

# Munich Cancer Registry



- ▶ Incidence and Mortality
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## ICD-10 C43: Malignant melanoma

### Survival

Year of diagnosis	1988-1997	1998-2019
Patients	3,169	20,388
Diseases	3,234	21,410
Cases evaluated	2,934	16,120
Creation date	01/27/2021	
Database export	01/07/2021	
Population	4.92 m	



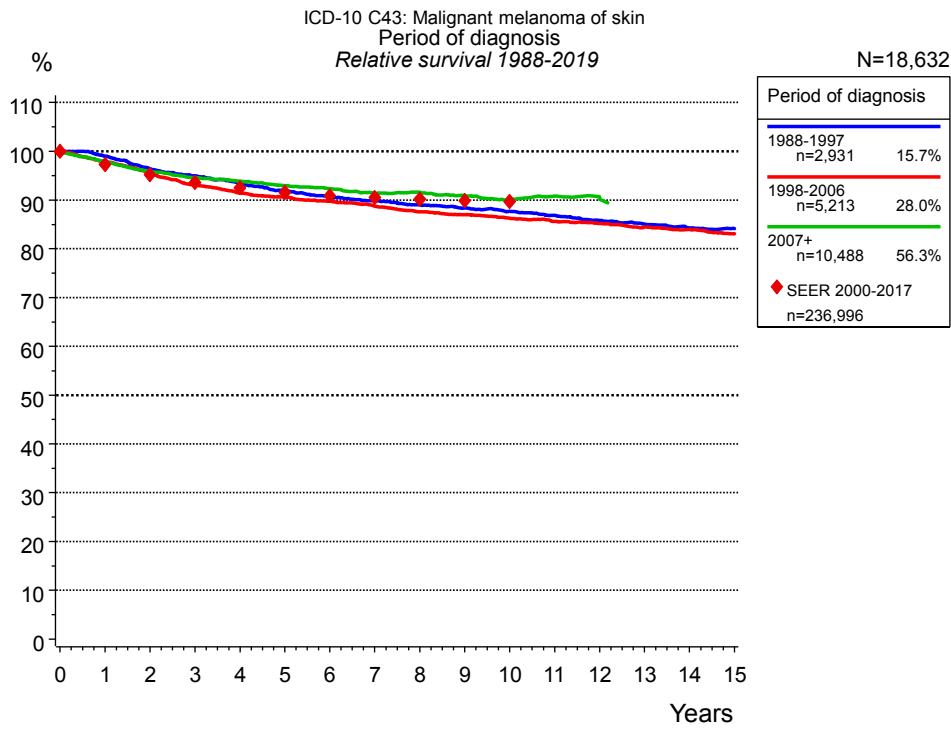
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<https://www.tumorregister-muenchen.de/en>

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

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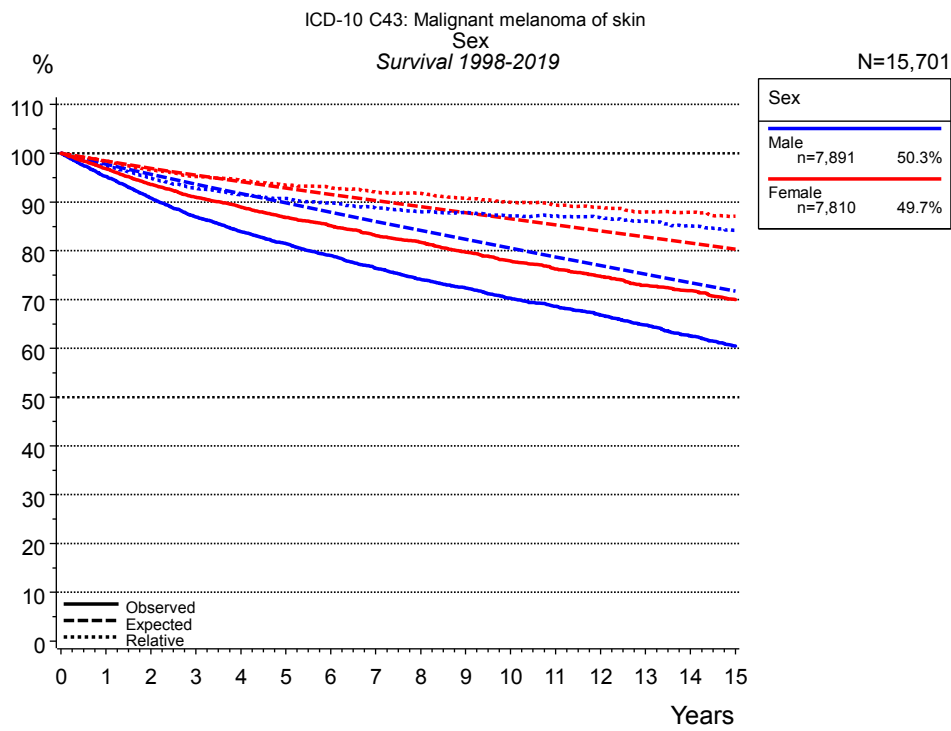
**Figure 1a.** Relative survival of patients with malignant melanoma by period of diagnosis. Included in the evaluation are 18,632 cases diagnosed between 1988 and 2019.

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=2,931		1998-2006 n=5,213		2007+ n=10,488	
	obs. %	rel. %	obs. %	rel. %	obs. %	rel. %
0	100.0	100.0	100.0	100.0	100.0	100.0
1	97.2	99.0	96.1	97.8	96.0	97.9
2	92.9	96.3	92.0	95.4	92.3	95.9
3	90.0	94.9	88.2	93.1	89.4	94.6
4	86.9	93.4	85.3	91.5	87.1	93.8
5	84.1	92.0	83.0	90.6	84.8	93.0
6	81.6	90.8	80.8	89.7	82.8	92.4
7	79.4	89.9	78.6	88.7	80.4	91.4
8	77.3	89.0	76.3	87.6	79.2	91.6
9	75.4	88.4	74.5	87.0	77.2	91.0
10	73.5	87.7	72.6	86.3	75.0	90.1
11	71.5	86.9	70.8	85.6	74.2	90.8
12	69.4	85.8	69.2	85.2	72.6	90.1
13	67.6	85.1	67.3	84.4		
14	65.7	84.3	65.7	84.0		
15	64.4	84.1	63.8	83.1		
Median	23.1					

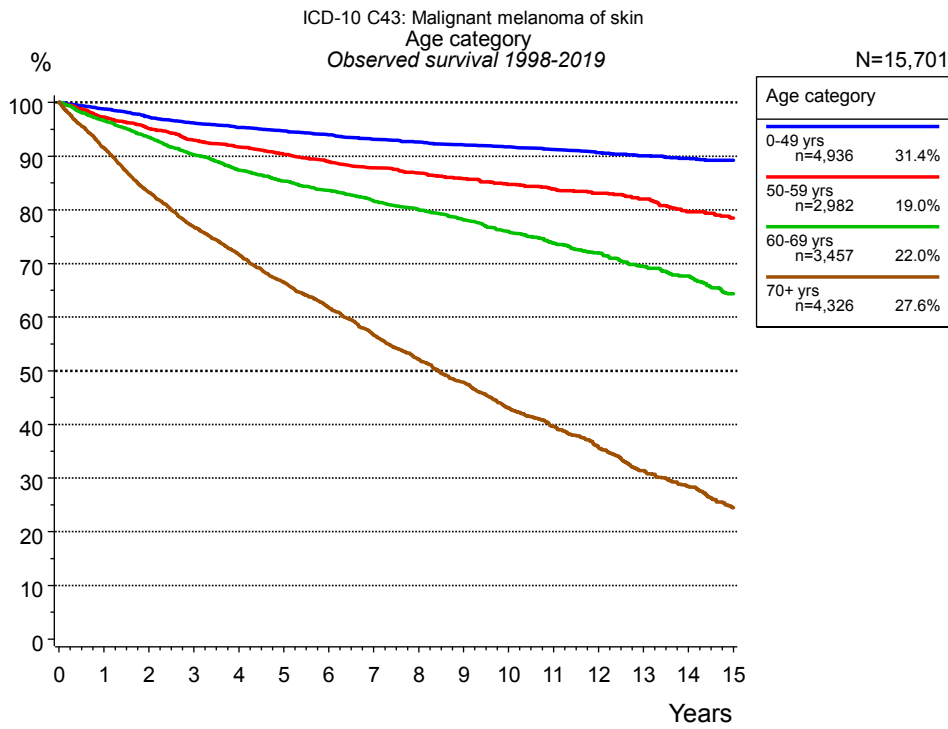
**Table 1b.** Observed (obs.) and relative (rel.) survival of patients with malignant melanoma by period of diagnosis for period 1988-2019 (N=18,632).



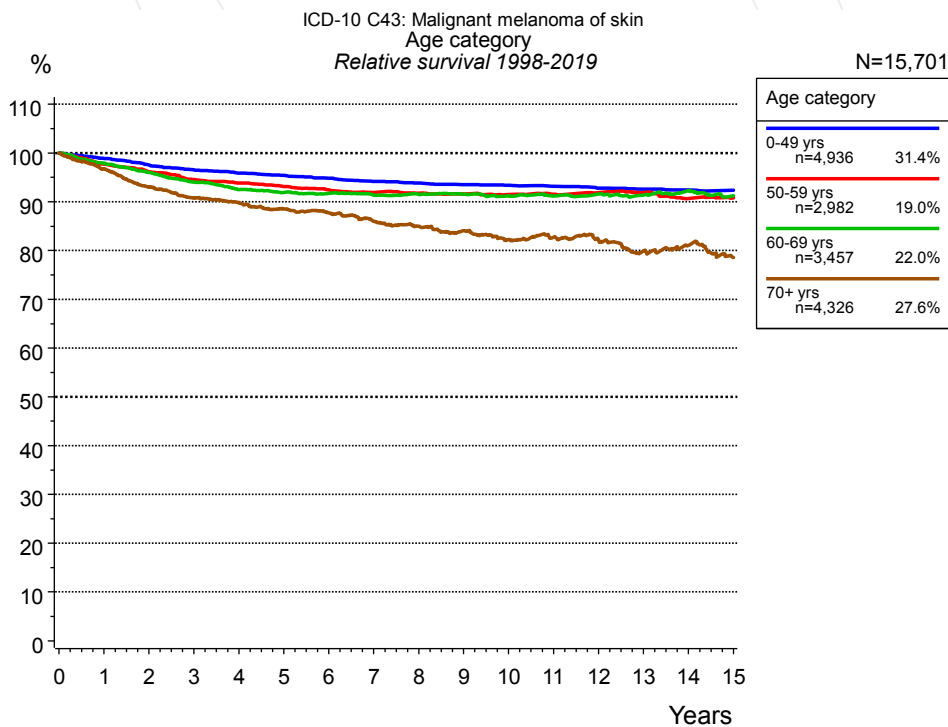
**Figure 2a.** Survival of patients with malignant melanoma by sex. Included in the evaluation are 15,701 cases diagnosed between 1998 and 2019.

Years	Sex			
	Male n=7,891		Female n=7,810	
	obs. %	rel. %	obs. %	rel. %
0	100.0	100.0	100.0	100.0
1	95.2	97.4	96.8	98.4
2	90.8	94.9	93.6	96.6
3	87.0	92.8	91.0	95.2
4	83.9	91.5	89.0	94.4
5	81.5	90.7	86.8	93.5
6	79.0	89.9	85.1	92.9
7	76.4	88.8	83.1	92.0
8	74.1	88.0	81.7	91.8
9	72.4	87.8	79.7	90.8
10	70.2	87.2	77.9	90.0
11	68.6	87.1	76.2	89.3
12	66.8	86.7	74.8	88.9
13	64.8	86.1	72.9	88.0
14	62.6	85.1	71.8	87.9
15	60.5	84.2	70.0	87.1
Median				

**Table 2b.** Observed (obs.) and relative (rel.) survival of patients with malignant melanoma by sex for period 1998-2019 (N=15,701).



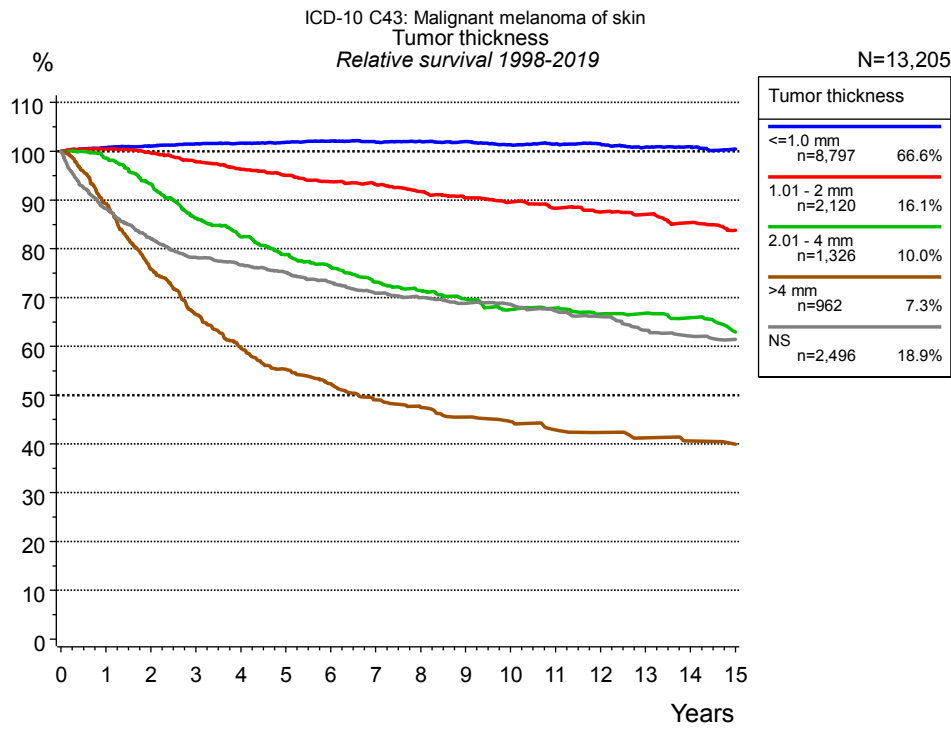
**Figure 3a.** Observed survival of patients with malignant melanoma by age category. Included in the evaluation are 15,701 cases diagnosed between 1998 and 2019.



**Figure 3b.** Relative survival of patients with malignant melanoma by age category. Included in the evaluation are 15,701 cases diagnosed between 1998 and 2019.

Years	Age category							
	0-49 yrs n=4,936		50-59 yrs n=2,982		60-69 yrs n=3,457		70+ yrs n=4,326	
	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	98.8	98.9	97.3	97.7	96.6	97.9	91.5	96.7
2	97.3	97.5	95.1	96.2	93.5	96.0	83.3	93.0
3	96.2	96.5	93.0	94.6	90.2	94.0	76.8	90.8
4	95.3	95.9	91.7	93.8	87.4	92.5	71.7	89.8
5	94.7	95.4	90.3	93.1	85.3	91.9	66.5	88.5
6	94.0	94.8	89.0	92.4	83.6	91.7	61.8	87.7
7	93.1	94.2	87.7	91.9	81.6	91.4	56.7	86.0
8	92.6	93.9	86.8	91.8	80.0	91.5	52.1	85.0
9	92.1	93.5	85.8	91.6	78.1	91.5	47.8	84.1
10	91.7	93.4	84.7	91.5	75.9	91.2	43.1	82.2
11	91.2	93.2	83.8	91.6	73.8	91.2	39.6	82.7
12	90.6	92.8	83.1	91.9	71.9	91.6	35.8	82.2
13	90.1	92.6	82.0	91.9	69.5	91.4	31.4	79.9
14	89.6	92.4	79.6	90.7	67.6	92.3	28.4	81.0
15	89.2	92.4	78.5	90.8	64.3	91.3	24.4	78.6
Median							8.4	

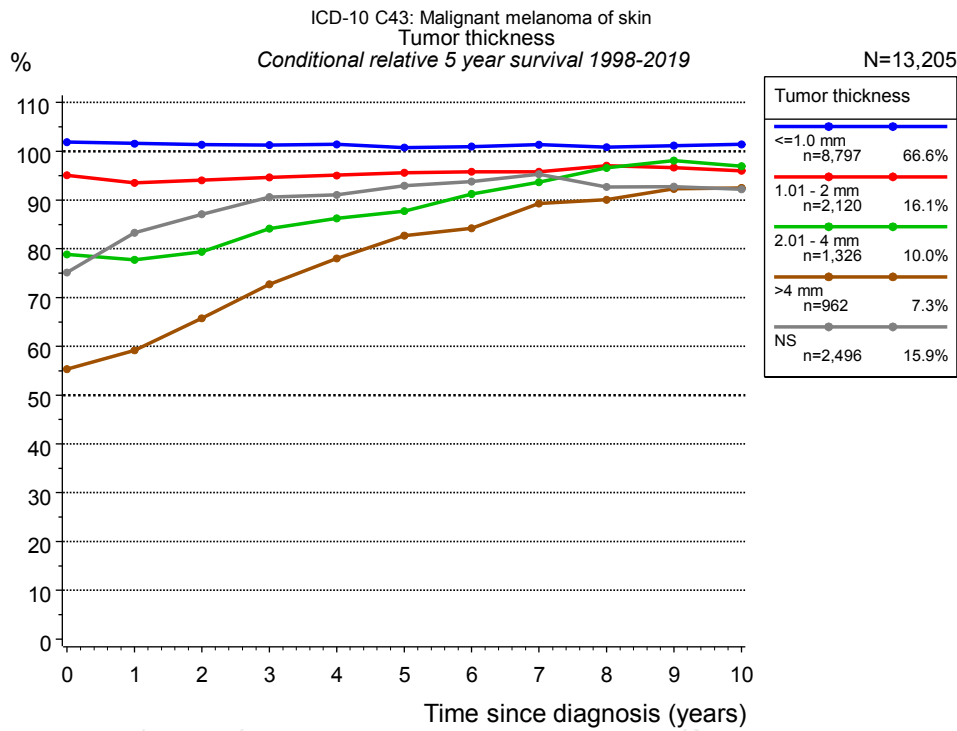
**Table 3c.** Observed (obs.) and relative (rel.) survival of patients with malignant melanoma by age category for period 1998-2019 (N=15,701).



**Figure 4a.** Relative survival of patients with malignant melanoma by tumor thickness. For 14,900 of 15,701 cases diagnosed between 1998 and 2019 valid data could be obtained for this item. For a total of 13,205 cases an evaluable classification was established. The grey line represents the subgroup of 2,496 patients with missing values regarding tumor thickness (15.9 % of 15,701 patients, the percent values of all other categories are related to n=13,205).

Years	Tumor thickness									
	<=1.0 mm n=8,797		1.01 - 2 mm n=2,120		2.01 - 4 mm n=1,326		>4 mm n=962		NS n=2,496	
	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	98.7	100.5	95.8	98.6	85.6	89.3	86.2	88.2
2	98.2	101.1	96.2	99.7	88.1	93.3	69.9	75.8	78.5	82.1
3	97.2	101.5	92.8	97.9	79.3	86.3	59.5	66.6	73.2	78.2
4	95.9	101.7	89.8	96.3	73.9	82.4	51.8	59.8	70.3	76.7
5	94.6	101.8	87.1	95.1	68.8	78.8	46.7	55.3	67.5	75.2
6	93.4	102.1	84.4	93.8	64.9	76.2	43.0	52.4	64.5	73.2
7	91.7	101.9	82.5	93.2	60.8	73.2	39.3	49.0	61.3	70.9
8	90.3	102.0	79.8	91.8	58.0	71.5	37.0	47.5	59.3	70.0
9	88.9	102.0	77.2	90.5	55.2	69.7	34.8	45.5	57.2	68.8
10	86.8	101.3	75.1	89.6	52.1	67.6	33.3	44.6	55.9	68.6
11	85.5	101.5	72.6	88.3	51.2	67.9	31.2	42.9	53.8	67.3
12	84.0	101.5	70.6	87.5	49.1	66.6	29.9	42.4	51.8	66.1
13	82.1	100.8	69.1	87.1	48.1	66.8	28.4	41.3	48.6	63.3
14	80.7	100.9	66.4	85.4	46.1	65.9	27.3	40.6	46.7	62.1
15	78.9	100.4	63.8	83.8	43.1	62.9	26.6	39.9	45.3	61.4
Median					11.4		4.2		12.5	

**Table 4b.** Observed (obs.) and relative (rel.) survival of patients with malignant melanoma by tumor thickness for period 1998-2019 (N=13,205).



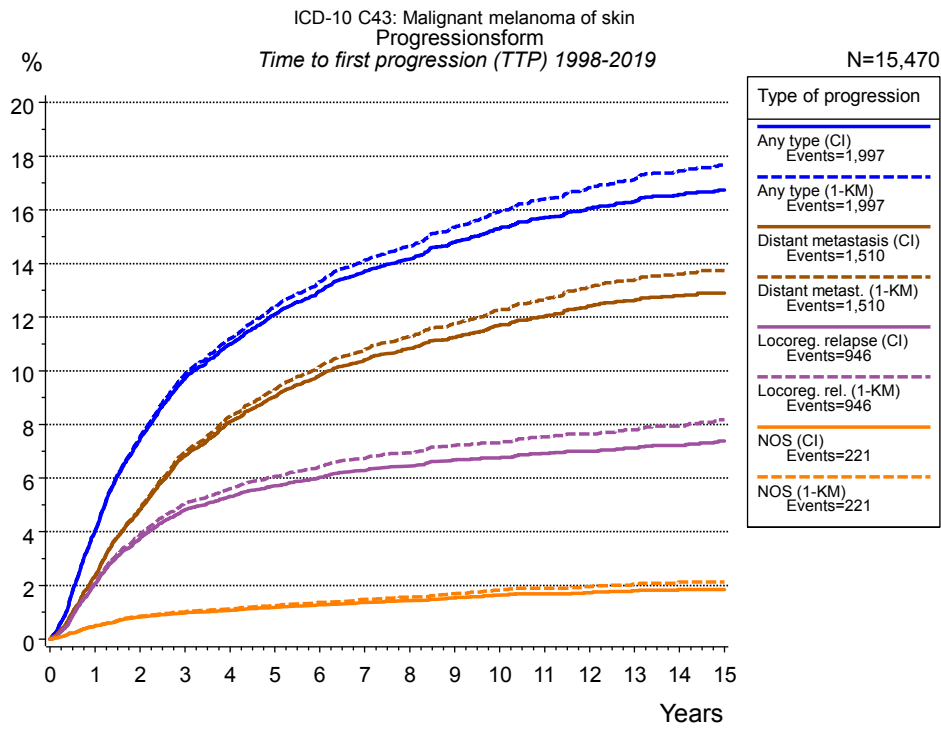
**Figure 4c.** Conditional relative 5-year survival of patients with malignant melanoma by tumor thickness. For 14,900 of 15,701 cases diagnosed between 1998 and 2019 valid data could be obtained for this item. For a total of 13,205 cases an evaluable classification was established. The grey line represents the subgroup of 2,496 patients with missing values regarding tumor thickness (15.9 % of 15,701 patients, the percent values of all other categories are related to n=13,205).

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	8,797	101.8	2,120	95.1	1,326	78.8	962	55.3	2,496	75.2
1	8,140	101.6	1,992	93.6	1,217	77.8	775	59.2	2,032	83.3
2	7,691	101.3	1,843	94.1	1,073	79.4	586	65.7	1,765	87.1
3	7,238	101.3	1,700	94.6	905	84.1	462	72.8	1,572	90.6
4	6,689	101.4	1,545	95.1	785	86.2	372	78.0	1,430	91.0
5	6,056	100.8	1,386	95.6	683	87.7	306	82.7	1,295	92.9
6	5,439	101.0	1,235	95.8	598	91.3	262	84.2	1,131	93.8
7	4,790	101.4	1,088	95.8	505	93.7	210	89.3	934	95.3
8	4,150	100.8	930	97.0	440	96.6	164	90.0	793	92.7
9	3,536	101.1	797	96.7	370	98.1	124	92.3	664	92.7
10	3,013	101.4	689	96.0	303	96.9	99	92.5	539	92.2

**Table 4d.** Conditional relative 5-year survival of patients with malignant melanoma by tumor thickness for period 1998-2019 (N=13,205).

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 4a). 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 101.3% (n=7,238).



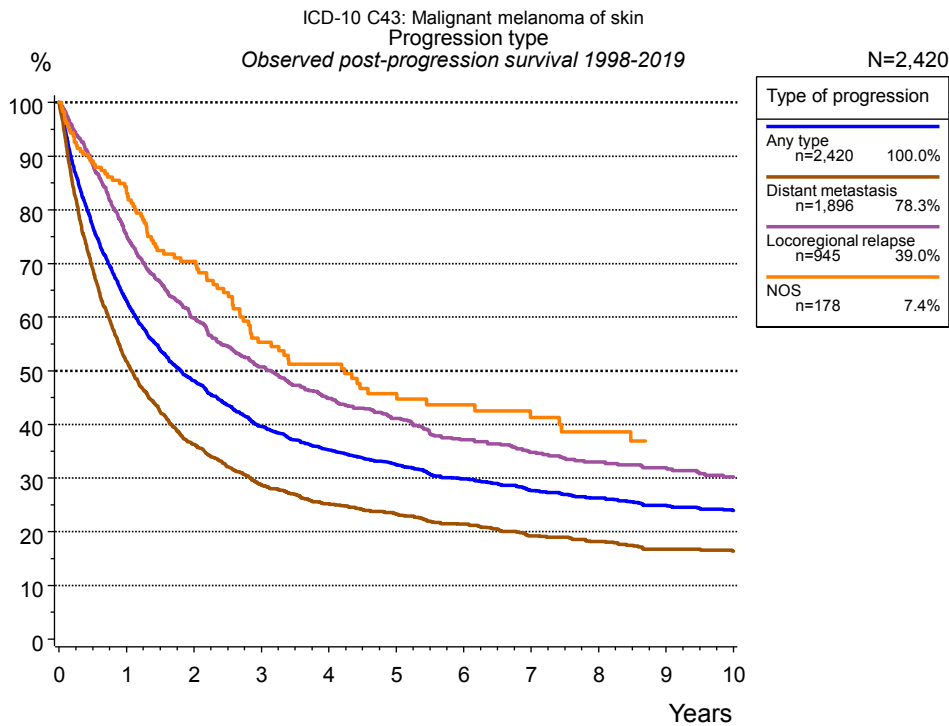


**Figure 5a.** Time to first progression of 15,470 patients with malignant melanoma diagnosed between 1998 and 2019 (in solid cancers M0 only) estimated by cumulative incidence function (CI, solid line) accounting for death as competing risk and by inverse Kaplan-Meier estimate (1-KM, dashed line). The 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)	NOS (1-KM)
N	14,787	14,787	14,796	14,796	15,470	15,470	15,461	15,461
Events	1,984	1,984	1,502	1,502	940	940	218	218
compet.	1,636		1,797		2,938		3,348	
Years	%	%	%	%	%	%	%	%
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	4.0	4.0	2.3	2.4	2.0	2.1	0.5	0.5
2	7.4	7.5	4.8	4.9	3.8	3.9	0.8	0.8
3	9.7	9.9	6.8	7.0	4.8	5.0	1.0	1.0
4	11.0	11.2	8.1	8.3	5.3	5.6	1.1	1.1
5	12.1	12.4	9.0	9.3	5.7	6.1	1.2	1.2
6	13.0	13.3	9.8	10.2	6.0	6.4	1.3	1.3
7	13.7	14.1	10.4	10.8	6.3	6.7	1.4	1.4
8	14.2	14.6	10.8	11.3	6.5	6.9	1.4	1.4
9	14.8	15.3	11.3	11.7	6.7	7.2	1.5	1.5
10	15.3	15.9	11.7	12.3	6.7	7.3	1.6	1.6
11	15.7	16.4	12.0	12.7	6.9	7.5	1.7	1.7
12	16.1	16.8	12.4	13.1	7.0	7.6	1.7	1.7
13	16.3	17.1	12.6	13.4	7.1	7.8	1.8	1.8
14	16.6	17.5	12.8	13.6	7.2	7.9	1.8	1.8
15	16.7	17.7	12.9	13.7	7.4	8.2	1.8	1.8

Type of progression	
<i>cont'd</i>	NOS (1-KM)
N	15,461
Events	218
compet.	
Years	%
0	0.0
1	0.5
2	0.8
3	1.0
4	1.1
5	1.3
6	1.4
7	1.5
8	1.6
9	1.7
10	1.8
11	1.9
12	2.0
13	2.0
14	2.1
15	2.1

**Table 5b.** Time to first progression of patients with malignant melanoma for period 1998-2019 (N=15,470), also showing the total of progression events (Events) and of deaths as competing risk (compet.).

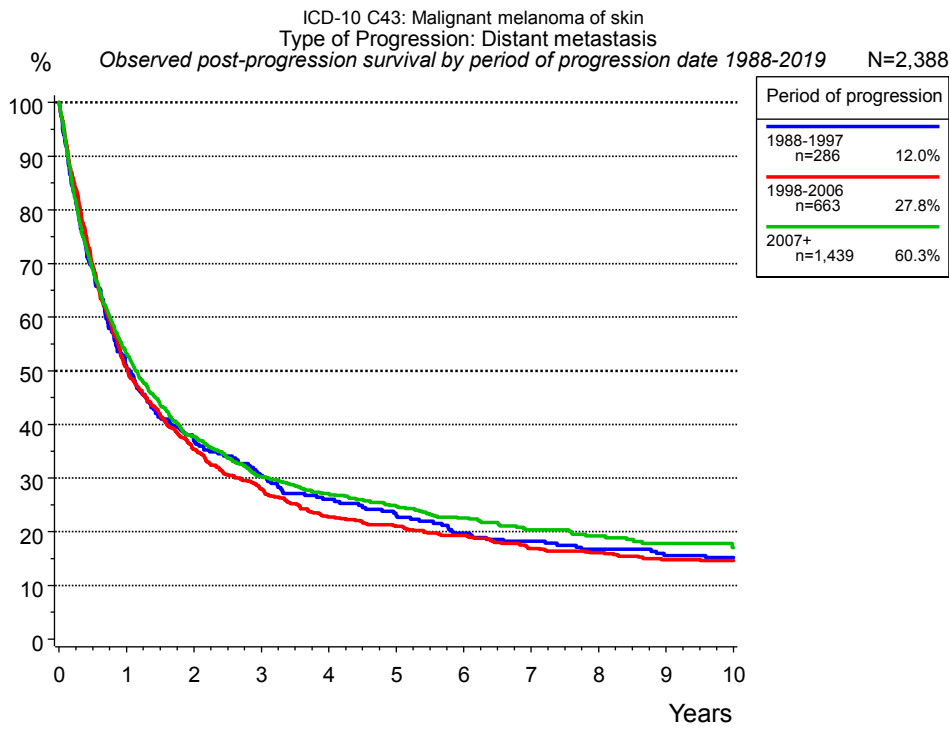


**Figure 5c.** Observed post-progression survival of 2,420 patients with malignant melanoma diagnosed between 1998 and 2019. These 2,420 patients with documented progression events during their course of disease represent 15.6 % of the totally 15,470 evaluated cases (incl. M1, n=683, 4.4 %). Patients with cancer relapse documented via death certificates only were excluded (n=260, 1.7 %). 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=2,420 %	Distant metastasis n=1,896 %	Locoregional relapse n=945 %	NOS n=178 %
0	100.0	100.0	100.0	100.0
1	63.1	51.8	75.3	83.1
2	48.1	36.3	59.8	70.4
3	39.6	28.8	50.7	55.3
4	35.2	25.2	44.8	51.3
5	32.5	23.3	41.1	45.7
6	29.9	21.4	37.2	43.7
7	27.7	19.2	34.8	41.3
8	26.3	18.2	33.0	38.6
9	24.9	16.7	32.0	36.9
10	24.0	16.4	30.2	

**Table 5d.** Observed post-progression survival of patients with malignant melanoma for period 1998-2019 (N=2,420).



**Figure 5e.** Observed post-progression (distant metastasis) survival of 2,388 patients with malignant melanoma diagnosed between 1988 and 2019 by period of progression.

Years	Period of progression		
	1988-1997 n=286 %	1998-2006 n=663 %	2007+ n=1,439 %
0	100.0	100.0	100.0
1	51.0	50.6	53.3
2	37.0	35.3	37.8
3	30.5	28.0	30.3
4	26.0	22.7	27.1
5	23.1	21.0	24.8
6	19.7	19.3	22.6
7	18.2	16.9	20.4
8	16.7	16.1	19.2
9	15.6	14.8	17.8
10	15.2	14.6	17.1

**Table 5f.** Observed post-progression (distant metastasis) survival of patients with malignant melanoma for period 1988-2019 by period of progression (N=2,388).

## 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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