

# Munich Cancer Registry



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

## ICD-10 C43: Malignant melanoma

### Survival

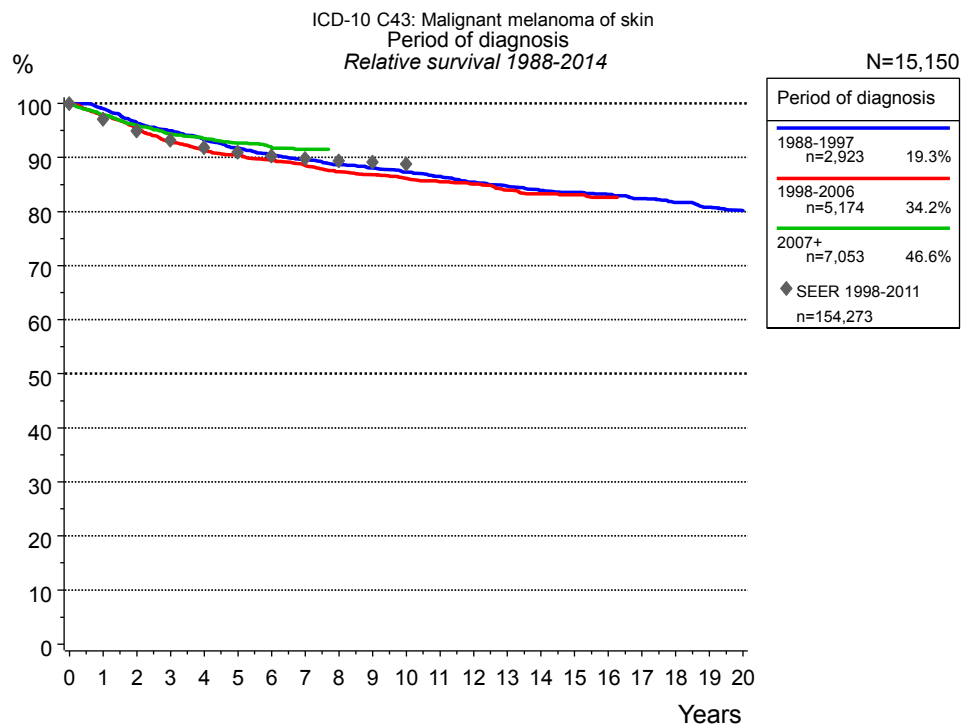
Year of diagnosis	1988-1997	1998-2014
Patients	3,150	15,418
Diseases	3,215	16,145
Cases evaluated	2,926	12,376
Creation date	03/02/2016	
Export date	12/23/2015	
Population	4.64 m	



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

[http://www.tumorregister-muenchen.de/en/facts/surv/sC43\\_\\_E-ICD-10-C43-Malignant-melanoma-survival.pdf](http://www.tumorregister-muenchen.de/en/facts/surv/sC43__E-ICD-10-C43-Malignant-melanoma-survival.pdf)



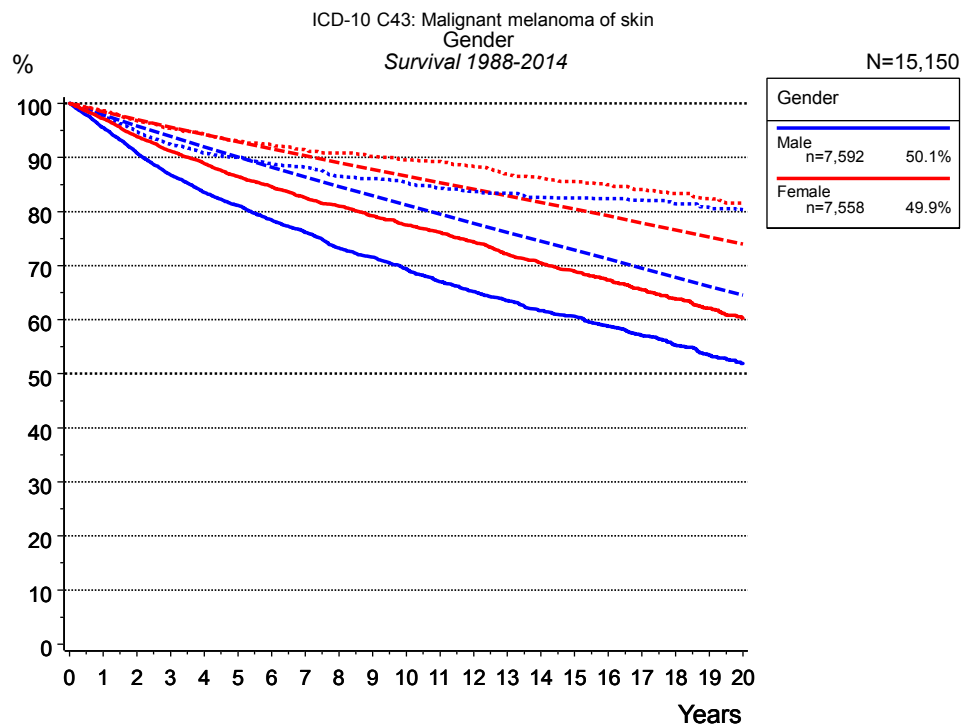
**Figure 1a.** Relative survival of patients with malignant melanoma by period of diagnosis. Included in the evaluation are 15,150 cases diagnosed between 1988 and 2014.

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=2,923		1998-2006 n=5,174		2007+ n=7,053	
	obs. %	rel. %	obs. %	rel. %	obs. %	rel. %
0	100.0	100.0	100.0	100.0	100.0	100.0
1	97.2	99.0	96.0	97.8	96.2	97.9
2	92.9	96.4	91.8	95.3	92.6	96.0
3	90.0	94.9	88.0	92.9	89.4	94.4
4	86.8	93.3	85.1	91.3	87.1	93.5
5	83.9	91.8	82.8	90.4	84.9	92.7
6	81.4	90.6	80.6	89.5	82.6	91.9
7	79.1	89.6	78.4	88.5	80.8	91.5
8	77.0	88.7	76.1	87.4		
9	75.1	88.1	74.4	86.8		
10	73.1	87.3	72.6	86.2		
11	71.1	86.5	70.8	85.5		
12	69.0	85.5	69.3	85.1		
13	67.2	84.7	67.3	83.9		
14	65.4	83.9	65.7	83.3		
15	64.0	83.6	64.6	83.1		
16	62.4	83.2	63.0	82.6		
17	60.6	82.4				
18	58.8	81.7				
19	57.0	80.8				
20	55.4	80.1				

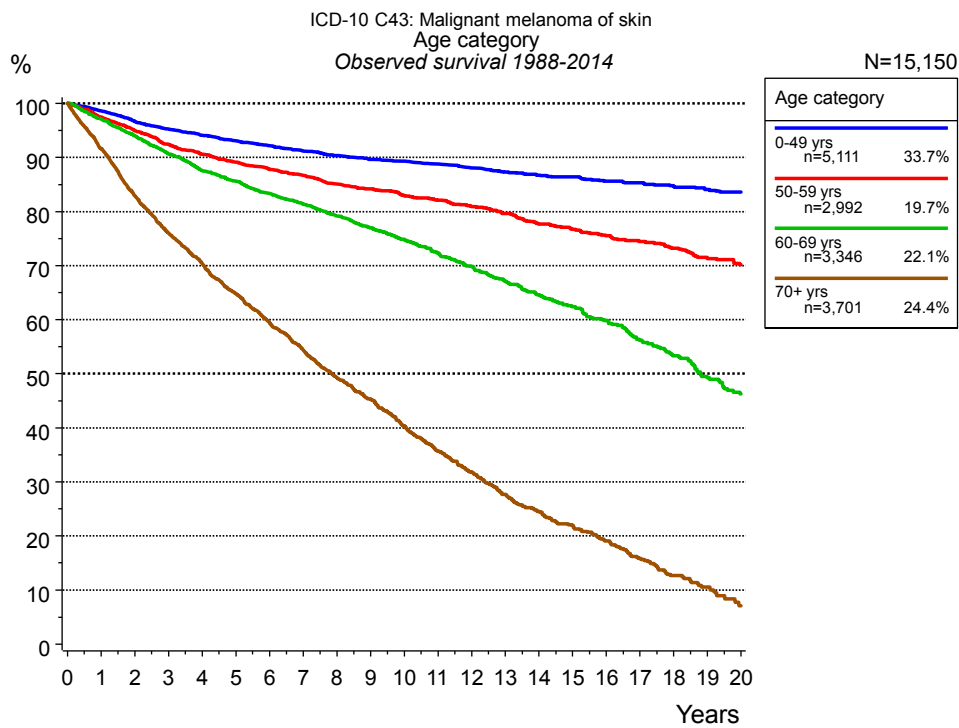
**Table 1b.** Observed (obs.) and relative (rel.) survival of patients with malignant melanoma by period of diagnosis for period 1988-2014 (N=15,150).



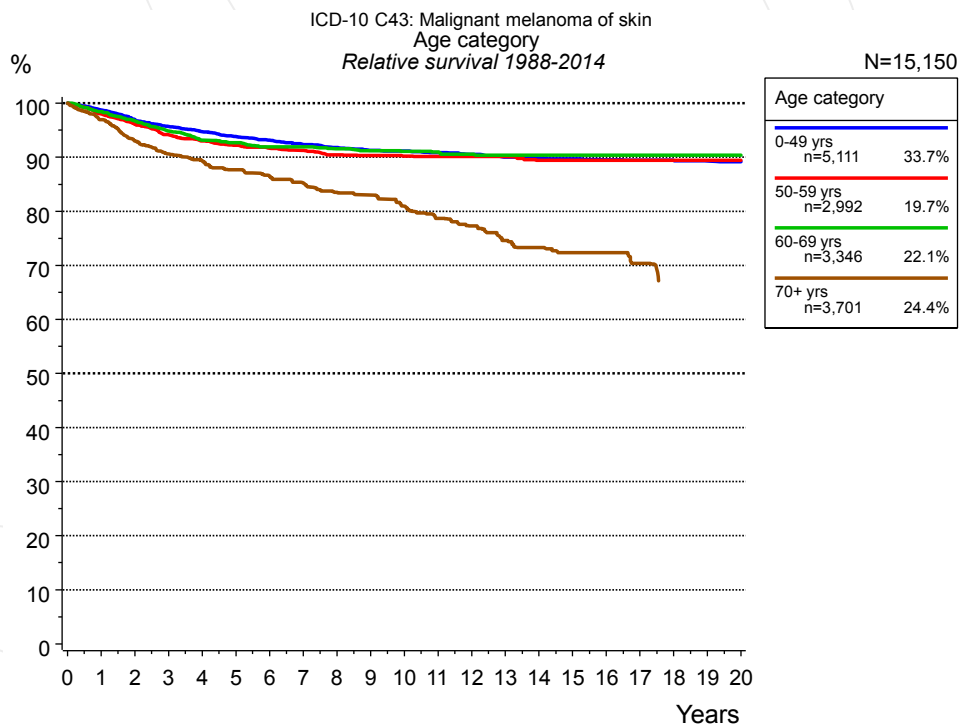
**Figure 2a.** Survival of patients with malignant melanoma by gender. Included in the evaluation are 15,150 cases diagnosed between 1988 and 2014.

Years	Gender			
	Male n=7,592		Female n=7,558	
	obs. %	rel. %	obs. %	rel. %
0	100.0	100.0	100.0	100.0
1	95.5	97.5	97.2	98.7
2	90.8	94.8	93.9	96.8
3	86.8	92.5	91.2	95.4
4	83.5	90.8	88.9	94.3
5	81.2	90.0	86.5	93.1
6	78.4	88.9	84.6	92.3
7	76.2	88.1	82.5	91.4
8	73.3	86.5	81.0	90.9
9	71.5	86.1	79.2	90.2
10	69.4	85.4	77.5	89.5
11	67.0	84.3	76.2	89.2
12	65.2	83.7	74.4	88.4
13	63.5	83.3	72.1	86.9
14	61.6	82.6	70.5	86.2
15	60.6	82.5	68.9	85.6
16	58.8	82.4	67.4	85.0
17	57.1	82.1	65.6	84.1
18	55.3	81.4	63.8	83.3
19	53.3	80.7	62.1	82.4
20	51.9	80.3	60.3	81.5

**Table 2b.** Observed (obs.) and relative (rel.) survival of patients with malignant melanoma by gender for period 1988-2014 (N=15,150).



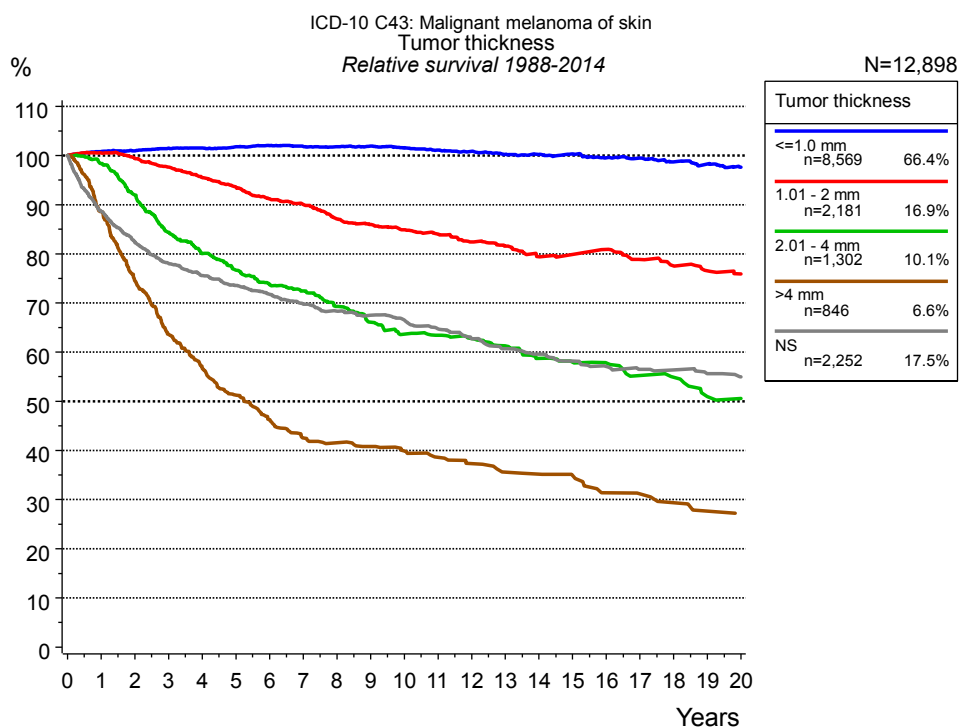
**Figure 3a.** Observed survival of patients with malignant melanoma by age category. Included in the evaluation are 15,150 cases diagnosed between 1988 and 2014.



**Figure 3b.** Relative survival of patients with malignant melanoma by age category. Included in the evaluation are 15,150 cases diagnosed between 1988 and 2014.

Years	Age category							
	0-49 yrs n=5,111		50-59 yrs n=2,992		60-69 yrs n=3,346		70+ yrs n=3,701	
	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	98.6	98.7	97.4	98.0	97.1	98.4	91.6	96.9
2	96.6	96.9	94.9	96.1	94.0	96.7	82.9	93.0
3	95.3	95.7	92.4	94.2	90.7	94.8	76.0	90.6
4	94.1	94.7	90.6	93.0	87.6	93.1	70.5	89.4
5	93.1	93.8	89.1	92.2	85.6	92.6	64.8	87.7
6	92.2	93.1	87.8	91.6	83.3	91.9	59.4	86.5
7	91.2	92.3	86.7	91.2	81.4	91.9	54.4	85.2
8	90.4	91.8	85.1	90.4	79.2	91.5	49.3	83.5
9	89.6	91.3	84.2	90.3	77.0	91.2	45.3	83.0
10	89.3	91.1	83.0	90.2	74.8	91.1	40.3	80.9
11	88.8	90.9	82.1	90.2	72.3	91.0	35.7	78.7
12	88.0	90.5	80.9	90.2	69.8	90.5	31.8	77.3
13	87.3	90.0	79.6	90.1	67.0	90.3	27.7	74.6
14	86.8	89.8	77.7	89.4	64.6	90.3	24.5	73.3
15	86.4	89.7	76.7	89.4	62.4	90.3	21.9	72.3
16	85.6	89.5	75.5	89.4	59.8	90.3	19.1	72.3
17	85.3	89.4	74.5	89.4	56.2	90.3	15.8	70.4
18	84.7	89.4	73.2	89.4	53.3	90.3		
19	84.1	89.3	71.3	89.4	49.3	90.3		
20	83.6	89.1	70.2	89.4	46.3	90.3		

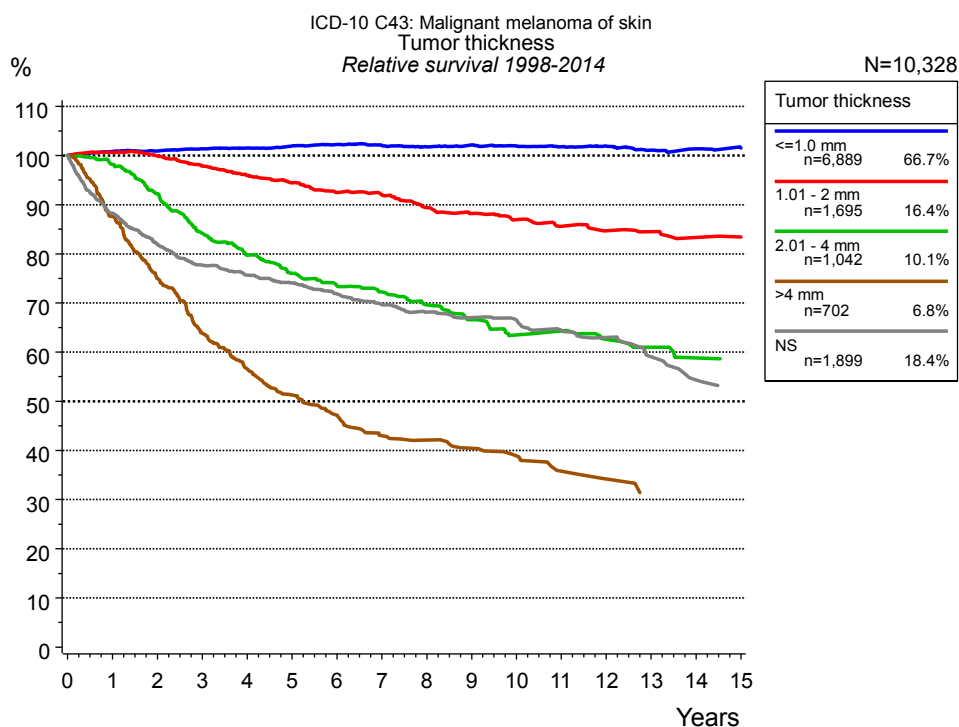
**Table 3c.** Observed (obs.) and relative (rel.) survival of patients with malignant melanoma by age category for period 1988-2014 (N=15,150).



**Figure 4a.** Relative survival of patients with malignant melanoma by tumor thickness. For 14,432 of 15,150 cases diagnosed between 1988 and 2014 valid data could be obtained for this item. For a total of 12,898 cases an evaluable classification was established. The grey line represents the subgroup of 2,252 patients with missing values regarding tumor thickness (14.9% of 15,150 patients, the percent values of all other categories are related to n=12,898).

Years	Tumor thickness									
	≤1.0 mm n=8,569		1.01 - 2 mm n=2,181		2.01 - 4 mm n=1,302		>4 mm n=846		NS n=2,252	
	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	99.4	100.8	98.8	100.5	95.7	98.4	85.1	88.6	86.7	88.7
2	98.1	101.0	96.0	99.4	87.2	92.0	69.1	74.5	78.9	82.4
3	97.1	101.5	92.6	97.6	78.0	84.3	57.2	63.6	73.2	78.1
4	95.8	101.5	89.1	95.5	72.2	80.1	49.7	56.8	69.4	75.6
5	94.5	101.8	85.9	93.6	67.5	76.7	43.5	51.3	66.3	73.6
6	93.2	102.0	82.2	91.2	63.4	73.7	38.2	46.3	63.4	71.8
7	91.6	101.8	79.8	90.1	60.8	72.4	34.2	42.6	60.4	69.8
8	90.1	101.8	75.8	87.1	56.7	69.3	32.7	41.6	58.1	68.4
9	88.8	101.9	73.6	86.0	52.9	66.1	31.4	40.8	56.3	67.5
10	87.1	101.6	71.4	84.9	49.7	63.7	29.9	39.9	54.5	66.6
11	85.3	101.1	69.3	84.0	48.5	63.4	28.2	38.6	52.1	64.8
12	83.7	100.9	66.8	82.4	46.8	62.8	26.7	37.3	49.5	62.7
13	81.9	100.3	64.9	81.6	44.7	61.3	24.8	35.6	47.1	60.7
14	80.4	100.2	62.1	79.4	42.0	58.7	24.3	35.2	45.4	59.6
15	79.1	100.3	61.3	79.9	40.7	57.9	23.2	34.9	43.3	58.2
16	77.1	99.6	60.9	80.9	39.6	57.8	20.2	31.4	41.7	57.1
17	75.5	99.5	58.0	78.9	37.1	55.3	19.6	31.2	40.3	56.5
18	73.5	98.7	56.0	77.5	36.0	54.9	18.2	29.3	39.4	56.4
19	71.8	98.3	54.1	76.6	32.6	51.0	16.6	27.7	38.0	55.6
20	69.8	97.6	52.7	75.9	32.0	50.6	15.6	26.9	36.9	55.0

**Table 4b.** Observed (obs.) and relative (rel.) survival of patients with malignant melanoma by tumor thickness for period 1988-2014 (N=12,898).

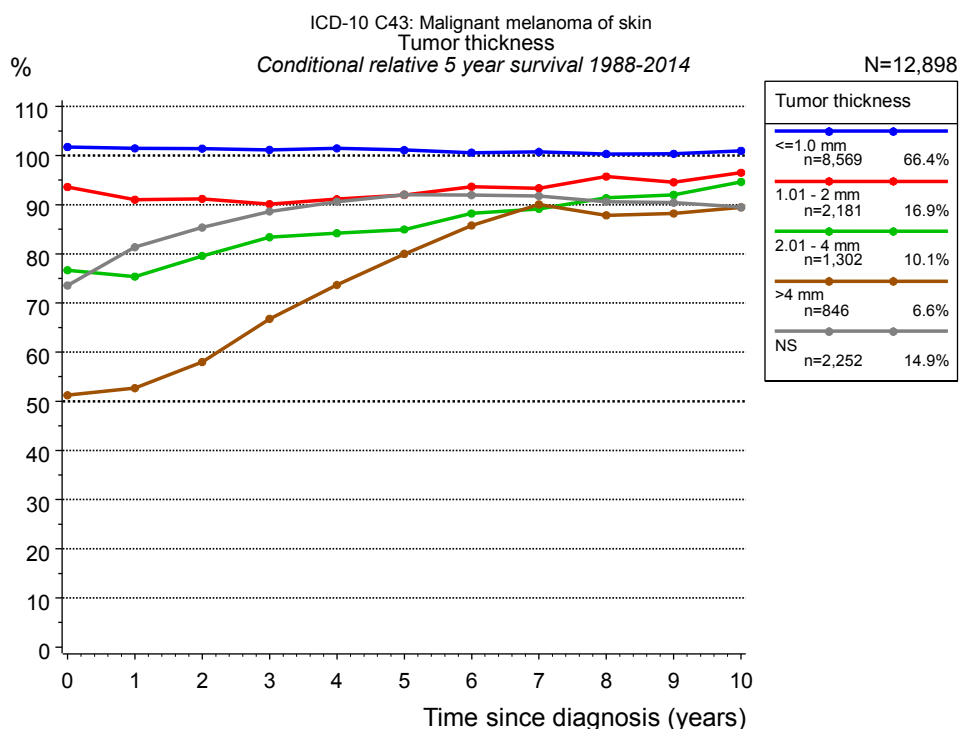


**Figure 4c.** Relative survival of patients with malignant melanoma by tumor thickness. For 11,656 of 12,227 cases diagnosed between 1998 and 2014 valid data could be obtained for this item. For a total of 10,328 cases an evaluable classification was established. The grey line represents the subgroup of 1,899 patients with missing values regarding tumor thickness (15.5% of 12,227 patients, the percent values of all other categories are related to n=10,328).

		Tumor thickness									
		≤1.0 mm n=6,889		1.01 - 2 mm n=1,695		2.01 - 4 mm n=1,042		>4 mm n=702		NS n=1,899	
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		99.5	100.8	99.0	100.7	95.4	98.2	84.2	87.6	86.2	88.2
2		98.1	100.9	96.5	99.9	87.2	92.2	69.5	75.0	78.4	82.0
3		97.2	101.4	92.9	97.9	77.6	84.2	57.5	63.9	72.7	77.7
4		95.9	101.5	89.5	95.9	71.7	79.7	49.7	56.6	69.4	75.7
5		94.8	101.9	86.7	94.5	66.7	76.1	43.7	51.3	66.6	74.1
6		93.6	102.2	83.5	92.5	62.9	73.5	39.2	47.2	63.3	71.9
7		92.0	102.0	81.7	92.0	60.4	72.2	34.7	43.0	60.0	69.6
8		90.4	101.8	78.0	89.4	56.8	69.6	33.3	42.1	57.6	68.2
9		89.3	102.1	75.5	88.2	53.1	66.6	31.2	40.4	55.5	67.1
10		87.8	101.9	73.2	87.0	49.4	63.5	29.4	38.8	54.0	66.5
11		86.3	101.7	70.7	85.6	49.1	64.3	26.3	35.8	51.3	64.4
12		85.1	101.9	68.7	84.7	46.7	62.6	24.7	34.2	49.4	63.0
13		83.1	101.1	67.6	84.5	44.6	61.0	22.1	31.1	45.4	59.1
14		82.1	101.4	65.5	83.3	42.3	58.8	22.1	29.9	40.9	54.4
15		80.9	101.6	64.8	83.4			22.1	28.6		

**Table 4d.** Observed (obs.) and relative (rel.) survival of patients with malignant melanoma by tumor thickness for period 1998-2014 (N=10,328).



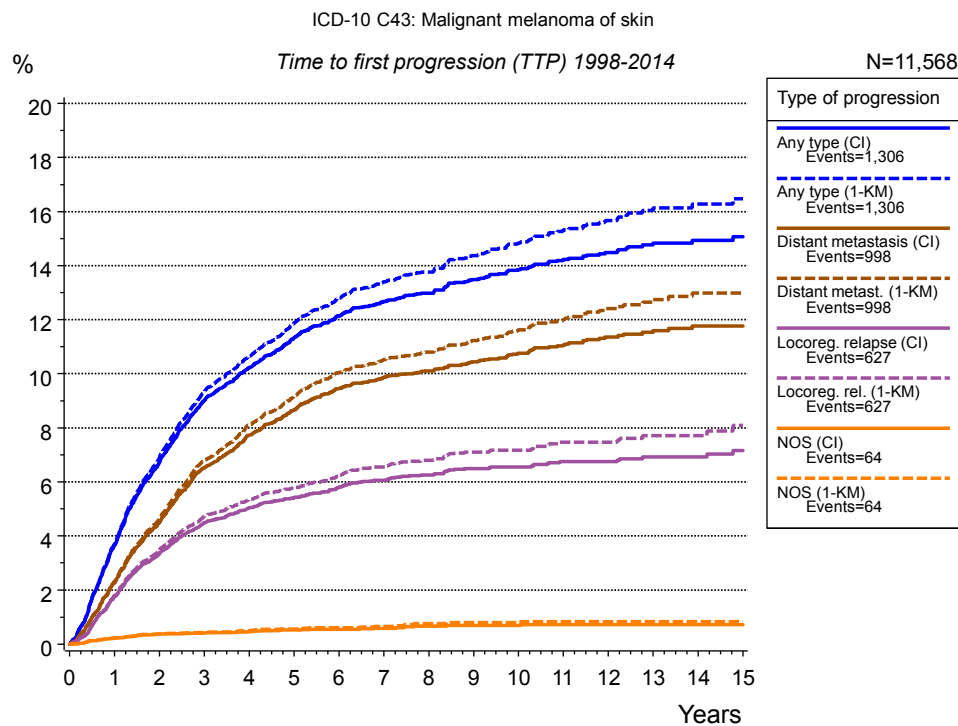


**Figure 4e.** Conditional relative 5-year survival of patients with malignant melanoma by tumor thickness. For 14,432 of 15,150 cases diagnosed between 1988 and 2014 valid data could be obtained for this item. For a total of 12,898 cases an evaluable classification was established. The grey line represents the subgroup of 2,252 patients with missing values regarding tumor thickness (14.9% of 15,150 patients, the percent values of all other categories are related to n=12,898).

Years	Tumor thickness									
	≤1.0 mm		1.01 - 2 mm		2.01 - 4 mm		>4 mm		NS	
	n	Cond. surv. % 5 yrs	n	Cond. surv. % 5 yrs	n	Cond. surv. % 5 yrs	n	Cond. surv. % 5 yrs	n	Cond. surv. % 5 yrs
0	8,569	101.8	2,181	93.6	1,302	76.7	846	51.3	2,252	73.6
1	8,078	101.5	2,046	91.0	1,196	75.4	688	52.7	1,860	81.4
2	7,399	101.4	1,863	91.2	1,027	79.6	529	58.0	1,574	85.4
3	6,737	101.2	1,670	90.1	860	83.4	393	66.8	1,328	88.6
4	6,021	101.5	1,472	91.1	730	84.2	307	73.7	1,138	90.6
5	5,359	101.1	1,308	92.0	622	85.0	234	80.0	967	92.0
6	4,793	100.6	1,162	93.7	537	88.2	189	85.8	802	92.0
7	4,247	100.7	1,035	93.4	462	89.2	147	90.1	672	91.8
8	3,758	100.3	899	95.7	390	91.4	128	87.9	555	90.7
9	3,347	100.4	806	94.6	332	92.0	114	88.2	490	90.4
10	2,964	101.0	700	96.5	282	94.6	98	89.5	419	89.5

**Table 4f.** Conditional relative 5-year survival of patients with malignant melanoma by tumor thickness for period 1988-2014 (N=12,898).

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 4c). 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 tumor thickness="≤1.0 mm", who are alive at least 3 years after cancer diagnosis, the conditional relative 5-year survival rate is 101.2% (n=6,737).

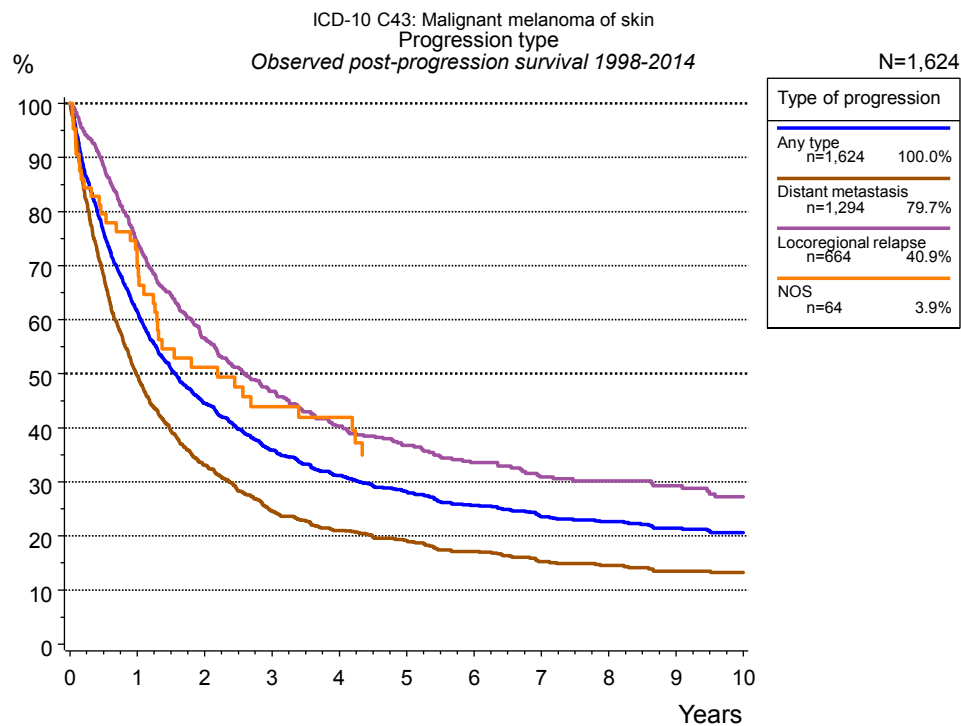


**Figure 5a.** Time to first progression of 11,568 patients with malignant melanoma diagnosed between 1998 and 2014 (M0 only in solid cancers) estimated by cumulative incidence function (CI, solid line) accounting for death as competing risk and by inverse Kaplan-Meier estimate (1-KM, dashed line). The frequency of events may be underestimated due to underreporting.

Years	Type of progression						
	Any type (CI)	Any type (1-KM)	Distant metastasis (CI)	Distant metast. (1-KM)	Locoreg. relapse (CI)	Locoreg. rel. (1-KM)	NOS (CI)
	n=11,568 %	n=11,568 %	n=11,568 %	n=11,568 %	n=11,568 %	n=11,568 %	n=11,568 %
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	3.7	3.7	2.3	2.3	1.8	1.8	0.2
2	6.7	6.9	4.5	4.6	3.4	3.5	0.4
3	9.0	9.3	6.5	6.8	4.5	4.7	0.4
4	10.2	10.6	7.7	8.1	5.0	5.4	0.5
5	11.3	11.9	8.7	9.2	5.4	5.8	0.5
6	12.1	12.8	9.5	10.0	5.8	6.2	0.6
7	12.7	13.4	9.9	10.5	6.1	6.5	0.6
8	13.0	13.8	10.1	10.8	6.3	6.8	0.7
9	13.5	14.4	10.4	11.2	6.5	7.1	0.7
10	13.8	14.8	10.8	11.6	6.5	7.2	0.7
11	14.2	15.3	11.1	12.0	6.8	7.5	0.7
12	14.5	15.7	11.4	12.4	6.8	7.5	0.7
13	14.8	16.1	11.6	12.7	6.9	7.7	0.7
14	14.9	16.3	11.8	13.0	6.9	7.7	0.7
15	15.1	16.5	11.8	13.0	7.2	8.1	0.7

Type of progression	
<i>cont'd</i>	NOS (1-KM) n=11,568
Years	%
0	0.0
1	0.2
2	0.4
3	0.4
4	0.5
5	0.6
6	0.6
7	0.7
8	0.8
9	0.8
10	0.8
11	0.8
12	0.8
13	0.8
14	0.8
15	0.8

**Table 5b.** Time to first progression of patients with malignant melanoma for period 1998-2014 (N=11,568).

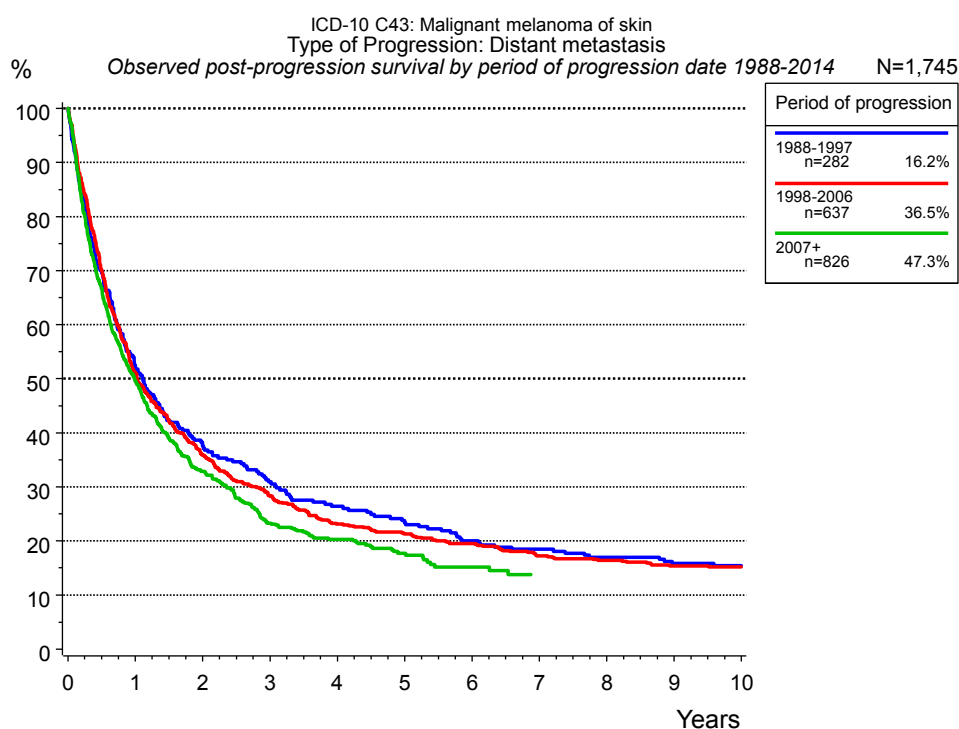


**Figure 5c.** Observed post-progression survival of 1,624 patients with malignant melanoma diagnosed between 1998 and 2014. These 1,624 patients with documented progression events during their course of disease represent 13.5 % of the totally 12,064 evaluated cases (incl. M1, n=496, 4.1 %). Patients with cancer relapse documented via death certificates only were excluded (n=178, 1.5 %). 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=1,624 %	Distant metastasis n=1,294 %	Locoregional relapse n=664 %	NOS n=64 %
0	100.0	100.0	100.0	100.0
1	61.5	49.7	74.4	69.6
2	44.5	33.1	56.5	51.2
3	35.9	24.7	46.7	43.9
4	31.1	21.0	40.3	41.9
5	28.2	19.1	36.7	
6	25.6	17.2	33.6	
7	23.5	15.3	30.9	
8	22.6	14.5	30.2	
9	21.4	13.5	29.3	
10	20.6	13.2	27.2	

**Table 5d.** Observed post-progression survival of patients with malignant melanoma for period 1998-2014 (N=1,624).



**Figure 5e.** Observed post-progression (distant metastasis) survival of 1,745 patients with malignant melanoma diagnosed between 1988 and 2014 by period of progression.

Years	Period of progression		
	1988-1997 n=282	1998-2006 n=637	2007+ n=826
	%	%	%
0	100.0	100.0	100.0
1	52.5	51.1	49.6
2	37.6	35.9	32.9
3	30.9	28.4	23.3
4	26.4	23.1	20.3
5	23.4	21.3	17.8
6	20.0	19.5	15.2
7	18.5	17.2	
8	17.0	16.4	
9	15.8	15.4	
10	15.4	15.2	

**Table 5f.** Observed post-progression (distant metastasis) survival of patients with malignant melanoma for period 1988-2014 by period of progression (N=1,745).

## 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

## Recommended Citation

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