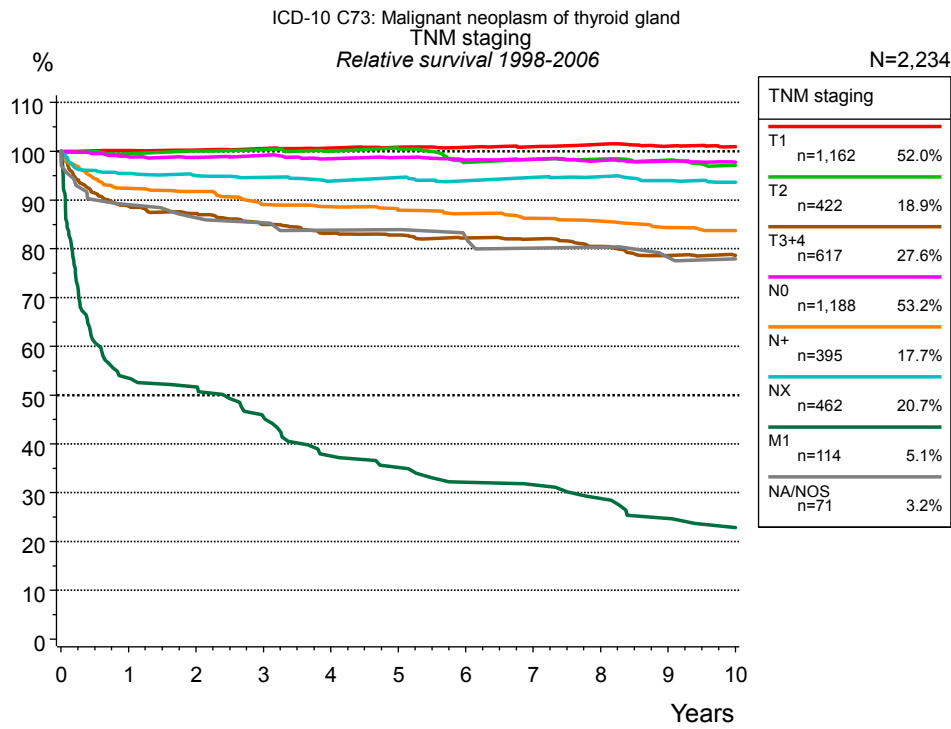
**Table 3b.** Observed (obs.) and relative (rel.) survival of patients with thyroid cancer by age category for period 1998-2019 (N=7,678).



**Figure 4a.** Relative survival of patients with thyroid cancer by histology. For 7,644 of 7,678 cases diagnosed between 1998 and 2019 valid data could be obtained for this item. The grey line represents the subgroup of 34 patients with missing values regarding histology (0.4 % of 7,678 patients, the percent values of all other categories are related to n=7,644).

Years	Histology											
	NOS n=308		Follicular n=757		Papillary n=6,032		Medullary n=353		Anaplastic n=194		NA n=34	
	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
1	80.2	81.3	94.5	95.8	99.4	99.9	97.3	97.9	22.6	23.4	85.0	85.9
2	76.3	78.5	92.1	94.8	99.0	100.2	94.4	95.7	15.1	15.9	85.0	85.1
3	73.7	77.1	89.5	93.4	98.6	100.4	92.6	94.6			81.9	82.8
4	72.2	76.1	86.0	91.1	98.0	100.5	91.9	94.5			75.3	77.3
5	71.0	75.8	84.4	90.8	97.4	100.5	91.0	94.6			75.3	76.5
6	68.3	73.8	81.7	89.4	96.6	100.4	87.7	91.9			71.7	76.0
7	65.6	71.9	80.0	89.0	96.1	100.7	86.1	90.7				
8	64.2	71.0	77.2	87.5	95.1	100.6	85.0	90.2				
9	63.7	71.0	74.8	86.3	93.9	100.2	84.3	90.3				
10	61.1	69.2	72.1	85.0	92.9	100.2	82.8	89.2				
Median	18.8								0.3			

**Table 4b.** Observed (obs.) and relative (rel.) survival of patients with thyroid cancer by histology for period 1998-2019 (N=7,644).



**Figure 4c.** Relative survival of patients with thyroid cancer by TNM staging. For 2,236 of 2,305 cases diagnosed between 1998 and 2006 valid data could be obtained for this item. For a total of 2,234 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 71 patients with missing values regarding TNM staging (3.1 % of 2,305 patients, the percent values of all other categories are related to n=2,234).

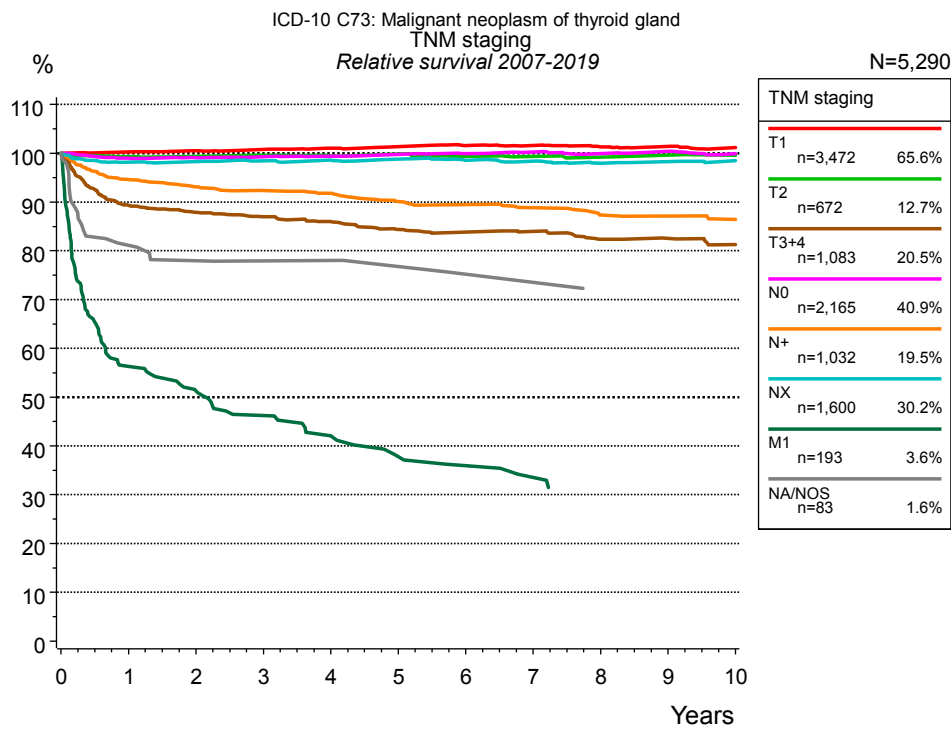
Due to substantial changes in stage classification schemes long-term survival statistics over decades could not be created.

Years	TNM staging													
	T1 n=1,162		T2 n=422		T3+4 n=617		N0 n=1,188		N+ n=395		NX n=462		M1 n=114	
	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	99.7	100.2	98.8	99.5	87.3	88.7	98.1	98.9	91.8	92.4	94.6	95.5	52.6	53.5
2	99.2	100.3	98.5	100.1	84.8	87.2	97.2	98.7	90.5	91.8	93.2	95.0	50.0	51.7
3	98.9	100.6	98.0	100.3	81.5	85.0	96.8	99.2	87.1	89.1	92.1	94.7	42.8	45.6
4	98.3	100.7	96.7	100.0	78.9	83.2	95.3	98.5	86.3	88.7	90.2	93.9	34.8	37.5
5	97.8	100.9	96.1	100.4	77.6	82.8	94.7	98.8	84.9	87.9	90.2	94.6	32.1	35.2
6	97.0	100.8	92.7	97.8	76.0	82.2	93.3	98.2	83.7	87.2	88.5	94.0	28.6	32.2
7	96.4	101.0	92.4	98.3	74.9	82.0	92.6	98.4	82.2	86.3	88.3	94.7	27.7	31.6
8	96.0	101.4	91.6	98.4	72.8	80.5	91.5	98.1	81.3	85.7	87.3	94.8	25.0	28.8
9	94.7	101.1	90.5	98.2	70.0	78.6	90.4	98.0	79.2	84.4	85.6	94.0	21.4	24.7
10	93.7	101.0	88.5	97.1	69.1	78.7	89.2	97.8	78.2	83.8	84.0	93.7	18.7	22.8
Median													1.6	

TNM staging		
<i>cont'd</i>	NA/NOS n=71	
Years	obs. %	rel. %
0	100.0	100.0
1	88.3	89.1
2	85.3	86.4
3	83.7	85.3
4	80.5	83.8
5	80.5	83.9
6	77.3	82.3
7	74.0	80.2
8	74.0	80.4
9	70.8	78.3
10	69.1	78.0
Median		

**Table 4d.** Observed (obs.) and relative (rel.) survival of patients with thyroid cancer by TNM staging for period 1998-2006 (N=2,234).





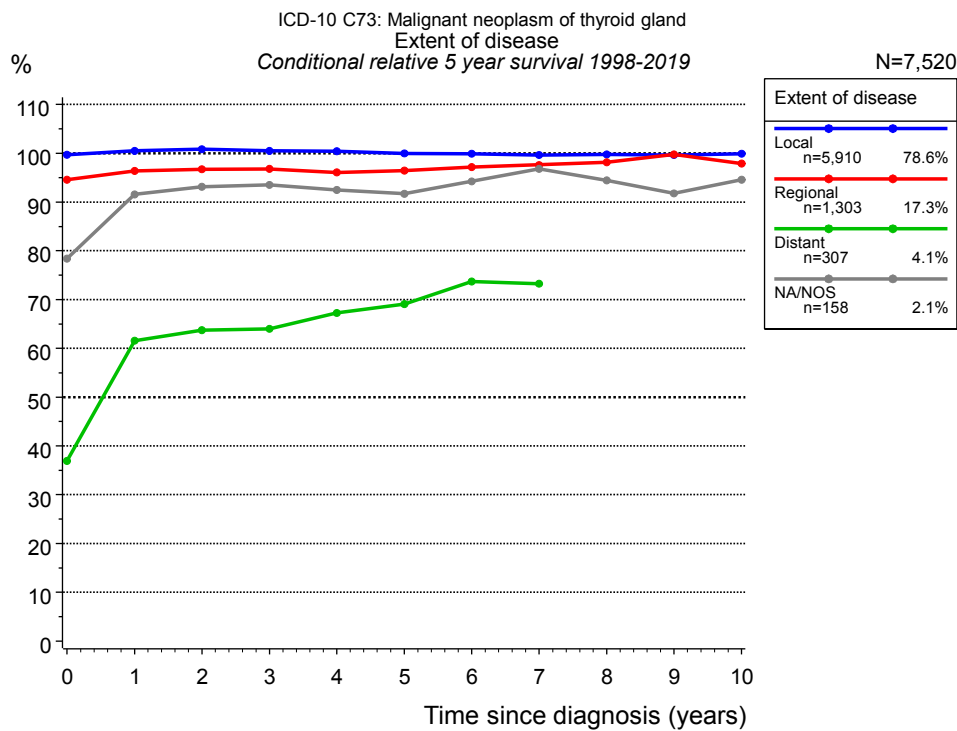
**Figure 4e.** Relative survival of patients with thyroid cancer by TNM staging. For 5,293 of 5,373 cases diagnosed between 2007 and 2019 valid data could be obtained for this item. For a total of 5,290 cases an evaluable classification was established. The accumulated percentage exceeds the 100 % value because patients are potentially considered in more than one subgroup. The grey line represents the subgroup of 83 patients with missing values regarding TNM staging (1.5 % of 5,373 patients, the percent values of all other categories are related to n=5,290).

Due to substantial changes in stage classification schemes long-term survival statistics over decades could not be created.

Years	TNM staging													
	T1 n=3,472		T2 n=672		T3+4 n=1,083		N0 n=2,165		N+ n=1,032		NX n=1,600		M1 n=193	
	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	99.8	100.3	98.9	99.3	88.2	89.3	98.5	99.0	94.0	94.6	97.4	98.2	55.1	56.3
2	99.5	100.5	98.4	99.4	85.9	87.9	98.0	99.1	92.0	93.1	96.8	98.3	49.0	51.3
3	99.1	100.8	98.0	99.6	84.2	87.0	97.6	99.3	90.7	92.3	96.2	98.4	43.7	46.2
4	98.7	101.0	97.3	99.5	82.4	86.0	97.1	99.4	89.8	91.8	95.4	98.6	38.6	42.1
5	98.4	101.3	97.1	99.9	80.0	84.4	96.8	99.8	87.5	90.1	94.8	98.8	34.5	37.8
6	97.8	101.6	95.7	99.4	78.6	83.8	96.2	99.9	86.4	89.5	93.6	98.5	32.3	36.0
7	97.1	101.6	95.0	99.3	77.9	84.0	95.8	100.3	85.4	88.9	92.5	98.4	29.8	33.6
8	95.9	101.3	94.3	99.2	75.5	82.4	94.7	100.0	83.3	87.3	91.2	98.0		
9	95.1	101.4	93.8	99.6	74.9	82.6	94.3	100.4	82.9	87.1	90.3	98.3		
10	93.9	101.2	92.8	99.6	73.0	81.3	92.8	99.9	81.8	86.4	89.3	98.5		
Median													1.8	

TNM staging		
<i>cont'd</i>	NA/NOS n=83	
Years	obs. %	rel. %
0	100.0	100.0
1	79.5	81.1
2	75.4	78.0
3	74.0	77.9
4	74.0	78.0
5	70.7	76.8
6	68.9	75.2
7	66.8	73.5
8	64.3	71.8
Median		

**Table 4f.** Observed (obs.) and relative (rel.) survival of patients with thyroid cancer by TNM staging for period 2007-2019 (N=5,290).

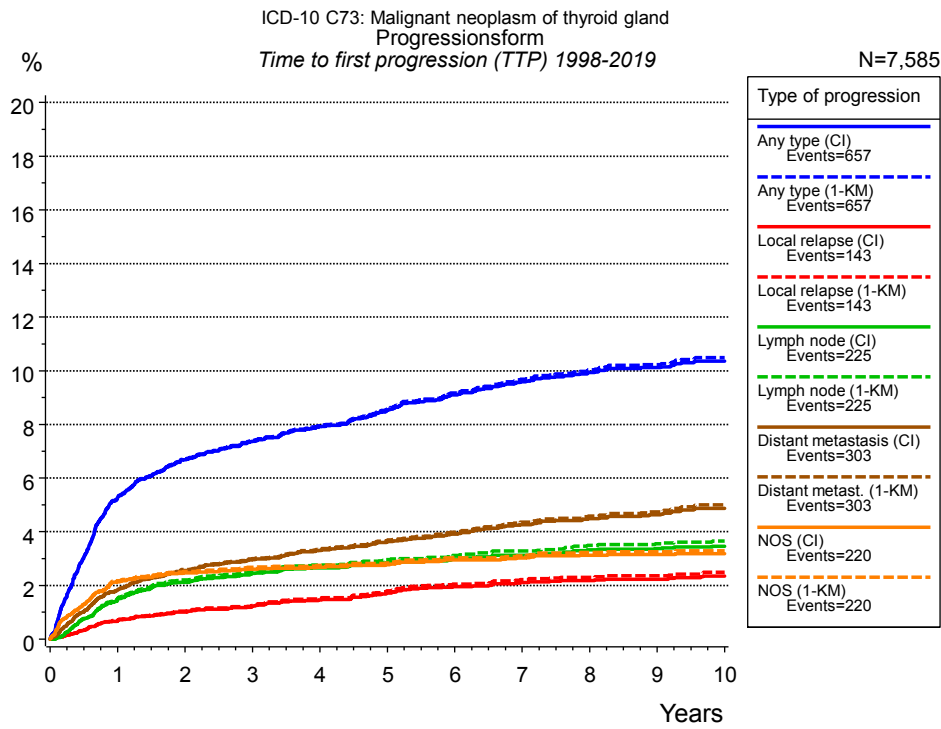


**Figure 4g.** Conditional relative 5-year survival of patients with thyroid cancer by extent of disease. For 7,529 of 7,678 cases diagnosed between 1998 and 2019 valid data could be obtained for this item. For a total of 7,520 cases an evaluable classification was established. The grey line represents the subgroup of 158 patients with missing values regarding extent of disease (2.1 % of 7,678 patients, the percent values of all other categories are related to n=7,520).

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	5,910	99.7	1,303	94.6	307	37.0	158	78.4
1	5,196	100.5	1,121	96.4	155	61.6	121	91.6
2	4,849	100.8	1,011	96.7	132	63.7	108	93.2
3	4,522	100.5	902	96.8	105	64.0	103	93.5
4	4,185	100.4	816	96.1	81	67.3	96	92.5
5	3,919	100.0	742	96.5	67	69.1	91	91.7
6	3,556	99.9	659	97.1	60	73.7	82	94.2
7	3,252	99.7	589	97.6	54	73.2	75	96.8
8	2,947	99.8	506	98.1			69	94.4
9	2,580	99.7	425	99.8			61	91.7
10	2,197	99.9	358	97.9			54	94.6

**Table 4h.** Conditional relative 5-year survival of patients with thyroid cancer by extent of disease for period 1998-2019 (N=7,520).

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 100.5% (n=4,522).

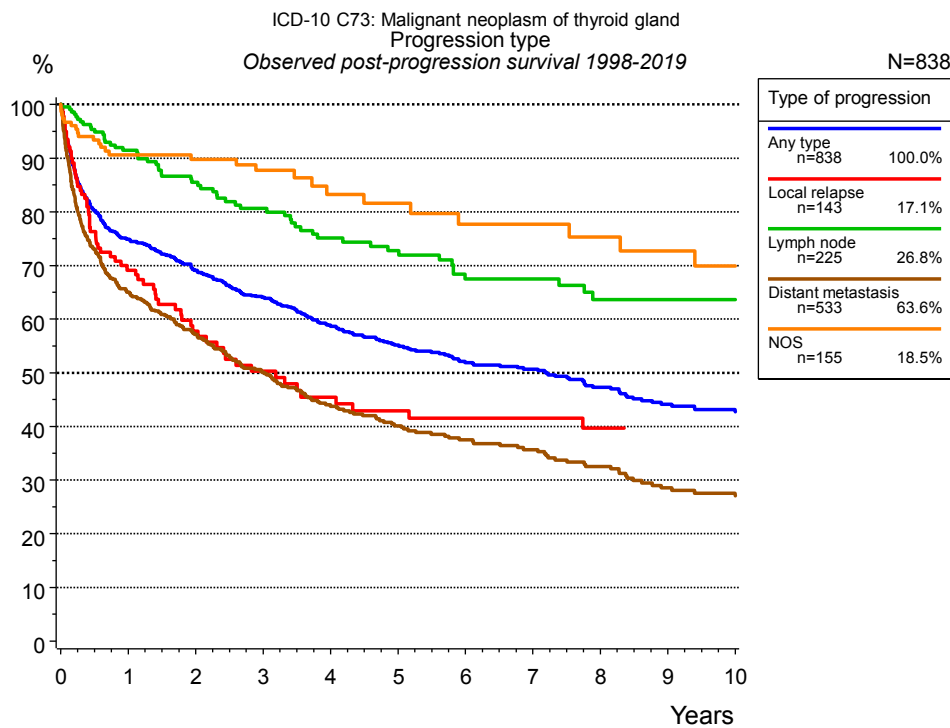


**Figure 5a.** Time to first progression of 7,585 patients with thyroid cancer diagnosed between 1998 and 2019 (in solid cancers M0 only) estimated by cumulative incidence function (CI, solid line) accounting for death as competing risk and by inverse Kaplan-Meier estimate (1-KM, dashed line). The frequency of events may be underestimated due to underreporting.

		Type of progression						Distant metastasis (CI)
		Any type (CI)	Any type (1-KM)	Local relapse (CI)	Local relapse (1-KM)	Lymph node (CI)	Lymph node (1-KM)	(CI)
N	7,285	7,285	7,585	7,585	7,585	7,585	7,585	7,285
Events	634	634	139	139	217	217	217	283
compet.	281		685		699			374
Years	%	%	%	%	%	%	%	%
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	5.3	5.3	0.7	0.7	1.5	1.5	1.5	1.8
2	6.7	6.7	1.0	1.0	2.1	2.2	2.2	2.6
3	7.4	7.4	1.2	1.3	2.4	2.5	2.5	3.0
4	7.9	8.0	1.5	1.5	2.7	2.8	2.8	3.3
5	8.5	8.6	1.7	1.8	2.8	3.0	3.0	3.6
6	9.1	9.2	2.0	2.0	3.0	3.1	3.1	3.9
7	9.6	9.7	2.1	2.2	3.1	3.3	3.3	4.3
8	9.9	10.0	2.2	2.3	3.3	3.5	3.5	4.5
9	10.1	10.2	2.2	2.4	3.4	3.5	3.5	4.6
10	10.4	10.5	2.3	2.5	3.5	3.6	3.6	4.9

<i>cont'd</i>	Type of progression		
	Distant metast. (1- KM)	NOS (CI)	NOS (1-KM)
N	7,285	7,585	7,585
Events	283	212	212
compet.		662	
Years	%	%	%
0	0.0	0.0	0.0
1	1.8	2.1	2.2
2	2.6	2.5	2.5
3	3.0	2.6	2.7
4	3.4	2.7	2.7
5	3.7	2.8	2.8
6	4.0	2.9	3.0
7	4.4	3.0	3.1
8	4.6	3.1	3.2
9	4.7	3.2	3.3
10	5.0	3.2	3.3

**Table 5b.** Time to first progression of patients with thyroid cancer for period 1998-2019 (N=7,585), also showing the total of progression events (Events) and of deaths as competing risk (compet.).

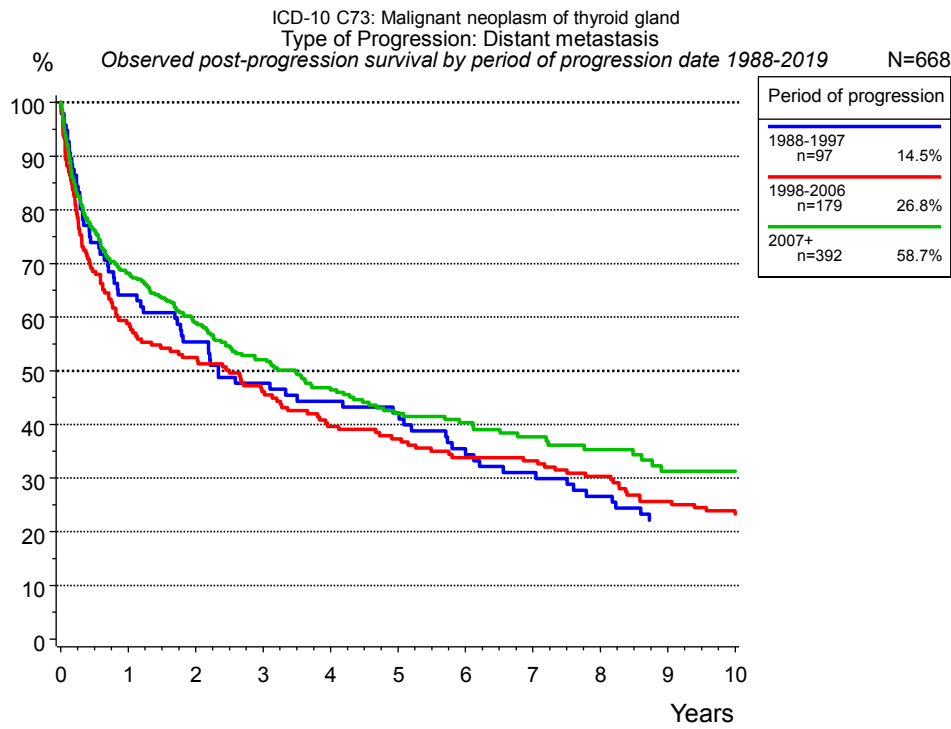


**Figure 5c.** Observed post-progression survival of 838 patients with thyroid cancer diagnosed between 1998 and 2019. These 838 patients with documented progression events during their course of disease represent 11.0 % of the totally 7,585 evaluated cases (incl. M1, n=300, 4.0 %). Patients with cancer relapse documented via death certificates only were excluded (n=119, 1.6 %). 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=838 %	Local relapse n=143 %	Lymph node n=225 %	Distant metastasis n=533 %	NOS n=155 %
0	100.0	100.0	100.0	100.0	100.0
1	74.9	69.1	91.5	65.0	90.6
2	69.1	57.8	85.5	57.2	89.7
3	64.0	50.3	80.6	50.1	87.8
4	58.7	45.4	75.1	43.7	83.2
5	55.1	42.9	72.7	40.1	81.6
6	51.9	41.5	67.5	37.5	77.6
7	50.7	41.5	67.5	35.7	77.6
8	47.3	39.7	63.6	32.5	75.3
9	44.1		63.6	28.5	72.7
10	42.7		63.6	27.1	69.9

**Table 5d.** Observed post-progression survival of patients with thyroid cancer for period 1998-2019 (N=838).



**Figure 5e.** Observed post-progression (distant metastasis) survival of 668 patients with thyroid cancer diagnosed between 1988 and 2019 by period of progression.

Years	Period of progression		
	1988-1997 n=97 %	1998-2006 n=179 %	2007+ n=392 %
0	100.0	100.0	100.0
1	64.1	58.8	68.2
2	55.4	52.5	58.9
3	47.7	46.1	52.1
4	44.3	39.6	46.4
5	42.1	37.3	42.0
6	35.5	33.8	40.3
7	31.0	33.2	37.7
8	26.6	30.3	35.3
9	22.2	25.7	31.3
10		23.3	31.3

**Table 5f.** Observed post-progression (distant metastasis) survival of patients with thyroid cancer for period 1988-2019 by period of progression (N=668).

## 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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