Munich Cancer Registry

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ICD-10 D03: Melanoma in situ

Incidence and Mortality

Year of diagnosis	1998-2014
Patients	4,702
Diseases	4,896
Creation date	04/13/2016
Export date	12/23/2015
Population	4.64 m

Munich Cancer Registry at Munich Cancer Center
Marchioninistr. 15
Munich, 81377
Germany

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

http://www.tumorregister-muenchen.de/en/facts/base/bD03__E-ICD-10-D03-Melanoma-in-situ-incidence-and-mortality.pdf

Global Statements about the statistics on the Internet −
Baseline Statistics (grey button), **Survival** (red button)

In these analyses, the clinics and physicians of Upper Bavaria and the city and county of Landshut[#], with a total of 4.64 million inhabitants, account for the frequency of cancer diseases[##] and the achieved long term results. Additionally, the long term survival evaluated by the Munich Cancer Registry (MCR) is compared with the results of the population-based registry in the USA (SEER), which is useful for checking the consistency of the data on an international level.

In comparing several tables, inconsistent figures may be detected. This is based on the fact that different patient cohorts are included in the base calculation, for example when proportions of multiple tumors or DCO-cases[###] are concerned. In other cases the individual tumor diagnosis is the basis for calculation, for example with incidence.

The foot notes describe the currentness of the data. The baseline statistics and survival data are updated annually. This yearly analysis comprises the Annual Report of the MCR.

Clinics and physicians have access to essentially more detailed data, with which they can check, compare and in the best case optimize their own data and results.

We would be pleased to receive corrections, critique and useful suggestions. Just send an e-mail to tumor@ibe.med.uni-muenchen.de.

Munich Cancer Registry, April 2016

[#] Base data has been collected since 1998. An increase in new diseases is apparent, which is an effect of two extensions in the MCR catchment area (from a base population of 2.51 million to 3.96 in 2002, and to 4.52 million in 2007).

[##] Due to the high frequency and good prognosis of non-malignant skin cancer (C44), no systematic ascertainment is performed for this diagnosis. C44 is not designated as a primary, but rather as a secondary tumor.

[###] DCO (death certificate only) identifies a cancer case that first becomes available to the MCR through the death certificate.

ICD-10 codes (ICD-10 2015) used for specifying cancer site

Code	Description
D03.-	Melanoma in situ
D03.0	Lip
D03.1	Eyelid, including canthus
D03.2	Ear and external auricular canal
D03.3	Other and unspecified parts of face
D03.4	Scalp and neck
D03.5	Trunk
D03.6	Upper limb, including shoulder
D03.7	Lower limb, including hip
D03.8	Other sites
D03.9	Melanoma in situ, unspecified

INCIDENCE

Table 1

All patients by year of diagnosis,
proportions of multiple primaries, deaths, and active follow-up

Year of diagnosis	Cases n	Prop. mult. primaries %	Prop. deaths %	Prop. actively followed %
1998	77	42.9	26.0	96.1
1999	113	42.5	22.1	95.6
2000	107	39.3	17.8	97.2
2001	93	47.3	15.1	94.6
2002	145	44.1	19.3	95.9 #
2003	167	39.5	18.6	89.8
2004	237	43.0	17.7	92.8
2005	256	40.6	23.8	93.0
2006	293	41.0	14.0	86.7
2007	250	41.6	15.2	59.6 #
2008	383	38.9	12.3	54.0
2009	368	36.1	8.7	42.7
2010	479	37.8	7.3	42.4
2011	558	33.5	4.7	38.9
2012	606	31.0	4.0	40.8
2013	524	29.4	2.3	99.0
2014	240	37.1	0.8	99.6 ##
1998-2014	4896	36.9	10.2	67.7

The increases of incident cases in 2002 and 2007 reflect the expansion to additional registry areas.

Please be aware that data of recent annual patient cohorts may not yet be fully processed. The years under evaluation can be found in the respective headings.

Table 1a

All patients
by year of diagnosis and gender

Year of diagnosis	All n	Males n	Females n	Prop. males %
1998	77	35	42	45.5
1999	113	64	49	56.6
2000	107	61	46	57.0
2001	93	43	50	46.2
2002	145	66	79	45.5
2003	167	84	83	50.3
2004	237	115	122	48.5
2005	256	118	138	46.1
2006	293	132	161	45.1
2007	250	113	137	45.2
2008	383	188	195	49.1
2009	368	198	170	53.8
2010	479	225	254	47.0
2011	558	248	310	44.4
2012	606	296	310	48.8
2013	524	250	274	47.7
2014	240	115	125	47.9
1998-2014	4896	2351	2545	48.0

Table 2

Incidence measures by year of diagnosis
(with respect to registry area expansion from 2.51 to 3.96 m as of 2002, and from 3.96 to 4.64 m as of 2007, respectively)

Year of diagnosis	Males n	Females n	Males Inc. raw	Fem. Inc. raw	Males Inc. WS	Fem. Inc. WS	Males Inc. ES	Fem. Inc. ES	Males Inc. BRD-S	Fem. Inc. BRD-S
1998	35	42	3.2	3.6	2.0	2.6	2.8	3.1	3.5	3.4
1999	64	49	5.7	4.1	3.7	2.9	4.9	3.6	5.5	3.7
2000	61	46	5.4	3.8	3.3	2.7	4.6	3.2	5.5	3.6
2001	43	50	3.7	4.1	2.4	2.9	3.2	3.5	3.6	3.8
2002	66	79	3.5	4.0	2.2	2.9	3.1	3.4	3.4	3.9
2003	84	83	4.5	4.2	2.8	2.6	3.7	3.4	4.4	3.7
2004	115	122	6.1	6.2	3.7	3.7	5.1	4.8	6.0	5.4
2005	118	138	6.2	6.9	3.7	3.9	5.1	5.2	6.2	6.1
2006	132	161	6.9	8.0	4.1	4.7	5.5	6.1	6.5	7.0
2007	113	137	5.1	5.9	2.8	3.2	4.0	4.3	4.8	4.9
2008	188	195	8.4	8.4	4.7	4.7	6.6	6.2	7.8	7.1
2009	198	170	8.9	7.3	4.7	4.0	6.7	5.4	8.6	6.3
2010	225	254	10.0	10.9	5.4	5.8	7.6	7.8	9.3	9.2
2011	248	310	10.9	13.1	5.9	7.8	8.2	10.0	10.0	11.5
2012	296	310	13.0	13.1	6.8	7.3	9.6	9.7	11.8	11.3
2013	250	274	10.9	11.6	6.3	6.7	8.5	8.7	10.1	10.2
2014	115	125	5.0	5.3	2.6	2.9	3.8	3.9	4.7	4.6
1998-2014	2351	2545	7.3	7.6	4.2	4.5	5.9	5.8	7.1	6.7

The computation of the incidence measures includes all primaries, irrespective of first or subsequent malignancy.

Table 3

Age distribution parameters by year of diagnosis (All patients)

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	77	55.8	16.7	19.5	92.2	31.4	41.5	59.6	67.3	76.2
1999	113	53.0	16.8	11.8	95.1	31.2	38.8	56.7	63.6	72.6
2000	107	58.4	15.4	22.8	87.1	34.3	45.7	62.7	70.2	75.1
2001	93	54.4	15.1	24.2	86.2	33.5	42.4	55.4	65.7	72.5
2002	145	56.3	16.3	19.9	84.1	32.0	42.2	59.6	67.7	77.5
2003	167	59.1	15.2	18.1	90.3	36.8	50.5	62.0	69.0	78.5
2004	237	60.1	16.2	20.3	94.7	36.4	48.0	63.7	71.3	81.0
2005	256	62.3	16.1	22.9	99.1	38.6	49.2	65.1	74.5	81.5
2006	293	61.6	15.5	16.2	94.5	39.4	51.0	64.6	71.4	81.1
2007	250	63.8	15.3	13.7	91.6	41.1	54.0	67.3	73.9	82.6
2008	383	63.1	14.6	16.0	93.7	42.5	52.4	66.7	72.9	81.2
2009	368	64.0	15.5	15.4	96.5	40.6	53.9	67.7	75.3	81.7
2010	479	64.1	15.2	18.1	97.7	42.2	53.0	67.7	74.6	81.7
2011	558	62.3	15.6	19.6	96.9	40.6	50.4	64.8	73.7	81.0
2012	606	64.0	15.1	12.1	95.7	41.9	53.4	67.8	74.7	80.8
2013	524	61.4	16.7	16.0	96.7	36.7	49.0	65.0	74.0	80.9
2014	240	64.4	15.2	22.0	94.9	42.0	54.2	68.2	75.7	81.5
1998-2014	4896	62.0	15.8	11.8	99.1	38.8	50.7	65.0	73.4	80.8

Table 3a

Age distribution parameters by year of diagnosis (MALES)

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	35	62.1	14.5	36.1	92.2	41.5	52.5	61.1	72.9	82.6
1999	64	55.6	16.0	23.7	89.7	32.9	39.5	59.0	65.9	72.9
2000	61	62.6	13.1	33.5	87.1	40.4	57.4	64.9	71.0	78.1
2001	43	56.5	15.3	25.9	86.2	34.8	43.4	59.7	67.5	73.5
2002	66	60.3	11.4	32.0	78.8	40.1	56.4	61.6	67.4	73.4
2003	84	59.0	15.0	18.1	83.4	36.8	49.3	63.0	70.1	76.2
2004	115	60.8	14.7	24.5	89.3	38.4	49.7	64.1	71.3	76.6
2005	118	62.5	16.4	25.2	99.1	37.9	50.9	66.2	73.9	82.6
2006	132	62.0	14.8	18.3	94.5	40.1	52.1	66.1	71.2	77.6
2007	113	64.3	13.8	13.7	89.5	43.4	55.0	67.4	73.9	79.3
2008	188	64.6	12.7	16.0	93.2	44.8	58.0	67.2	72.2	78.2
2009	198	65.3	14.3	22.8	96.5	41.2	57.6	68.8	75.7	80.3
2010	225	64.9	14.2	20.9	95.7	44.2	55.6	68.7	74.6	81.6
2011	248	65.0	14.0	24.8	96.9	45.9	55.3	67.8	74.7	81.3
2012	296	66.3	13.0	29.5	95.7	47.0	58.9	69.4	74.6	79.8
2013	250	62.4	15.8	16.0	96.7	41.0	50.9	65.9	73.7	79.6
2014	115	65.8	15.0	22.0	94.9	42.5	56.0	70.6	75.9	81.5
1998-2014	2351	63.5	14.5	13.7	99.1	41.5	54.5	66.6	73.6	79.8

Table 3b

Age distribution parameters by year of diagnosis (FEMALES)

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	42	50.5	16.7	19.5	82.3	29.5	35.8	53.0	63.0	71.2
1999	49	49.6	17.4	11.8	95.1	26.5	33.8	54.8	59.5	68.5
2000	46	52.7	16.3	22.8	81.3	29.2	36.4	55.9	66.4	72.0
2001	50	52.5	14.8	24.2	82.2	32.8	39.6	54.0	62.7	71.8
2002	79	52.9	18.9	19.9	84.1	27.5	35.7	52.2	68.9	79.1
2003	83	59.3	15.5	22.1	90.3	37.2	50.7	60.9	68.0	79.1
2004	122	59.5	17.5	20.3	94.7	35.5	45.6	62.2	71.8	82.0
2005	138	62.1	15.8	22.9	95.2	40.1	48.0	64.1	75.0	81.5
2006	161	61.3	16.0	16.2	89.2	39.4	49.9	63.6	71.5	82.5
2007	137	63.4	16.4	20.0	91.6	39.3	51.2	67.3	73.8	84.4
2008	195	61.8	16.1	25.5	93.7	39.7	46.9	65.2	73.4	82.3
2009	170	62.5	16.6	15.4	94.6	37.7	50.5	66.9	74.0	82.0
2010	254	63.3	16.1	18.1	97.7	41.2	50.8	66.5	74.7	81.7
2011	310	60.1	16.5	19.6	96.8	35.9	46.6	62.3	73.1	80.6
2012	310	61.9	16.6	12.1	93.4	38.4	48.9	65.1	74.8	81.4
2013	274	60.6	17.4	17.4	95.6	33.9	48.0	64.3	74.0	81.3
2014	125	63.1	15.4	25.7	93.4	40.8	53.5	64.8	74.9	81.5
1998–2014	2545	60.6	16.8	11.8	97.7	36.1	47.7	63.3	73.3	81.4

Table 4

Age distribution by 5-year age group and gender for period 2007-2014

Age at diagnosis Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
10-14	2	0.1	0.1	1	0.1	0.1	1	0.1	0.1
15-19	8	0.2	0.3	3	0.2	0.2	5	0.3	0.3
20-24	18	0.5	0.8	5	0.3	0.6	13	0.7	1.1
25-29	65	1.9	2.7	20	1.2	1.8	45	2.5	3.6
30-34	85	2.5	5.2	22	1.3	3.1	63	3.5	7.2
35-39	131	3.8	9.1	43	2.6	5.8	88	5.0	12.1
40-44	195	5.7	14.8	91	5.6	11.3	104	5.9	18.0
45-49	254	7.5	22.2	100	6.1	17.5	154	8.7	26.6
50-54	224	6.6	28.8	103	6.3	23.8	121	6.8	33.5
55-59	238	7.0	35.8	116	7.1	30.9	122	6.9	40.3
60-64	343	10.1	45.9	174	10.7	41.5	169	9.5	49.9
65-69	480	14.1	59.9	247	15.1	56.6	233	13.1	63.0
70-74	581	17.0	77.0	325	19.9	76.5	256	14.4	77.4
75-79	367	10.8	87.8	209	12.8	89.3	158	8.9	86.3
80-84	247	7.2	95.0	106	6.5	95.8	141	7.9	94.3
85+	170	5.0	100.0	68	4.2	100.0	102	5.7	100.0
All ages	3408	100.0		1633	100.0		1775	100.0	

Included in the statistics are 61.5% multiple primaries in males and 39.8% in females.

Table 5

Age-specific incidence
for period 2007-2014

Age at diagnosis Years	Males n	Females n	Males Age-spec. incid.	Females Age-spec. incid.
0- 4			0.0	0.0
5- 9			0.0	0.0
10-14	1	1	0.1	0.1
15-19	3	5	0.3	0.5
20-24	5	13	0.4	1.2
25-29	19	45	1.6	3.7
30-34	21	61	1.7	4.9
35-39	43	88	3.3	7.0
40-44	91	103	5.6	6.7
45-49	97	151	6.1	10.0
50-54	100	120	7.7	9.4
55-59	114	122	10.7	10.9
60-64	172	166	17.5	15.7
65-69	241	228	25.0	21.8
70-74	322	250	35.4	23.9
75-79	202	154	36.7	21.6
80-84	104	140	29.8	25.0
85+	65	99	28.1	17.1
All ages	1600	1746		
Incidence				
Raw			8.9	9.3
WS			4.8	5.2
ES			6.8	6.9
BRD-S			8.3	8.0

The age-specific incidence characterizes the disease risk in a particular age group. The age distribution depends on the patient population frequency in each age group and reflects the tangible clinical picture of everyday patients care (see following chart).

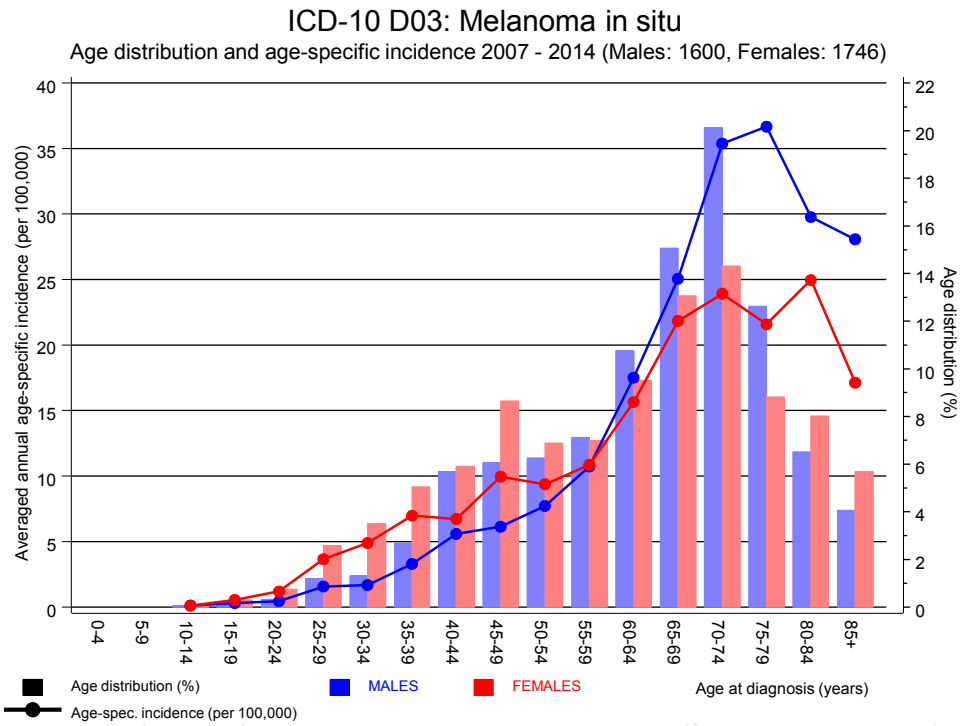


Figure 6. Age distribution and age-specific incidence

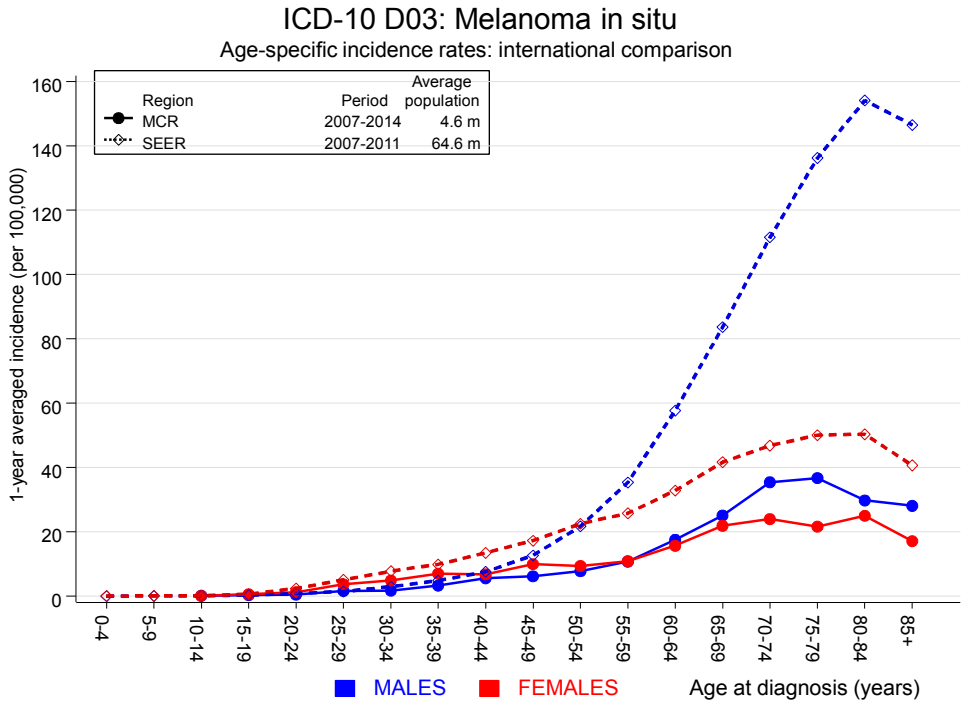


Figure 6a. Age-specific incidence in MCR registry areas compared to SEER (Surveillance, Epidemiology, and End Results, USA).

Reference:

Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Incidence - SEER 18 Regs Research Data, released April 2014, based on the November 2013 submission. http://www.seer.cancer.gov.

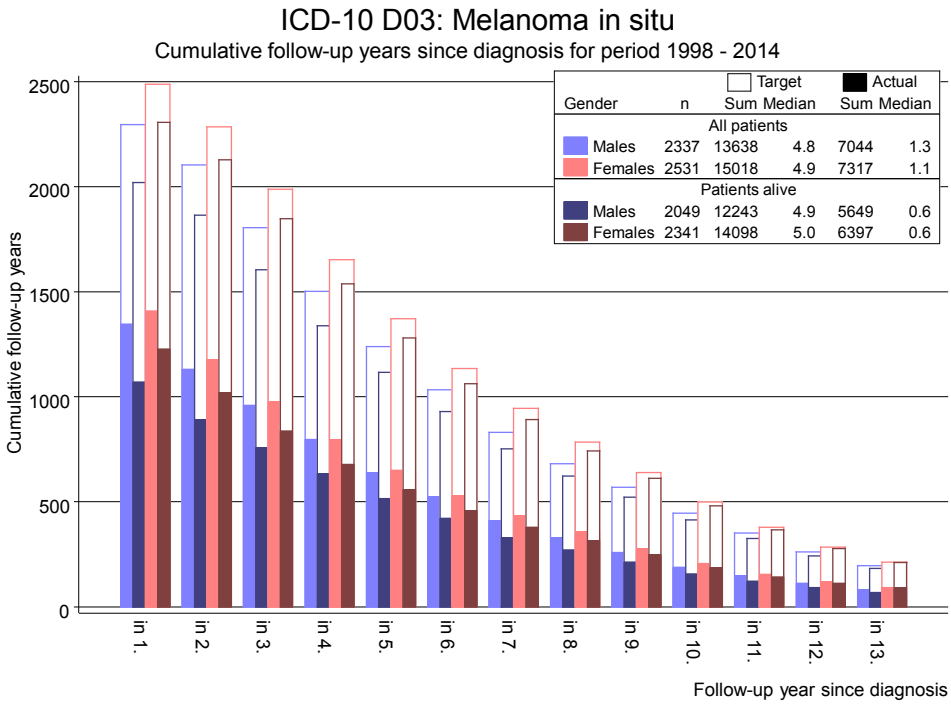


Figure 7. Cumulative follow-up years depending on time since diagnosis

The increase of the lost to follow-up rate can be interpreted as a consequence of a declining number of survivors over time.

Table 8a

Standardized incidence ratio (SIR, with 95% confidence limits), excess absolute risk (EAR) and DCO rate of second primaries for period 1998-2014
MALES

Diagnosis		Observed n	Expected n	SIR	LCL 95%	UCL 95%		EAR	DCO %
C03-C06	Oral cavity	2	0.8	2.4	0.3	8.6		1.7	
C15	Oesophagus	4	1.9	2.1	0.6	5.5		3.2	
C16	Stomach	6	4.3	1.4	0.5	3.1		2.6	
C17	Small intestine	4	0.5	7.4	2.0	19.0	#	5.2	
C18	Colon	12	10.3	1.2	0.6	2.0		2.6	25.0
C19-C20	Rectum	5	5.7	0.9	0.3	2.1		-1.0	
C22	Liver	5	2.9	1.7	0.6	4.1		3.2	
C23-C24	Bile	2	1.0	1.9	0.2	7.0		1.4	
C25	Pancreas	10	3.9	2.5	1.2	4.7	#	9.1	10.0
C33-C34	Lung	20	12.2	1.6	1.0	2.5	#	11.7	15.0
C43	Malign. melanoma	191	4.6	42.0	36.2	48.3	#	279.6	0.5
C46,C49	Soft tissue	2	0.6	3.4	0.4	12.4		2.1	
C61	Prostate	88	30.5	2.9	2.3	3.6	#	86.2	8.0
C64	Kidney	6	3.6	1.7	0.6	3.6		3.5	
C67	Bladder	13	4.8	2.7	1.4	4.6	#	12.3	15.4
C69	Eye melanoma	2	0.1	19.9	2.4	71.9	#	2.8	
C70-C72	CNS cancer	4	1.4	2.9	0.8	7.4		3.9	
C73	Thyroid	4	0.7	5.9	1.6	15.2	#	5.0	
C76-C79	CUP	4	1.8	2.3	0.6	5.8		3.3	
C82-C85	NHL	5	4.3	1.2	0.4	2.7		1.1	
C90	Mult. myeloma	4	1.4	3.0	0.8	7.6		4.0	25.0
C91-C96	Leukaemia	3	1.8	1.7	0.3	4.9		1.8	33.3
Other primaries		5	1.3	3.9	1.3	9.1	#	5.6	40.0
Not observed		0	5.6	0.0	0.0	0.7	#	-8.5	
All mult. primaries		401	105.7	3.8	3.4	4.2	#	442.7	5.2

Patients	2195
Median age at second malignancy (years)	72.5
Person-years	6669
Mean observation time (years)	3.0
Median observation time (years)	1.3

The occurrence of second malignancy is statistically significant.

Observed second primaries with count 1 are pooled in category “Other primaries”

Table 8b

Standardized incidence ratio (SIR, with 95% confidence limits), excess absolute risk (EAR) and DCO rate of second primaries for period 1998–2014
FEMALES

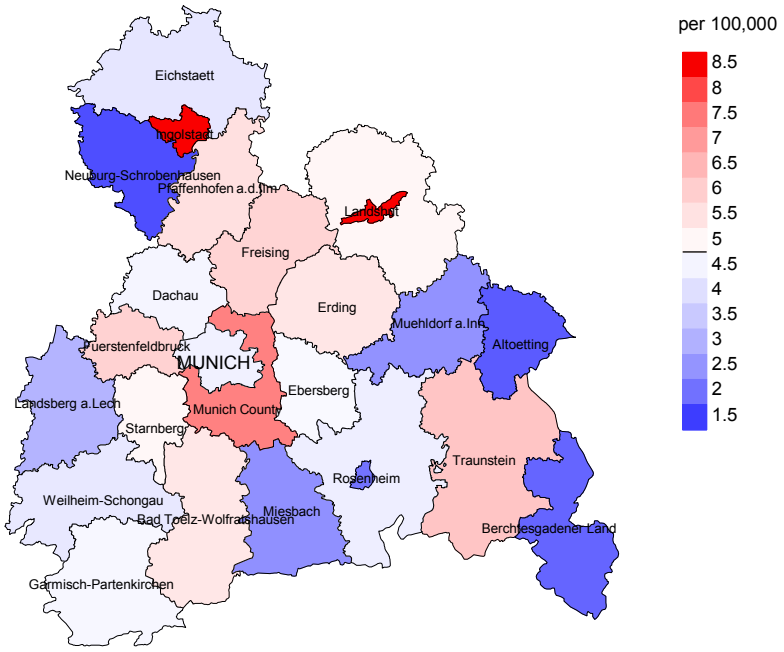
Diagnosis		Observed n	Expected n	SIR	LCL 95%	UCL 95%		EAR	DCO %
C16	Stomach	3	2.2	1.4	0.3	4.0		1.1	
C18	Colon	13	6.3	2.1	1.1	3.5	#	9.5	15.4
C19–C20	Rectum	3	2.7	1.1	0.2	3.2		0.4	
C23–C24	Bile	3	0.9	3.3	0.7	9.7		3.0	
C25	Pancreas	5	2.9	1.7	0.6	4.0		2.9	40.0
C33–C34	Lung	7	4.7	1.5	0.6	3.1		3.3	14.3
C43	Malign. melanoma	125	2.7	47.0	39.2	56.1	#	173.3	
C46,C49	Soft tissue	3	0.4	7.9	1.6	23.1	#	3.7	
C50	Breast	52	20.6	2.5	1.9	3.3	#	44.5	1.9
C51	Vulva	2	0.7	2.9	0.4	10.6		1.9	
C53	Cervix uteri	2	1.0	2.0	0.2	7.1		1.4	
C54	Corpus uteri	4	3.6	1.1	0.3	2.8		0.5	
C56	Ovary	8	2.7	3.0	1.3	5.9	#	7.5	
C64	Kidney	7	1.6	4.4	1.8	9.1	#	7.7	
C67	Bladder	4	1.2	3.2	0.9	8.3		3.9	
C70–C72	CNS cancer	2	0.9	2.2	0.3	8.0		1.5	
C82–C85	NHL	12	2.5	4.8	2.5	8.4	#	13.4	
C90	Mult. myeloma	4	0.8	5.1	1.4	13.1	#	4.6	25.0
C91–C96	Leukaemia	7	1.1	6.5	2.6	13.4	#	8.4	28.6
Other primaries		6	2.5	2.4	0.9	5.2		4.9	
Not observed		0	4.6	0.0	0.0	0.8	#	-6.6	
All mult. primaries		272	66.7	4.1	3.6	4.6	#	290.8	3.3

Patients	2411
Median age at second malignancy (years)	69.4
Person-years	7060
Mean observation time (years)	2.9
Median observation time (years)	1.1

The occurrence of second malignancy is statistically significant.

Observed second primaries with count 1 are pooled in category “Other primaries”

Average incidence (world standard population) 2007 - 2014: Males



Average incidence (world standard population) 2007 - 2014: Females

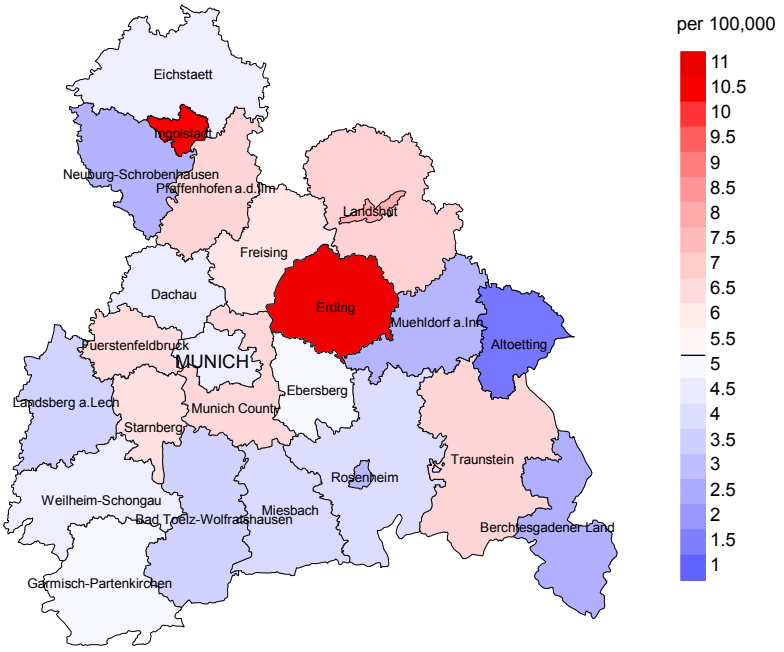
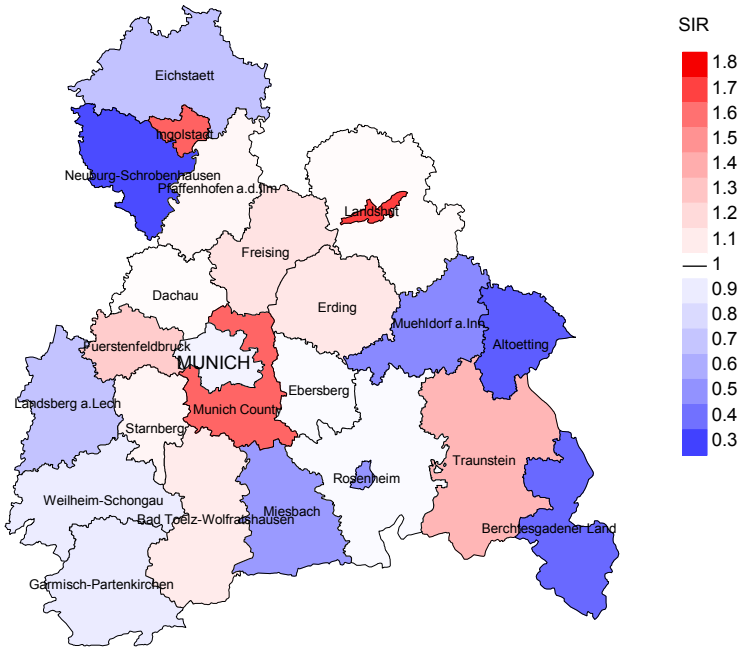


Figure 9a. Map of cancer incidence (world standard population) by county averaged for period 2007 to 2014. According to their individual incidence rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 4.8/100,000 WS N=1,600, females 5.2/100,000 WS N=1,746).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 65,347 female residents (averaged) in the period from 2007 to 2014 a total of 50 women were identified with newly diagnosed melanoma in situ. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 5.0/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 3.2 and 7.4/100,000.

Standardized incidence ratio (SIR) 2007 - 2014: Males



Standardized incidence ratio (SIR) 2007 - 2014: Females

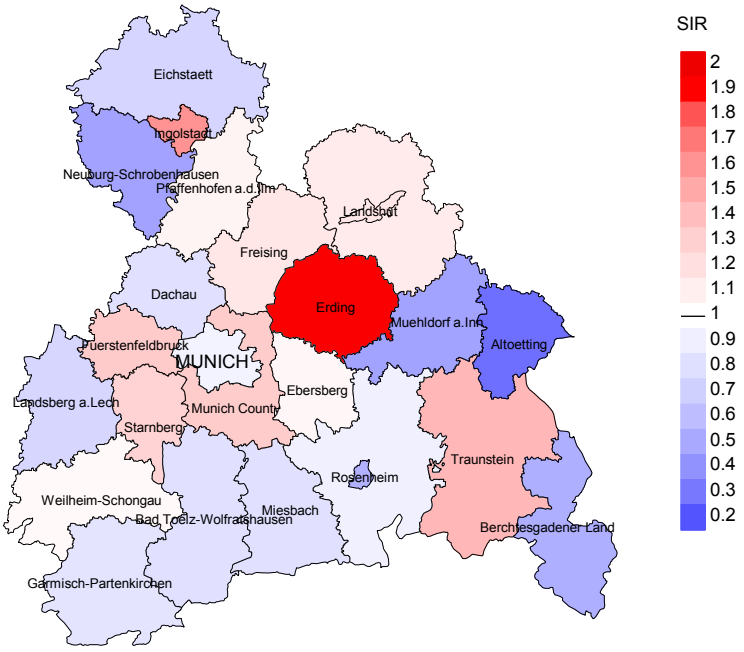


Figure 9b. Map of standardized incidence ratio (SIR) by county averaged for period 2007 to 2014. According to their individual SIR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=1,600, females N=1,746).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 64,924 female residents (averaged) in the period from 2007 to 2014 a total of 50 women were identified with newly diagnosed melanoma in situ. Therefore, the mean standardized incidence ratio (SIR) for this cancer type in this area can be calculated at 1.05. Though, the value of this parameter may vary with an underlying probability of 99% between 0.71 and 1.50, and is therefore not statistically striking.

MORTALITY

Table 10a

Patient cohorts of incident cancers by year of diagnosis, follow-up status, and deaths among the annual cohorts

(with respect to registry area expansion from 2.51 to 3.96 m as of 2002, and from 3.96 to 4.64 m as of 2007, respectively)

Year of diagnosis	Incident cases n	Prop. actively followed %	Deaths n	Prop. deaths %	Prop. deaths with death certific. %
1998	77	96.1	20	26.0	90.0
1999	113	95.6	25	22.1	96.0
2000	107	97.2	19	17.8	89.5
2001	93	94.6	14	15.1	100.0
2002	145	95.9	28	19.3	100.0
2003	167	89.8	31	18.6	87.1
2004	237	92.8	42	17.7	97.6
2005	256	93.0	61	23.8	95.1
2006	293	86.7	41	14.0	97.6
2007	250	59.6	38	15.2	97.4
2008	383	54.0	47	12.3	97.9
2009	368	42.7	32	8.7	96.9
2010	479	42.4	35	7.3	97.1
2011	558	38.9	26	4.7	100.0
2012	606	40.8	24	4.0	95.8
2013	524	99.0	12	2.3	91.7
2014	240	99.6	2	0.8	100.0
1998-2014	4896	67.7	497	10.2	96.0

Table 10b

Annual cohorts of incident cancers and deaths,
and cases deceased the same year of cancer diagnosis

(with respect to registry area expansion from 2.51 to 3.96 m as of 2002,
and from 3.96 to 4.64 m as of 2007, respectively)

Year of diagnosis/ death	Incident cases n	Deaths n	Deaths in same year n	Prop. deaths in same year %
1998	77	5		
1999	113	12		
2000	107	8		
2001	93	10	1	1.1
2002	145	16		
2003	167	15		
2004	237	14	1	0.4
2005	256	24		
2006	293	26	1	0.3
2007	250	38		
2008	383	38	4	1.0
2009	368	30	1	0.3
2010	479	64	4	0.8
2011	558	60	1	0.2
2012	606	74	5	0.8
2013	524	84	3	0.6
2014	240	89	2	0.8
1998-2014	4896	607	23	0.5

Table 10c

Annual cohorts of deaths, and proportion of cancer-related and non-cancer-related deaths

(with respect to registry area expansion from 2.51 to 3.96 m as of 2002, and from 3.96 to 4.64 m as of 2007, respectively)

Year of death	Deaths n	Prop. cancer-related %	Prop. non-cancer-related %	Prop. cancer recorded on death certificate %
1998	5	20.0	80.0	25.0
1999	12	33.3	66.7	33.3
2000	8	37.5	62.5	28.6
2001	10	30.0	70.0	62.5
2002	16	56.3	43.8	71.4
2003	15	46.7	53.3	57.1
2004	14	35.7	64.3	53.8
2005	24	50.0	50.0	52.2
2006	26	34.6	65.4	53.8
2007	38	36.8	63.2	50.0
2008	38	36.8	63.2	47.2
2009	30	40.0	60.0	57.1
2010	64	37.5	62.5	47.6
2011	60	36.7	63.3	39.0
2012	74	35.1	64.9	42.5
2013	84	48.8	51.2	51.8
2014	89	48.3	51.7	54.0
1998-2014	607	41.0	59.0	49.1

Table 11a

Medians of age at death according to the grouping in Table 10
MALES

Year of death	Deaths n	Age at death (all causes) Years	Age at death (cancer-related) Years	Age at death (non-cancer-related) Years	Age at death (according to death certificate) Years
1998	4	74.4	73.8	74.9	74.9
1999	9	79.3	69.9	83.1	69.9
2000	5	78.6	68.1	88.1	73.4
2001	7	73.7	74.3	73.7	75.9
2002	8	70.8	70.8	79.1	69.6
2003	9	81.7	74.5	82.5	67.2
2004	5	65.4	64.7	87.8	65.0
2005	17	77.3	78.3	76.4	78.3
2006	13	77.5	73.0	80.4	73.0
2007	23	78.3	77.1	78.3	79.1
2008	18	79.9	78.9	85.3	78.9
2009	19	81.7	78.3	84.7	79.4
2010	33	77.8	74.4	81.1	76.6
2011	31	82.3	80.9	83.7	81.4
2012	47	83.0	77.4	83.5	77.1
2013	46	80.3	79.4	80.8	79.8
2014	53	84.2	75.2	88.2	76.8
1998-2014	347	80.2	77.4	83.0	77.8

Deaths of patients are considered to be cancer-related, in case that fact was recorded on the death certificate, or patients had suffered from metastasis or recurrence.

Table 11b

Medians of age at death according to the grouping in Table 10
FEMALES

Year of death	Deaths n	Age at death (all causes) Years	Age at death (cancer-related) Years	Age at death (non-cancer-related) Years	Age at death (according to death certificate) Years
1998	1	76.8		76.8	
1999	3	89.3	91.8	83.9	78.5
2000	3	86.8		86.8	
2001	3	81.0	75.5	88.8	75.5
2002	8	78.1	63.9	79.1	73.5
2003	6	77.7	64.5	85.2	64.5
2004	9	81.5	65.2	85.5	79.3
2005	7	83.4	74.0	90.7	74.0
2006	13	82.1	78.4	82.7	78.9
2007	15	82.4	77.4	83.5	77.9
2008	20	85.2	73.3	86.6	85.0
2009	11	83.6	81.9	84.2	80.6
2010	31	85.3	76.6	86.5	77.3
2011	29	88.4	85.1	90.4	85.1
2012	27	85.7	85.5	85.8	87.4
2013	38	85.2	78.4	90.6	79.8
2014	36	81.7	73.1	90.3	73.1
1998-2014	260	84.2	77.3	86.9	78.3

By 2010, life expectancy at birth was 77.5 years for boys and 82.6 years for girls.

Deaths of patients are considered to be cancer-related, in case that fact was recorded on the death certificate, or patients had suffered from metastasis or recurrence.

Table 12a

Mortality measures (cancer-related death) and mortality-incidence-index
by year of death
MALES

Year of death	Deaths n	Mort. raw	MI-Index raw	Mort. WS	MI-Index WS	Mort. ES	MI-Index ES	Mort. BRD-S	MI-Index BRD-S
1998	1	0.1	0.03	0.1	0.03	0.1	0.03	0.1	0.03
1999	3	0.3	0.05	0.2	0.04	0.2	0.05	0.3	0.06
2000	3	0.3	0.05	0.2	0.05	0.2	0.05	0.3	0.06
2001	2	0.2	0.05	0.1	0.04	0.1	0.05	0.2	0.05
2002	6	0.3	0.09	0.2	0.09	0.3	0.10	0.4	0.11
2003	4	0.2	0.05	0.1	0.04	0.2	0.05	0.2	0.06
2004	3	0.2	0.03	0.1	0.02	0.1	0.02	0.1	0.02
2005	8	0.4	0.07	0.2	0.05	0.3	0.07	0.5	0.08
2006	6	0.3	0.05	0.1	0.04	0.2	0.04	0.3	0.06
2007	8	0.4	0.07	0.1	0.05	0.2	0.06	0.4	0.08
2008	10	0.4	0.05	0.2	0.04	0.3	0.05	0.5	0.07
2009	8	0.4	0.04	0.2	0.03	0.3	0.04	0.4	0.05
2010	16	0.7	0.07	0.3	0.05	0.5	0.06	0.7	0.07
2011	13	0.6	0.05	0.2	0.04	0.4	0.04	0.6	0.06
2012	17	0.7	0.06	0.3	0.05	0.5	0.06	0.7	0.06
2013	24	1.1	0.10	0.4	0.06	0.7	0.08	1.1	0.11
2014	26	1.1	0.23	0.4	0.17	0.7	0.20	1.0	0.22
1998-2014	158	0.5	0.07	0.2	0.05	0.4	0.06	0.5	0.08

Table 12b

Mortality measures (cancer-related death) and mortality-incidence-index
by year of death
FEMALES

Year of death	Deaths n	Mort. raw	MI-Index raw	Mort. WS	MI-Index WS	Mort. ES	MI-Index ES	Mort. BRD-S	MI-Index BRD-S
1998									
1999	1	0.1	0.02	0.0	0.01	0.0	0.01	0.0	0.01
2000									
2001	1	0.1	0.02	0.0	0.01	0.0	0.01	0.1	0.02
2002	3	0.2	0.04	0.1	0.03	0.1	0.03	0.1	0.03
2003	3	0.2	0.04	0.1	0.04	0.1	0.04	0.1	0.04
2004	2	0.1	0.02	0.1	0.01	0.1	0.01	0.1	0.02
2005	4	0.2	0.03	0.1	0.02	0.1	0.02	0.1	0.02
2006	3	0.1	0.02	0.0	0.01	0.1	0.01	0.1	0.02
2007	6	0.3	0.05	0.1	0.03	0.2	0.04	0.2	0.05
2008	4	0.2	0.02	0.1	0.01	0.1	0.02	0.1	0.02
2009	4	0.2	0.02	0.0	0.01	0.1	0.01	0.1	0.02
2010	8	0.3	0.03	0.1	0.02	0.2	0.02	0.3	0.03
2011	9	0.4	0.03	0.1	0.01	0.2	0.02	0.2	0.02
2012	9	0.4	0.03	0.1	0.01	0.2	0.02	0.2	0.02
2013	17	0.7	0.06	0.2	0.04	0.4	0.04	0.5	0.05
2014	17	0.7	0.14	0.3	0.10	0.4	0.11	0.6	0.13
1998-2014	91	0.3	0.04	0.1	0.02	0.1	0.03	0.2	0.03

Statistical Notes

In all tables and figures the respective reference values should be carefully considered. The incidence rates include diagnoses (with multiple primary), and death certificate only (DCO) cases, where applicable. For mortality statistics patients, diagnoses and progressive course of disease are presented. In the calculations, all courses of disease are considered whereby progressions occurred and/or death certificate identified progressive cancers were ascertained. Additionally there are three groups of disease course to consider:

1. **All multiple primaries included**

   The mortality statistic describes the tumor-specific death, independent of any malignancy. The patient perspective, induced secondary malignancies, and the problem of multiple malignancies from the same primary tumor all have reasons for their inclusion.

2. **First singular primary** (no information about other prior or synchronous malignancy)

   The mortality statistic describes the cancer-related death for patients who have no therapeutic restrictions due to a previous or synchronous cancer. These statistics are comparable to studies that have exclusion criteria based on a second malignancy.

3. **Single primary** (no information about other prior, syn- or metachronous malignancy)

   The mortality statistic describes the tumor-specific death that occurs without any impact through secondary primaries, earlier, synchronous, later or induced. Precisely the difference between disease group 1 and 2 highlight the magnitude of the problem of secondary malignancies.

For this reason differences appear concerning official mono-causal mortality statistics. To judge the maximum deviation, 2 further tables are presented. In the first table the distribution of secondary malignancies before, at or after the described cancer are shown, that could be an alternative cause of death. In the second table, the age-specific mortality rates for all courses of disease, without designation of secondary malignancies are shown.

A previously minimally acknowledged statistic is the **age at death**, which allows for a good assessment of the quality of classification of the apparent tumor-specific death. For assumed tumor-independent deaths, the age of death should be estimated from the age of diagnosis and the normal life expectancy, whereas tumor-dependent deaths can be estimated from the age of diagnosis plus the average tumor-specific life expectancy. The comparison of different tumors demonstrates this association, if the causes of cancer and the competing cause of death are independent of each other (e.g. breast and colon versus head/neck and lung).

The index from mortality and incidence (Mortality-Incidence ratio, **MI-index**) is a statistic that allows for the evaluation of the quality of data. For diseases with poor prognoses, comparable values are obtained from all age groups, because to a large extent, the numerator and denominator contain the same cases. For tumors with a good prognosis, increasing and decreasing incidence and age-specific differences in prognosis can more strongly alter the MI- index. Additionally, attention should be paid to the confidence intervals where fewer cases are reported.

The complexity of problems identified here emphasizes the importance of relative survival data for the appropriate analysis of long term results.

As a measurement of the burden of disease, the number of potential life years loss due to premature deaths in a cohort can be calculated (**PYLL**, potential years of life lost, standardized per 100,000 persons or per European standard) as well as the average loss of life years per individual (**AYLL**, average years of life lost). Depending upon the analytic aim (health economy, prevention, health care research) different methods exist for the generation of these measurements. In the results presented here, the age for a premature death is considered to be before 70 years, according to the guidelines of the OECD and the WHO (as seen in the abbreviation PYLL-70 or AYLL-70).

Shortcuts

FRG	Federal Republic of Germany
GEKID	Association of Population-based Cancer Registries in Germany (Gesellschaft der epidemiologischen Krebsregister in Deutschland e.V.)
MCR	Munich Cancer Registry (Tumorregister München)
SEER	Surveillance, Epidemiology, and End Results (USA)
AYLL-70	Average years of life lost prior to age 70 given a person dies before that age
BRD-S	German standard population
DCO	Death certificate only
EAR	Excess absolute risk = excess cancer cases (O - E) per 10,000 person-years
ES	European standard population (old)
LCL	Lower confidence limit
MI-index	Ratio between mortality and incidence
PYLL-70	Potential years of life lost prior to age 70 given a person dies before that age
SIR	Standardized incidence ratio
SMR	Standardized mortality ratio
UCL	Upper confidence limit
WS	World standard population

Recommended Citation

Munich Cancer Registry. ICD-10 D03: Melanoma in situ - Incidence and Mortality [Internet]. 2016 [updated 2016 Apr 13; cited 2016 Jun 1]. Available from: http://www.tumorregister-muenchen.de/en/facts/base/bD03__E-ICD-10-D03-Melanoma-in-situ-incidence-and-mortality.pdf

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