

# Munich Cancer Registry



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## ICD-10 C73: Thyroid cancer

### Survival

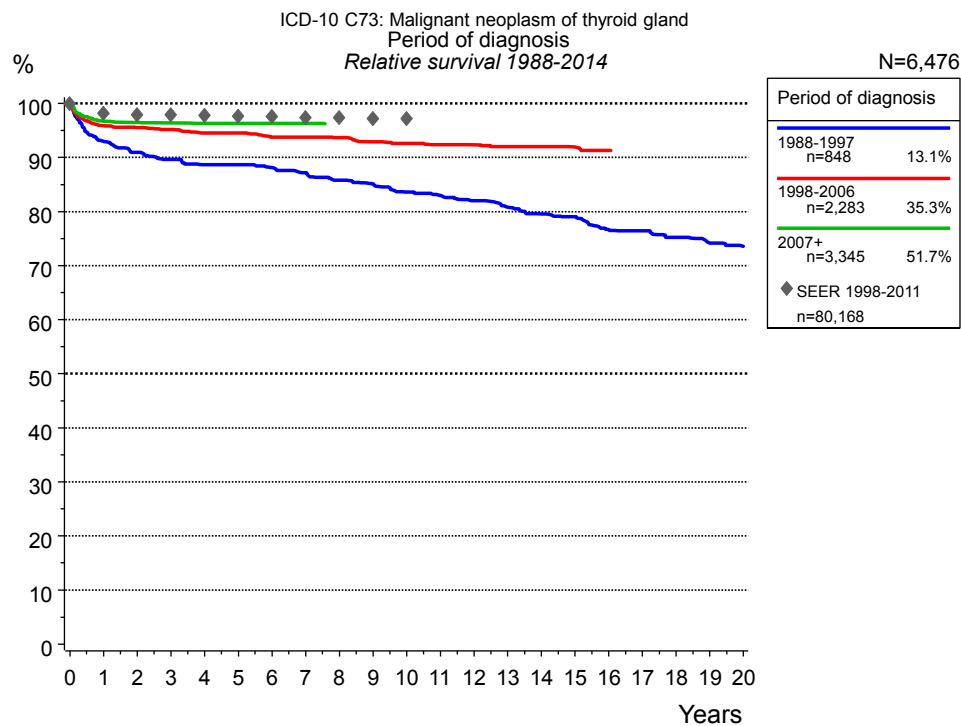
Year of diagnosis	1988-1997	1998-2014
Patients	921	6,440
Diseases	925	6,483
Cases evaluated	849	5,667
Creation date	03/02/2016	
Export date	12/23/2015	
Population	4.64 m	



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

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



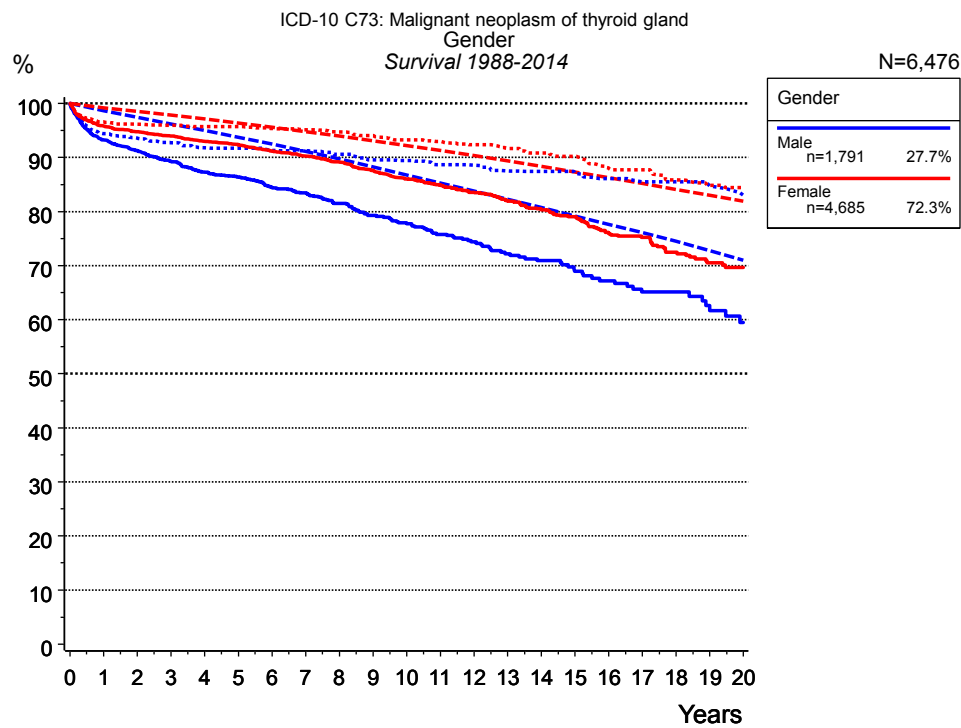
**Figure 1a.** Relative survival of patients with thyroid cancer by period of diagnosis. Included in the evaluation are 6,476 cases diagnosed between 1988 and 2014.

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=848		1998-2006 n=2,283		2007+ n=3,345	
	obs. %	rel. %	obs. %	rel. %	obs. %	rel. %
0	100.0	100.0	100.0	100.0	100.0	100.0
1	91.6	93.0	95.0	95.9	96.0	96.7
2	88.5	91.0	93.9	95.6	95.1	96.5
3	86.3	89.7	92.7	95.2	94.3	96.4
4	84.2	88.7	91.3	94.5	93.6	96.3
5	83.3	88.7	90.6	94.5	92.9	96.3
6	81.6	88.2	88.9	93.8	92.3	96.3
7	79.7	87.2	88.2	93.8	91.9	96.3
8	77.4	85.8	87.2	93.7		
9	76.0	85.2	85.5	92.9		
10	73.6	83.6	84.4	92.6		
11	72.2	83.0	83.2	92.4		
12	70.4	82.0	82.3	92.3		
13	68.5	80.8	81.0	92.0		
14	66.5	79.6	80.2	92.0		
15	65.3	79.0	78.6	91.9		
16	62.5	76.7	77.9	91.3		
17	61.4	76.5				
18	59.7	75.3				
19	57.7	74.2				
20	56.6	73.6				

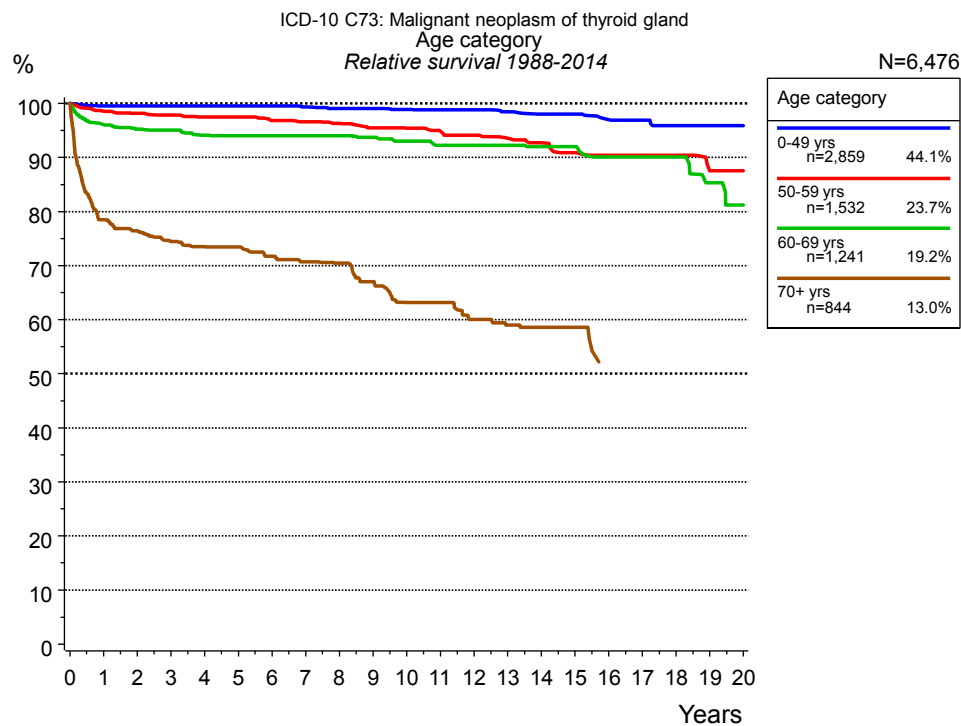
**Table 1b.** Observed (obs.) and relative (rel.) survival of patients with thyroid cancer by period of diagnosis for period 1988-2014 (N=6,476).



**Figure 2a.** Survival of patients with thyroid cancer by gender. Included in the evaluation are 6,476 cases diagnosed between 1988 and 2014.

Years	Gender			
	Male n=1,791		Female n=4,685	
	obs. %	rel. %	obs. %	rel. %
0	100.0	100.0	100.0	100.0
1	93.2	94.4	95.8	96.6
2	91.3	93.6	94.8	96.1
3	89.2	92.7	93.9	96.0
4	87.3	91.8	93.0	95.7
5	86.4	91.7	92.3	95.7
6	84.5	91.3	91.2	95.3
7	83.5	91.3	90.3	95.1
8	81.5	90.6	89.1	94.7
9	79.3	89.6	87.6	94.1
10	77.7	89.4	86.0	93.2
11	75.8	88.7	84.9	92.9
12	74.4	88.6	83.6	92.4
13	72.2	87.5	82.0	91.7
14	70.9	87.4	80.4	90.8
15	69.0	87.1	79.1	90.2
16	67.2	86.1	76.2	88.1
17	65.1	85.5	75.2	87.8
18	65.1	85.5	72.5	85.8
19	61.7	84.7	70.5	84.9
20	59.5	83.1	69.7	84.4

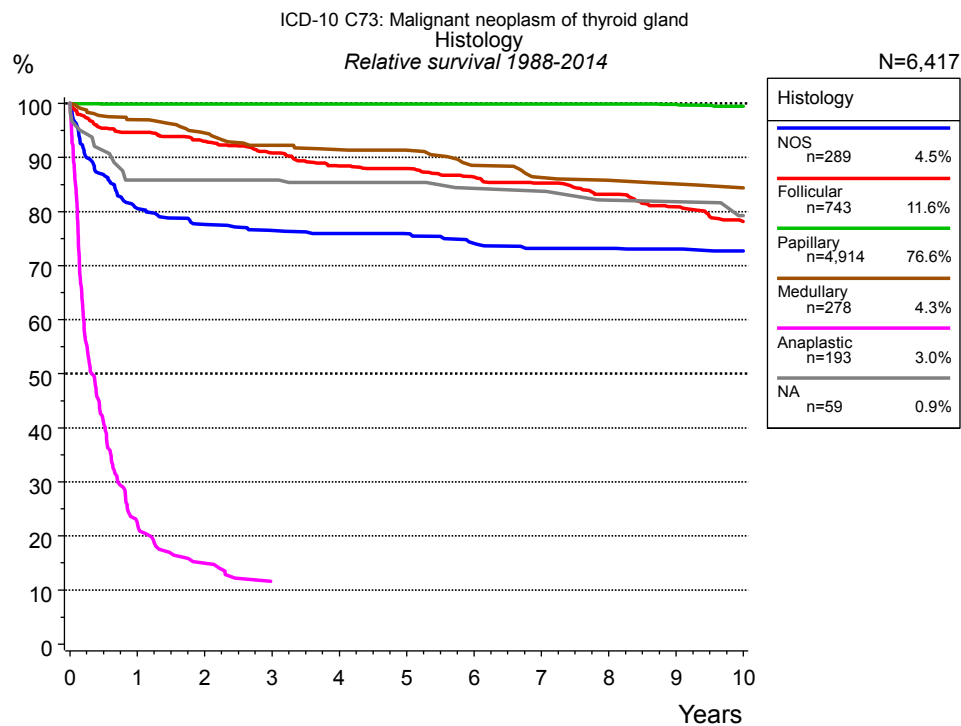
**Table 2b.** Observed (obs.) and relative (rel.) survival of patients with thyroid cancer by gender for period 1988-2014 (N=6,476).



**Figure 3a.** Relative survival of patients with thyroid cancer by age category. Included in the evaluation are 6,476 cases diagnosed between 1988 and 2014.

Years	Age category							
	0-49 yrs n=2,859		50-59 yrs n=1,532		60-69 yrs n=1,241		70+ yrs n=844	
	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	99.4	99.5	98.2	98.6	95.2	96.1	75.0	78.4
2	99.3	99.5	97.3	98.2	93.1	95.2	70.3	76.5
3	99.2	99.5	96.5	97.8	91.9	95.1	65.3	74.5
4	99.1	99.5	95.5	97.5	89.8	94.1	61.6	73.5
5	99.0	99.5	95.3	97.5	88.7	94.0	58.8	73.4
6	98.7	99.5	93.6	96.8	87.5	94.0	54.5	71.8
7	98.3	99.4	92.8	96.6	86.9	94.0	51.0	70.7
8	97.8	99.1	91.8	96.3	84.7	94.0	47.5	70.4
9	97.7	99.1	90.2	95.5	82.0	93.7	42.6	67.1
10	97.2	98.9	89.3	95.4	80.0	93.0	36.9	63.2
11	97.0	98.9	88.0	94.9	77.0	92.2	34.4	63.2
12	96.8	98.9	86.6	94.1	75.4	92.2	29.8	60.1
13	95.8	98.4	84.9	93.6	73.3	92.2	26.3	59.0
14	95.0	98.0	82.9	92.7	70.5	92.0	24.9	58.6
15	94.8	98.0	80.7	90.9	67.9	92.0	22.5	58.6
16	93.4	97.0	79.3	90.4	64.3	90.1		
17	93.1	96.9	78.0	90.4	62.1	90.1		
18	91.5	95.9	76.5	90.4	58.3	90.1		
19	91.5	95.9	72.1	87.5	51.3	85.3		
20	91.5	95.9	72.1	87.5	46.9	81.2		

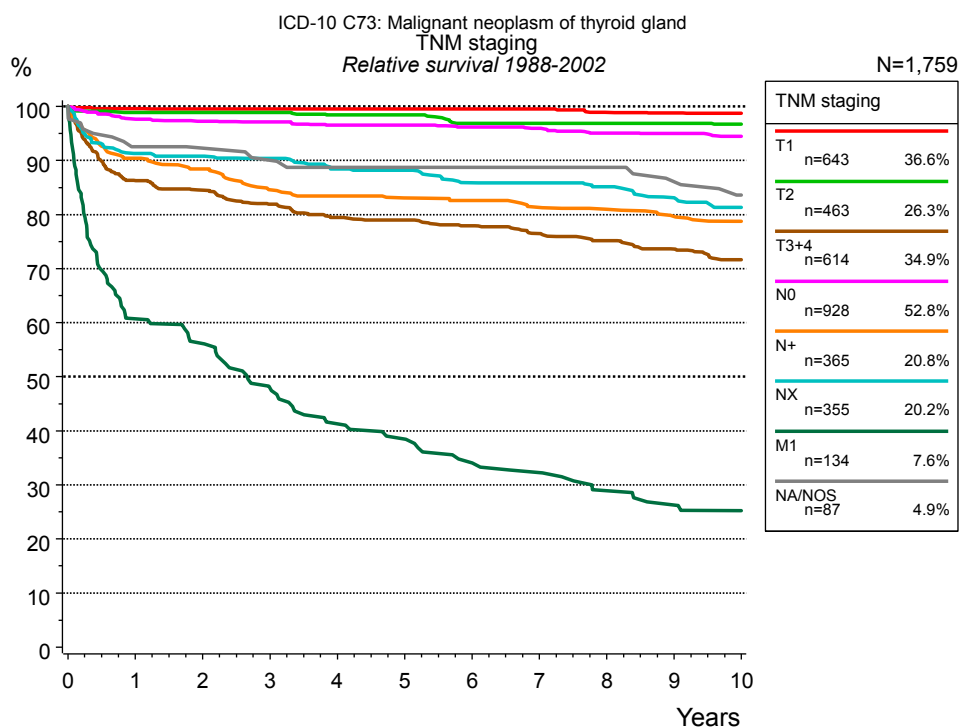
**Table 3b.** Observed (obs.) and relative (rel.) survival of patients with thyroid cancer by age category for period 1988-2014 (N=6,476).



**Figure 4a.** Relative survival of patients with thyroid cancer by histology. For 6,417 of 6,476 cases diagnosed between 1988 and 2014 valid data could be obtained for this item. The grey line represents the subgroup of 59 patients with missing values regarding histology (0.9% of 6,476 patients, the percent values of all other categories are related to n=6,417).

Years	Histology											
	NOS n=289		Follicular n=743		Papillary n=4,914		Medullary n=278		Anaplastic n=193		NA n=59	
	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	79.4	80.6	93.3	94.7	99.3	99.9	96.3	97.0	21.7	22.3	84.3	85.9
2	75.4	77.6	89.9	93.0	98.9	99.9	93.2	94.5	14.4	15.0	84.3	85.9
3	73.2	76.5	86.4	90.9	98.4	99.9	90.2	92.3	10.8	11.6	84.3	85.9
4	72.1	75.9	82.5	88.4	97.5	99.9	88.8	91.5	10.8	11.4	80.6	85.4
5	71.3	75.9	80.8	88.0	97.0	99.9	87.8	91.4	10.8	11.2	80.6	85.4
6	68.8	74.1	78.0	86.4	96.1	99.9	84.3	88.5			76.6	84.3
7	67.0	73.1	75.6	85.2	95.6	99.9	81.6	86.3			76.6	83.8
8	67.0	73.1	72.5	83.2	94.5	99.9	80.2	85.8			72.3	82.1
9	65.9	73.1	69.1	80.9	93.0	99.8	79.4	85.1			72.3	81.8
10	64.5	72.7	65.3	78.2	91.9	99.5	78.4	84.4			67.7	79.3

**Table 4b.** Observed (obs.) and relative (rel.) survival of patients with thyroid cancer by histology for period 1988-2014 (N=6,417).



**Figure 4c.** Relative survival of patients with thyroid cancer by TNM staging. For 1,760 of 1,846 cases diagnosed between 1988 and 2002 valid data could be obtained for this item. For a total of 1,759 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 87 patients with missing values regarding TNM staging (4.7 % of 1,846 patients, the percent values of all other categories are related to n=1,759).

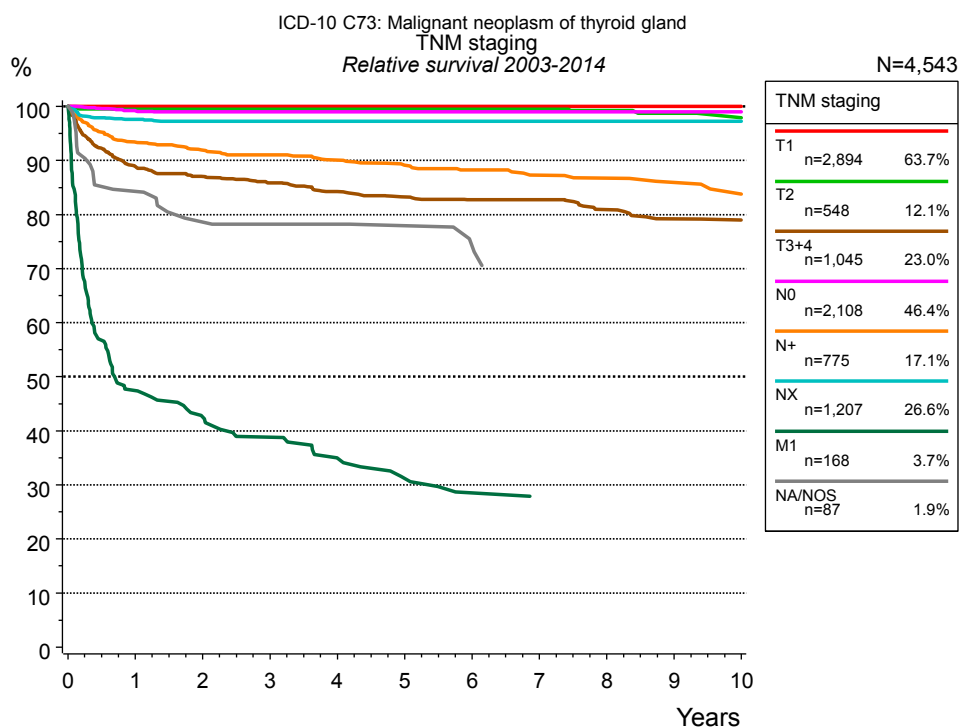
Due to substantial changes in stage classification schemes long-term survival statistics over decades could not be created.

TNM staging														
Years	T1 n=643		T2 n=463		T3+4 n=614		N0 n=928		N+ n=365		NX n=355		M1 n=134	
	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	99.2	99.6	98.2	98.9	84.6	86.3	96.8	97.7	89.4	90.5	89.9	91.3	59.3	60.7
2	98.2	99.5	97.6	98.9	81.6	84.5	95.5	97.2	86.5	88.4	88.4	90.8	54.0	56.1
3	97.7	99.5	96.9	98.9	77.7	81.9	94.7	97.2	81.7	84.6	86.9	90.4	44.9	47.9
4	97.3	99.5	95.5	98.4	74.2	79.5	93.1	96.5	80.2	83.4	83.7	88.5	38.0	41.3
5	96.8	99.5	94.8	98.4	72.7	79.0	92.4	96.5	78.7	83.1	82.8	88.2	35.0	38.5
6	95.7	99.5	92.4	96.8	70.6	77.9	90.9	96.2	77.8	82.6	79.2	85.9	30.4	34.1
7	94.9	99.5	92.1	96.8	68.1	76.5	89.8	95.9	75.8	81.3	78.3	85.9	28.1	32.3
8	93.0	98.9	91.7	96.8	66.0	75.2	88.0	95.0	74.8	81.0	76.4	85.1	24.3	28.9
9	92.1	98.7	90.9	96.8	63.5	73.6	87.2	95.0	72.8	79.7	73.7	83.1	22.1	26.3
10	91.6	98.7	88.9	96.7	60.8	71.7	85.8	94.5	71.2	78.7	70.9	81.3	20.5	25.2

TNM staging		
<i>cont'd</i>	NA/NOS	
	n=87	
Years	obs. %	rel. %
0	100.0	100.0
1	90.8	92.6
2	89.6	92.3
3	86.0	90.0
4	83.6	88.8
5	83.6	88.8
6	81.2	88.8
7	81.2	88.8
8	78.8	88.8
9	75.2	86.1
10	71.6	83.6

**Table 4d.** Observed (obs.) and relative (rel.) survival of patients with thyroid cancer by TNM staging for period 1988-2002 (N=3,502).





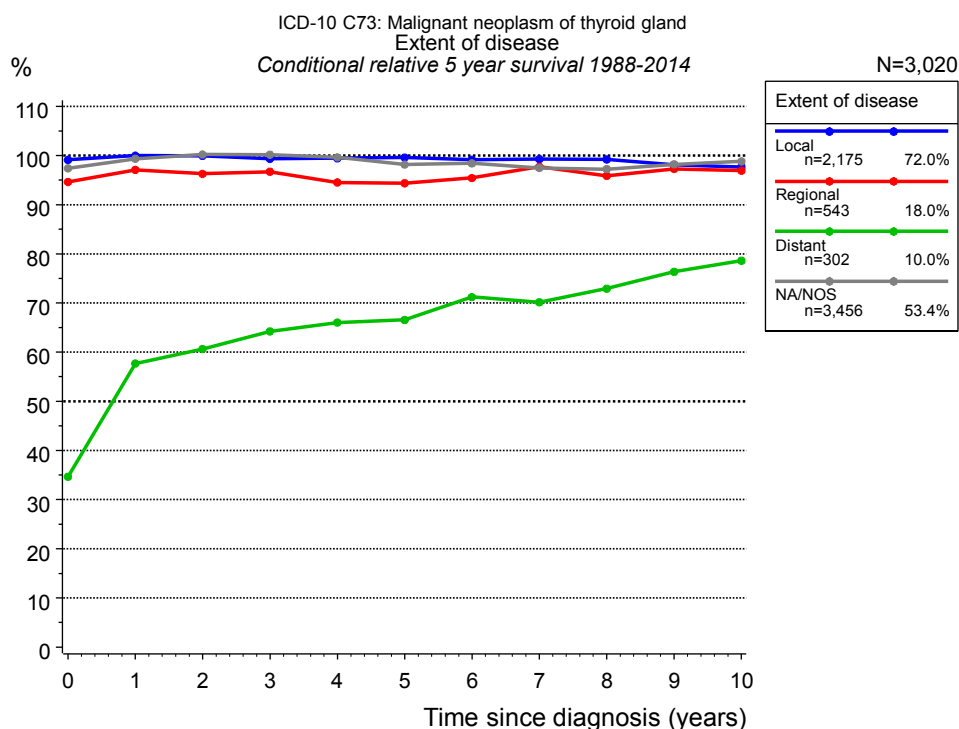
**Figure 4e.** Relative survival of patients with thyroid cancer by TNM staging. For 4,548 of 4,630 cases diagnosed between 2003 and 2014 valid data could be obtained for this item. For a total of 4,543 cases an evaluable classification was established. The accumulated percentage exceeds the 100% value because patients are potentially considered in more than one subgroup. The grey line represents the subgroup of 87 patients with missing values regarding TNM staging (1.9 % of 4,630 patients, the percent values of all other categories are related to n=4,543).

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

TNM staging														
Years	T1 n=2,894		T2 n=548		T3+4 n=1,045		N0 n=2,108		N+ n=775		NX n=1,207		M1 n=168	
	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	100.0	99.1	99.5	87.7	88.9	98.6	99.2	92.7	93.4	96.7	97.6	46.6	47.5
2	99.4	100.0	98.6	99.5	84.9	87.1	98.0	99.0	90.7	91.9	95.6	97.2	40.8	42.6
3	99.1	100.0	98.2	99.5	82.8	85.8	97.7	99.0	89.3	91.0	94.7	97.2	36.6	38.8
4	98.7	100.0	97.2	99.5	80.4	84.3	96.8	99.0	88.0	90.1	94.0	97.2	31.9	35.0
5	98.4	100.0	96.9	99.5	78.7	83.3	96.4	99.0	86.5	89.1	93.9	97.2	28.2	31.2
6	97.8	100.0	95.3	99.5	77.4	82.7	95.5	99.0	85.2	88.2	93.4	97.2	25.1	28.5
7	97.3	100.0	94.4	99.5	77.0	82.7	95.1	99.0	83.8	87.3	93.1	97.2	23.9	27.7
8	97.0	100.0	93.2	99.2	74.3	80.9	93.6	99.0	83.0	86.7	92.3	97.2	23.9	26.8
9	95.5	100.0	91.5	98.7	72.0	79.2	92.6	99.0	81.7	86.0	90.6	97.2		
10	94.9	100.0	90.4	97.9	70.8	78.9	91.9	99.0	79.9	83.8	90.6	97.2		

TNM staging		
<i>cont'd</i>	NA/NOS	
	n=87	
Years	obs. %	rel. %
0	100.0	100.0
1	83.5	84.3
2	76.9	78.6
3	75.4	78.2
4	75.4	78.2
5	73.7	77.9
6	69.2	74.2

**Table 4f.** Observed (obs.) and relative (rel.) survival of patients with thyroid cancer by TNM staging for period 2003-2014 (N=8,745).

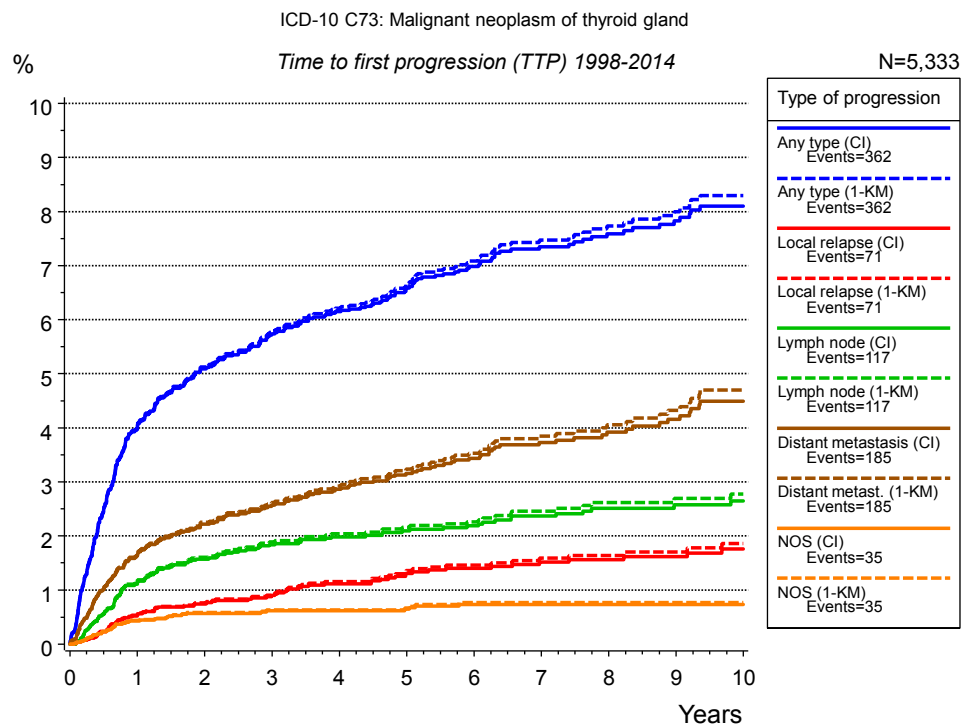


**Figure 4g.** Conditional relative 5-year survival of patients with thyroid cancer by extent of disease. For 6,308 of 6,476 cases diagnosed between 1988 and 2014 valid data could be obtained for this item. For a total of 3,020 cases an evaluable classification was established. The grey line represents the subgroup of 3,456 patients with missing values regarding extent of disease (53.4% of 6,476 patients, the percent values of all other categories are related to n=3,020).

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	2,175	99.1	543	94.6	302	34.7	3,456	97.4
1	1,967	100.0	478	97.1	154	57.7	3,179	99.4
2	1,797	99.9	432	96.3	132	60.6	2,966	100.2
3	1,642	99.3	375	96.7	108	64.2	2,790	100.2
4	1,481	99.4	313	94.5	88	66.0	2,577	99.7
5	1,359	99.6	269	94.4	74	66.6	2,299	98.2
6	1,273	99.1	244	95.4	63	71.2	1,854	98.4
7	1,158	99.3	217	97.7	55	70.2	1,428	97.5
8	947	99.2	183	95.9	47	72.9	1,187	97.2
9	802	98.1	153	97.3	38	76.4	1,016	98.2
10	681	97.7	137	97.0	31	78.6	885	98.8

**Table 4h.** Conditional relative 5-year survival of patients with thyroid cancer by extent of disease for period 1988-2014 (N=3,020).

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 99.3% (n=1,642).

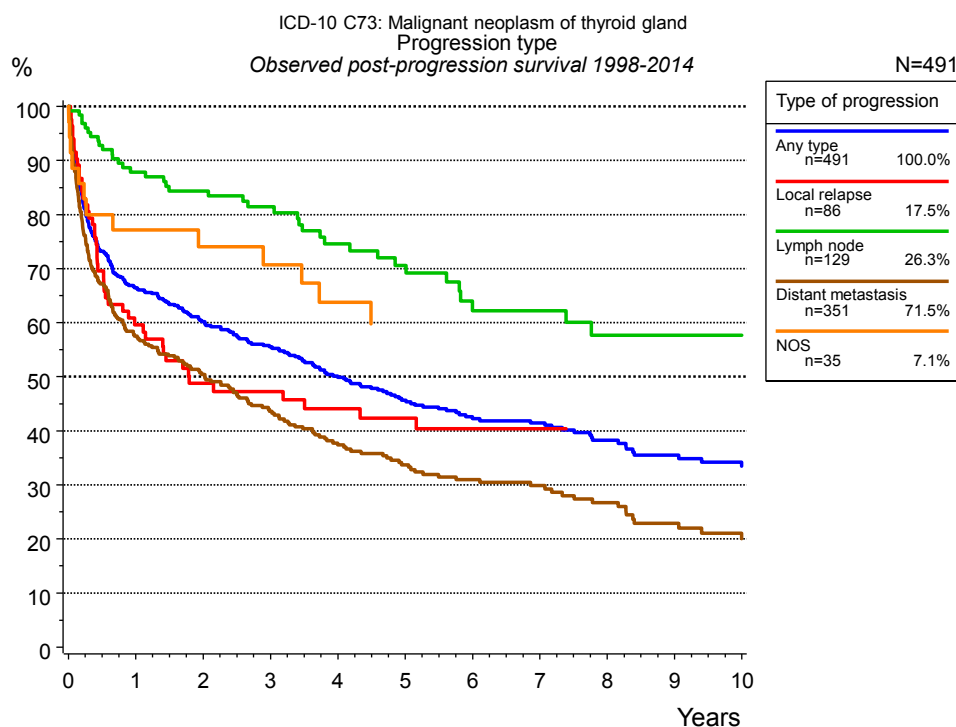


**Figure 5a.** Time to first progression of 5,333 patients with thyroid cancer diagnosed between 1998 and 2014 (M0 only in solid cancers) estimated by cumulative incidence function (CI, solid line) accounting for death as competing risk and by inverse Kaplan-Meier estimate (1-KM, dashed line). The frequency of events may be underestimated due to underreporting.

Years	Type of progression						
	Any type (CI)	Any type (1-KM)	Local relapse (CI)	Local relapse (1-KM)	Lymph node (CI)	Lymph node (1-KM)	Distant metastasis (CI)
	n=5,333 %	n=5,333 %	n=5,333 %	n=5,333 %	n=5,333 %	n=5,333 %	n=5,333 %
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	4.0	4.0	0.5	0.5	1.1	1.2	1.6
2	5.1	5.1	0.7	0.8	1.6	1.6	2.2
3	5.7	5.8	0.9	0.9	1.8	1.9	2.6
4	6.1	6.2	1.1	1.2	2.0	2.0	2.9
5	6.6	6.7	1.3	1.4	2.1	2.2	3.2
6	7.0	7.1	1.4	1.5	2.2	2.3	3.4
7	7.3	7.5	1.5	1.6	2.4	2.5	3.7
8	7.6	7.7	1.6	1.6	2.5	2.6	3.9
9	7.8	8.0	1.6	1.7	2.6	2.7	4.2
10	8.1	8.3	1.8	1.9	2.6	2.8	4.5

<i>cont'd</i>	Type of progression		
	Distant metast. (1- KM)	NOS (CI)	NOS (1-KM)
	n=5,333	n=5,333	n=5,333
Years	%	%	%
0	0.0	0.0	0.0
1	1.7	0.4	0.4
2	2.3	0.6	0.6
3	2.6	0.6	0.6
4	2.9	0.6	0.6
5	3.2	0.6	0.7
6	3.5	0.7	0.8
7	3.8	0.7	0.8
8	4.1	0.7	0.8
9	4.3	0.7	0.8
10	4.7	0.7	0.8

**Table 5b.** Time to first progression of patients with thyroid cancer for period 1998-2014 (N=5,333).

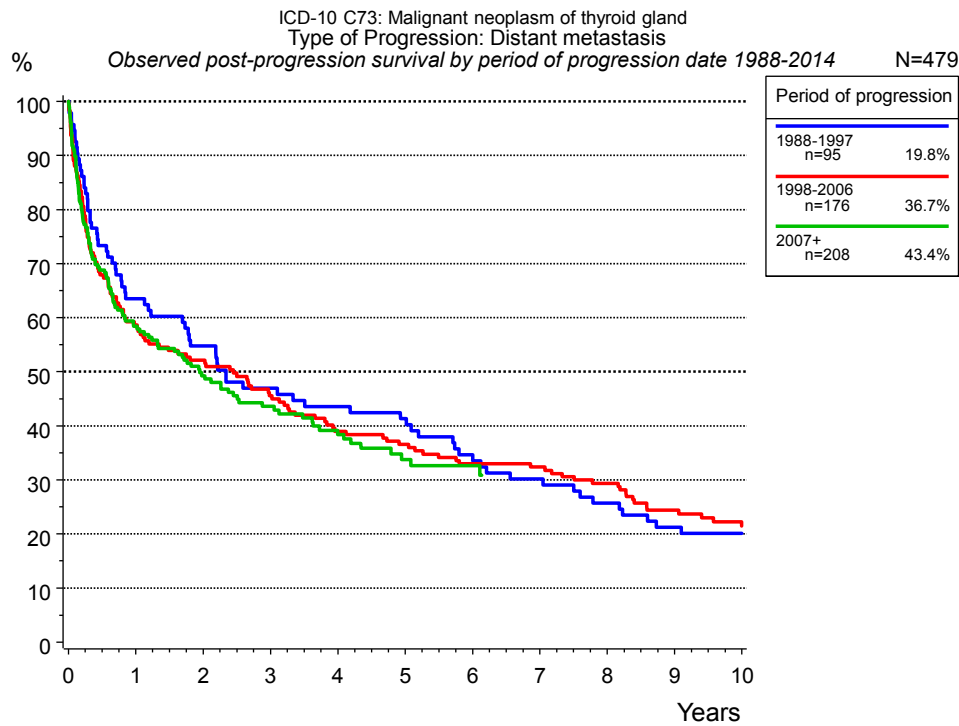


**Figure 5c.** Observed post-progression survival of 491 patients with thyroid cancer diagnosed between 1998 and 2014. These 491 patients with documented progression events during their course of disease represent 8.8 % of the totally 5,553 evaluated cases (incl. M1, n=220, 4.0 %). Patients with cancer relapse documented via death certificates only were excluded (n=91, 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=491 %	Local relapse n=86 %	Lymph node n=129 %	Distant metastasis n=351 %	NOS n=35 %
0	100.0	100.0	100.0	100.0	100.0
1	66.5	59.6	87.8	57.5	77.1
2	60.2	48.8	84.3	50.4	74.1
3	55.5	47.3	81.4	43.6	70.7
4	49.9	44.1	74.6	37.4	63.8
5	45.7	42.3	70.6	33.7	59.8
6	42.3	40.4	62.2	31.0	
7	41.5	40.4	62.2	29.9	
8	38.3		57.7	26.7	
9	35.5		57.7	22.9	
10	33.5		57.7	20.1	

**Table 5d.** Observed post-progression survival of patients with thyroid cancer for period 1998-2014 (N=491).



**Figure 5e.** Observed post-progression (distant metastasis) survival of 479 patients with thyroid cancer diagnosed between 1988 and 2014 by period of progression.

Years	Period of progression		
	1988-1997 n=95 %	1998-2006 n=176 %	2007+ n=208 %
0	100.0	100.0	100.0
1	63.5	58.7	58.4
2	54.8	52.2	49.3
3	46.9	45.6	43.6
4	43.6	39.0	38.4
5	41.4	36.6	33.8
6	34.7	33.0	32.6
7	30.2	32.4	30.9
8	25.7	29.4	30.9
9	21.2	24.4	
10	20.1	21.5	

**Table 5f.** Observed post-progression (distant metastasis) survival of patients with thyroid cancer for period 1988-2014 by period of progression (N=479).

## 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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