Munich Cancer Registry

- Survival
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- *Deutsch*

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

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

Cancer statistics: Baseline statistics

AML: Acute myelobl. leukemia

Year of diagnosis	1998-2013
Patients	2,419
Diseases	2,421
Creation date	05/19/2015
Export date	12/30/2014
Population	4.64 m

http://www.tumorregister-muenchen.de/en/facts/base/base_C920_E.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. The time-delayed acquisition of data and the occasionally high DCO-rates indicate optimizing reserves, among others, because of current financial and legal conditions that hinder the analyses.

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, May 2015

[#] 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). Death certificates from 2014 are incorporated into these analyses.

[##] 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. A high proportion of DCO cases (≥5%) in particular cancer types indicate insufficient participation of specific cancer specializations.

Some remarks regarding this cancer type

The results for leukemias should be interpreted with caution. As with other primarily non-surgically or non-radiologically treated cancer diseases, the MCR hardly manages to obtain even the simplest information on this cancer. The proportion of DCO cases indicates a situation that is far away from a satisfying cooperation. In the group of institutions that potentially participate in reporting are a few hospitals that refuse any contribution to MCR.

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

Code	Description
C92.0	Acute myeloblastic leukaemia [AML]

INCIDENCE

Table 1

Patient cohorts by year of diagnosis including DCO cases and multiple primaries, and with proportion of deaths and active follow-up

Year of diagnosis	Cases n	DCO cases n	Prop. DCO %	Prop. mult. primaries %	Prop. deaths %	Prop. actively followed %	
1998	48	2	4.2	14.6	85.4	100.0	
1999	48	2	4.2	16.7	75.0	97.9	
2000	80	19	23.8	13.8	75.0	98.8	
2001	95	41	43.2	22.1	87.4	98.9	
2002	120	41	34.2	18.3	82.5	96.7	#
2003	163	58	35.6	22.7	84.7	98.8	
2004	167	66	39.5	26.9	82.0	98.8	
2005	163	55	33.7	28.8	81.6	96.9	
2006	190	73	38.4	32.1	89.5	97.9	
2007	175	52	29.7	28.0	82.3	96.0	# ##
2008	177	50	28.2	33.3	80.2	86.4	
2009	192	39	20.3	33.3	81.3	87.5	
2010	246	48	19.5	36.6	77.2	83.7	
2011	185	34	18.4	37.3	75.1	87.0	
2012	232	54	23.3	39.2	72.4	88.8	
2013	140	57	40.7	47.1	75.0	99.3	###
1998-2013	2421	691	28.5	30.9	80.2	93.1	

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

Since 2007 the percentage of actively followed patients sharply declined compared to the previous years. This is a consequence of ambiguous data protection rules that currently forbid cancer registries in Bavaria to obtain the essential life status informations from competent registration offices.

Please be aware that data of recent annual patient cohorts may not yet be fully processed. Therefore, the presented figures and tables are potentially related to different time periods as pointed out in the respective headlines or legends.

Table 1a

Patient cohorts by year of diagnosis and gender
including DCO cases

Year of diagnosis	All n	Males n	Females n	Prop. males %
1998	48	22	26	45.8
1999	48	32	16	66.7
2000	80	39	41	48.8
2001	95	51	44	53.7
2002	120	63	57	52.5
2003	163	82	81	50.3
2004	167	76	91	45.5
2005	163	83	80	50.9
2006	190	109	81	57.4
2007	175	98	77	56.0
2008	177	90	87	50.8
2009	192	93	99	48.4
2010	246	124	122	50.4
2011	185	92	93	49.7
2012	232	109	123	47.0
2013	140	85	55	60.7
1998-2013	2421	1248	1173	51.5

Table 2

Incidence measures by year of diagnosis and gender including DCO cases
(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	22	26	2.0	2.2	1.6	1.6	1.9	1.8	2.3	2.0
1999	32	16	2.9	1.3	1.8	0.9	2.5	1.1	2.9	1.2
2000	39	41	3.4	3.4	2.8	2.2	3.3	2.8	3.8	3.1
2001	51	44	4.4	3.6	2.6	1.8	3.7	2.6	4.8	3.2
2002	63	57	3.4	2.9	2.3	1.5	3.0	2.0	3.6	2.5
2003	82	81	4.4	4.1	2.4	2.3	3.7	3.0	4.8	3.5
2004	76	91	4.0	4.6	2.4	2.7	3.4	3.4	4.2	4.0
2005	83	80	4.4	4.0	2.7	2.3	3.6	2.9	4.6	3.4
2006	109	81	5.7	4.0	3.2	1.8	4.5	2.4	5.9	3.2
2007	98	77	4.4	3.3	2.8	1.8	3.6	2.3	4.4	2.9
2008	90	87	4.0	3.7	2.7	1.8	3.3	2.5	4.0	3.2
2009	93	99	4.2	4.3	2.4	2.1	3.2	2.9	4.0	3.5
2010	124	122	5.5	5.2	3.1	2.5	4.3	3.4	5.4	4.2
2011	92	93	4.0	3.9	2.4	2.3	3.2	2.8	3.8	3.2
2012	109	123	4.8	5.2	2.4	2.9	3.5	3.7	4.5	4.4
2013	85	55	3.7	2.3	1.8	0.9	2.6	1.3	3.7	1.8
1998-2013	1248	1173	4.2	3.8	2.5	2.0	3.4	2.6	4.3	3.2

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)
(incl. DCO)

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	48	57.2	23.5	0.9	88.3	24.3	42.3	60.4	75.9	85.4
1999	48	61.6	18.0	12.6	88.2	38.9	54.2	63.8	75.0	79.3
2000	80	55.9	21.3	0.4	94.3	26.9	41.1	60.1	72.3	80.0
2001	95	65.3	13.6	26.8	89.5	45.0	57.2	66.2	76.3	81.0
2002	120	62.8	18.8	2.0	94.9	36.9	52.4	67.5	77.4	83.1
2003	163	65.3	17.3	1.0	93.6	42.5	55.1	66.7	79.4	83.6
2004	167	64.9	18.9	0.4	92.3	39.1	57.0	68.3	78.5	84.2
2005	163	63.0	20.1	0.6	91.3	36.4	52.1	68.1	78.3	83.1
2006	190	67.7	17.8	1.0	95.1	41.2	62.9	72.3	79.6	84.6
2007	175	63.1	19.2	3.0	94.5	36.4	55.2	68.4	75.9	82.3
2008	177	64.3	19.7	0.6	94.8	35.0	55.0	69.1	77.7	83.9
2009	192	65.1	18.9	4.2	99.2	37.6	53.0	70.4	78.4	86.3
2010	246	67.4	17.4	1.3	94.2	46.4	59.6	70.6	78.3	86.3
2011	185	64.1	19.9	0.3	98.4	40.1	54.3	69.8	77.1	84.7
2012	232	65.9	17.9	0.0	92.6	44.0	56.8	70.5	78.6	83.9
2013	140	71.9	15.8	0.5	92.7	55.1	69.2	75.7	81.6	85.0
1998-2013	2421	65.0	18.7	0.0	99.2	39.4	56.3	69.6	78.2	83.9

Table 3a

Age distribution parameters by year of diagnosis (MALES)
(incl. DCO)

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	22	55.7	25.0	0.9	88.3	24.3	39.4	59.5	75.2	84.3
1999	32	61.1	15.7	26.3	86.9	39.5	51.1	61.3	73.8	77.7
2000	39	53.8	24.2	0.4	86.5	8.6	37.0	61.2	72.7	80.3
2001	51	63.9	13.2	30.9	89.0	45.0	56.5	64.8	76.0	79.9
2002	63	60.2	20.3	2.0	94.9	30.6	51.9	64.1	73.8	81.2
2003	82	67.4	15.6	10.1	93.6	44.8	59.0	68.7	79.2	85.6
2004	76	66.1	17.8	0.4	89.2	40.2	60.9	68.5	78.6	85.0
2005	83	62.4	19.5	2.7	91.3	32.1	52.1	68.2	77.1	81.0
2006	109	65.8	17.2	1.0	93.6	40.8	60.7	70.6	76.3	81.6
2007	98	61.1	19.9	3.0	94.5	32.1	48.7	67.6	75.0	81.9
2008	90	61.2	22.3	0.6	93.8	26.3	49.1	68.9	75.6	82.4
2009	93	63.8	18.6	4.2	87.9	37.6	52.8	70.1	75.9	82.0
2010	124	66.5	16.6	2.9	92.8	47.8	60.3	69.9	76.7	83.4
2011	92	64.7	18.5	6.4	98.4	41.9	56.2	68.5	76.5	83.0
2012	109	67.6	15.5	9.9	92.6	46.8	59.5	70.6	79.2	84.5
2013	85	70.9	16.6	0.5	92.7	56.2	69.3	74.9	78.8	83.9
1998-2013	1248	64.3	18.5	0.4	98.4	38.9	56.2	69.2	76.8	82.6

Table 3b

Age distribution parameters by year of diagnosis (FEMALES)
(incl. DCO)

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	26	58.3	22.5	1.3	87.5	27.9	43.1	60.4	76.6	85.4
1999	16	62.7	22.6	12.6	88.2	15.1	54.6	70.1	76.6	87.9
2000	41	58.0	18.2	16.5	94.3	35.6	46.4	60.1	69.8	78.6
2001	44	66.9	14.1	26.8	89.5	52.7	57.6	71.2	77.3	81.9
2002	57	65.6	16.6	13.5	89.0	42.8	55.9	69.0	80.1	83.5
2003	81	63.2	18.7	1.0	89.1	40.2	50.0	65.3	79.4	82.7
2004	91	63.9	19.8	0.7	92.3	37.9	54.9	67.2	78.2	83.4
2005	80	63.7	20.8	0.6	90.8	39.5	53.9	67.3	80.5	84.3
2006	81	70.4	18.4	1.8	95.1	47.8	66.3	76.0	82.0	86.6
2007	77	65.8	17.9	3.5	94.3	42.1	60.4	69.5	76.8	84.3
2008	87	67.6	16.1	15.7	94.8	45.9	61.2	69.5	79.0	84.0
2009	99	66.2	19.1	17.8	99.2	37.0	53.9	71.7	81.2	87.0
2010	122	68.3	18.1	1.3	94.2	46.4	59.3	71.2	81.3	87.0
2011	93	63.6	21.3	0.3	90.0	38.8	51.1	70.7	78.5	85.2
2012	123	64.4	19.7	0.0	92.4	40.1	54.6	70.5	78.3	83.2
2013	55	73.3	14.3	29.7	91.2	53.7	64.9	76.9	82.6	87.5
1998-2013	1173	65.6	18.9	0.0	99.2	40.0	56.4	70.3	79.4	85.1

Table 4

Age distribution by 5-year age group and gender for period 1998-2013 (incl. DCO)

Age at diagnosis Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
0-4	34	1.4	1.4	18	1.4	1.4	16	1.4	1.4
5-9	15	0.6	2.0	10	0.8	2.2	5	0.4	1.8
10-14	17	0.7	2.7	9	0.7	3.0	8	0.7	2.5
15-19	22	0.9	3.6	12	1.0	3.9	10	0.9	3.3
20-24	25	1.0	4.7	12	1.0	4.9	13	1.1	4.4
25-29	25	1.0	5.7	16	1.3	6.2	9	0.8	5.2
30-34	47	1.9	7.6	27	2.2	8.3	20	1.7	6.9
35-39	67	2.8	10.4	30	2.4	10.7	37	3.2	10.1
40-44	103	4.3	14.7	52	4.2	14.9	51	4.3	14.4
45-49	95	3.9	18.6	42	3.4	18.3	53	4.5	18.9
50-54	125	5.2	23.8	70	5.6	23.9	55	4.7	23.6
55-59	157	6.5	30.2	66	5.3	29.2	91	7.8	31.4
60-64	204	8.4	38.7	120	9.6	38.8	84	7.2	38.5
65-69	301	12.4	51.1	171	13.7	52.5	130	11.1	49.6
70-74	343	14.2	65.3	199	15.9	68.4	144	12.3	61.9
75-79	359	14.8	80.1	192	15.4	83.8	167	14.2	76.1
80-84	284	11.7	91.8	126	10.1	93.9	158	13.5	89.6
85+	198	8.2	100.0	76	6.1	100.0	122	10.4	100.0
All ages	2421	100.0		1248	100.0		1173	100.0	

Included in the statistics are 38.4% multiple primaries in males and 37.0% in females.

Table 5

Age-specific incidence, DCO rate and proportion of all cancers
for period 1998-2013

Age at diagnosis Years	Males n	Females n	Males Age-spec. incid.	Females Age-spec. incid.	Males DCO rate n=347 %	Females DCO rate n=343 %	Males Prop.all cancers n=158258 %	Females Prop.all cancers n=153136 %
0- 4	18	16	1.2	1.1			5.6	6.6
5- 9	10	5	0.7	0.4			5.7	4.0
10-14	9	8	0.6	0.6			5.4	4.7
15-19	12	10	0.8	0.7			3.4	3.4
20-24	12	13	0.7	0.7	8.3	7.7	2.0	2.5
25-29	16	9	0.8	0.4			1.7	0.8
30-34	27	20	1.2	0.9	11.1	5.0	1.8	1.0
35-39	30	37	1.2	1.6	23.3	5.4	1.3	1.0
40-44	52	51	2.0	2.0	11.5	9.8	1.6	0.8
45-49	42	53	1.8	2.3	11.9	17.0	0.8	0.6
50-54	70	55	3.5	2.7	20.0	23.6	0.8	0.5
55-59	66	91	3.6	4.7	22.7	19.8	0.5	0.7
60-64	120	84	6.8	4.5	21.7	20.2	0.6	0.5
65-69	171	130	10.8	7.5	29.2	31.5	0.6	0.7
70-74	199	144	15.5	9.5	28.1	26.4	0.7	0.8
75-79	191	167	23.1	14.1	29.3	37.1	0.9	1.0
80-84	126	158	25.2	16.9	51.6	50.0	0.9	1.0
85+	76	122	22.3	13.7	56.6	46.7	0.8	0.7
All ages	1247	1173			27.8	29.2	0.8	0.8
Incidence								
Raw			4.2	3.8				
WS			2.5	2.0				
ES			3.4	2.6				
BRD-S			4.3	3.2				

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).

Table 6a

Standardized incidence ratio (SIR, with 95% confidence limits), excess absolute risk (EAR) and DCO rate of second primaries for period 1998-2013
MALES

Diagnosis	Observed n	Expected n	SIR	LCL 95%	UCL 95%		EAR	DCO %
C18 Colon	2	1.3	1.6	0.2	5.7		5.8	
C33-C34 Lung	5	1.6	3.2	1.0	7.4	#	26.8	20.0
C43 Malign. melanoma	2	0.6	3.5	0.4	12.8		11.3	
C61 Prostate	7	4.0	1.7	0.7	3.6		23.5	14.3
C82-C85 NHL	6	0.5	11.3	4.2	24.6	#	42.9	
C90 Mult. myeloma	3	0.2	18.2	3.8	53.2	#	22.3	
C91-C96 Leukaemia	6	0.2	28.4	10.4	61.9	#	45.4	66.7
Other primaries	9	1.8	5.0	2.3	9.5	#	56.6	
Not observed	0	3.5	0.0	0.0	1.1		-27.4	
All mult. primaries	40	13.6	2.9	2.1	4.0	#	207.2	15.0

Patients	715
Median age at second malignancy (years)	67.2
Person-years	1274
Mean observation time (years)	1.8
Median observation time (years)	0.6

The occurrence of second malignancy is statistically significant.

Observed second primaries with count 1 are pooled in category "Other primaries".

Table 6b

Standardized incidence ratio (SIR, with 95% confidence limits),
excess absolute risk (EAR) and DCO rate of second primaries
for period 1998-2013
FEMALES

Diagnosis	Observed n	Expected n	SIR	LCL 95%	UCL 95%	EAR	DCO %
C15 Oesophagus	2	0.1	38.1	4.6	137.5 #	16.5	
C33-C34 Lung	3	0.6	4.7	1.0	13.6	19.9	
C50 Breast	3	3.0	1.0	0.2	2.9	-0.1	
C53 Cervix uteri	2	0.2	12.6	1.5	45.5 #	15.6	100.0
C54 Corpus uteri	2	0.5	3.9	0.5	13.9	12.5	
Other primaries	5	1.7	2.9	0.9	6.7	27.5	
Not observed	0	3.0	0.0	0.0	1.2	-25.5	
All mult. primaries	17	9.2	1.9	1.1	3.0 #	66.4	11.8

Patients	651
Median age at second malignancy (years)	68.0
Person-years	1182
Mean observation time (years)	1.8
Median observation time (years)	0.6

The occurrence of second malignancy is statistically significant.

Observed second primaries with count 1 are pooled in category "Other primaries".

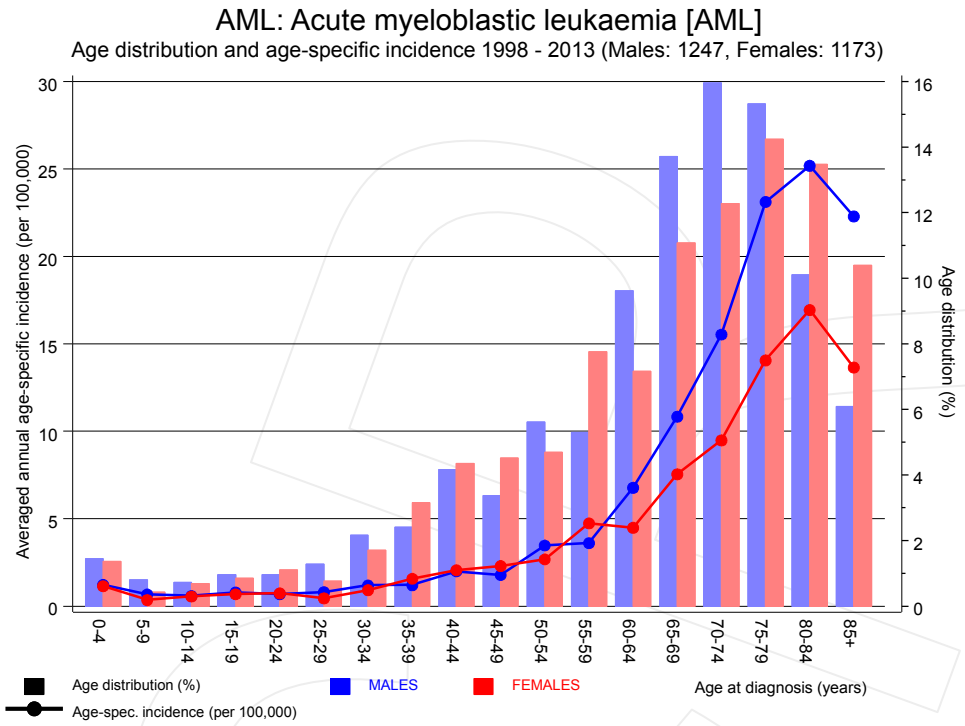


Figure 7. Age distribution and age-specific incidence

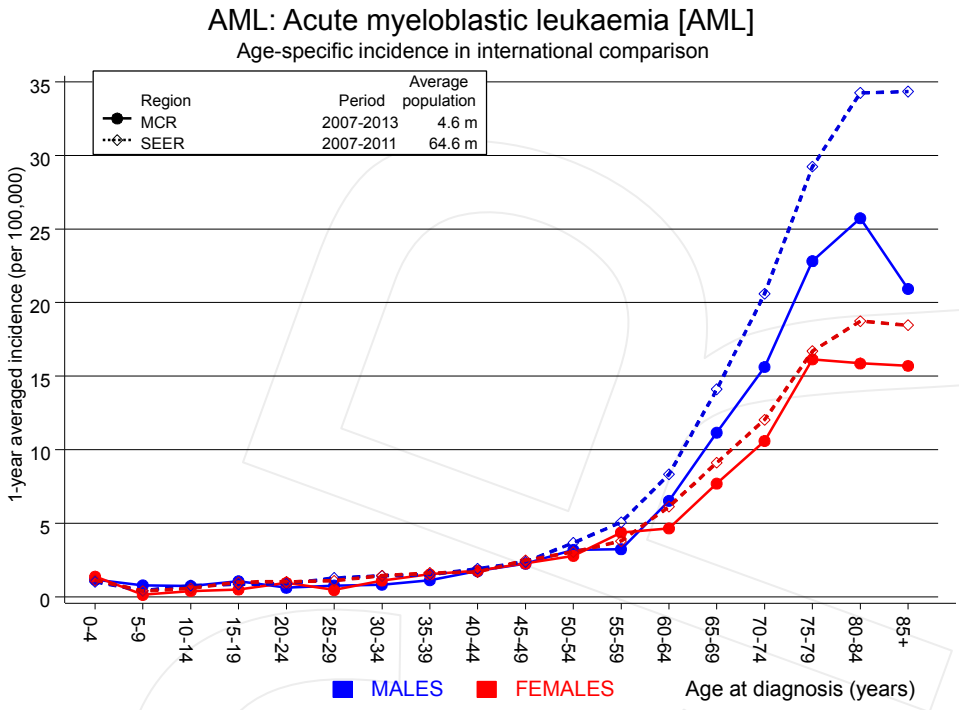


Figure 7a. Age-specific incidence in MCR registry areas compared to SEER (Surveillance, Epidemiology, and End Results, USA).

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.

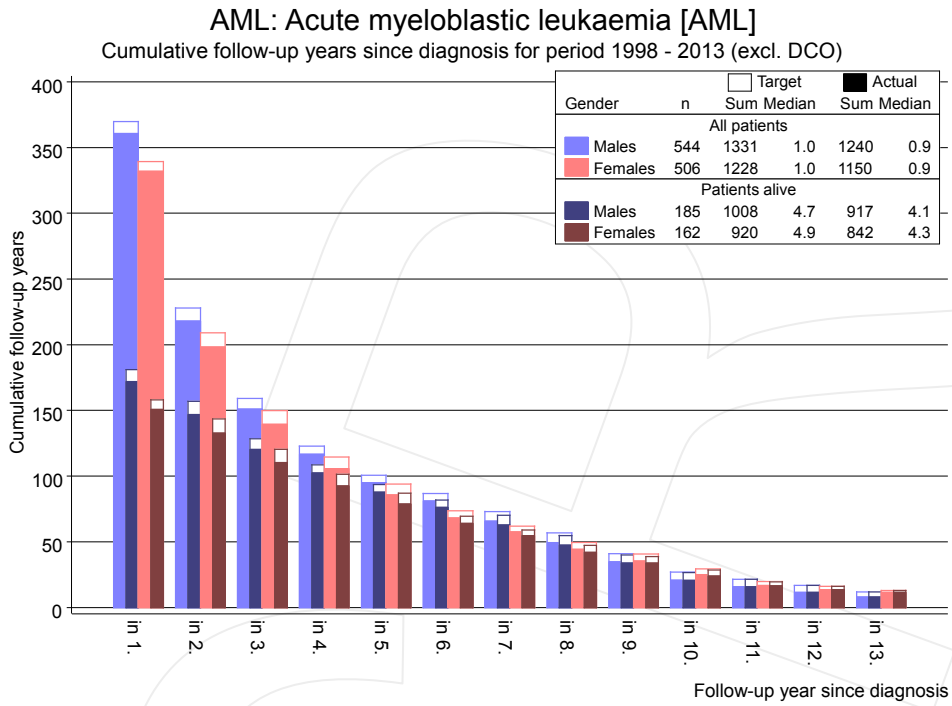
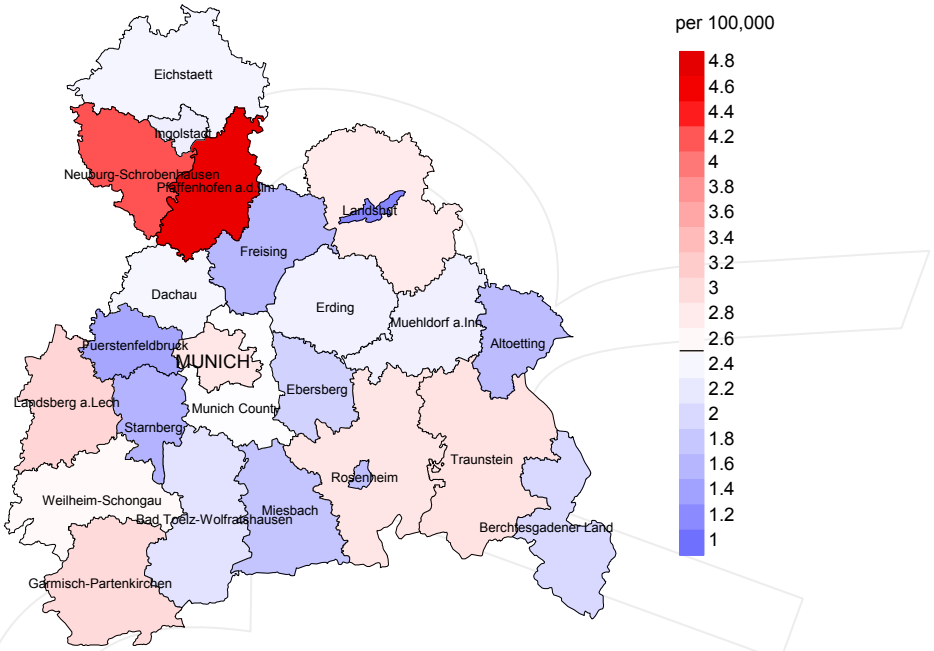


Figure 8. Cumulative follow-up years depending on time since diagnosis

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

Average incidence (world standard population) 2007 - 2013: Males



Average incidence (world standard population) 2007 - 2013: Females

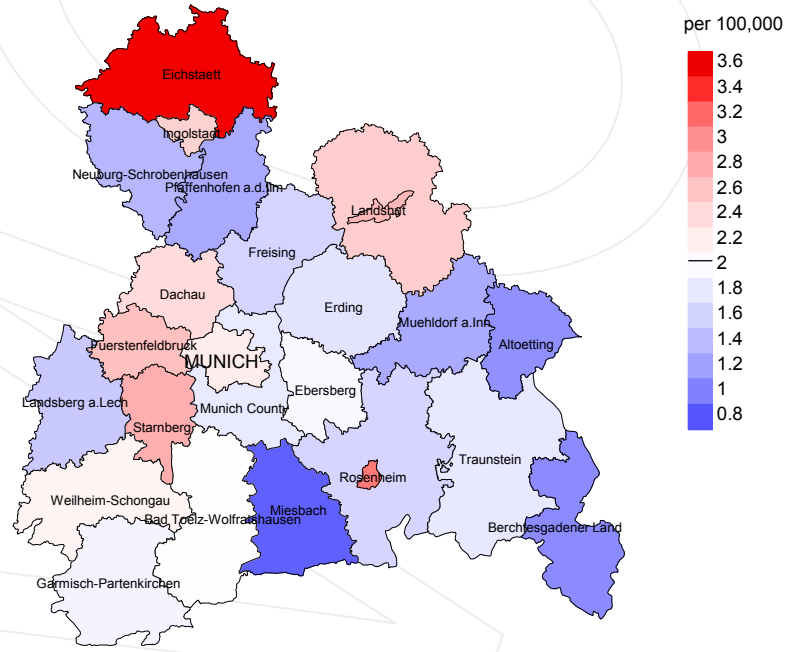
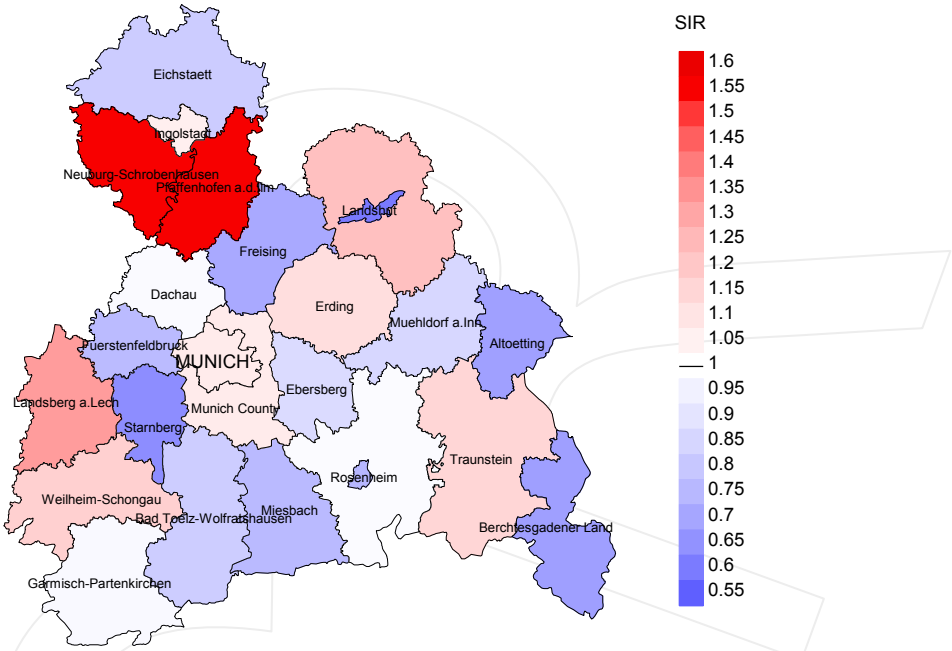


Figure 9a. Map of cancer incidence (world standard population, incl. DCO cases) by county averaged for period 2007 to 2013. According to their individual incidence rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 2.5/100,000 WS N=691, females 2.0/100,000 WS N=656).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 64,928 female residents (averaged) in the period from 2007 to 2013 a total of 15 women were identified with newly diagnosed acute myelobl. leukemia. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 2.0/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.6 and 5.5/100,000.

Standardized incidence ratio (SIR) 2007 - 2013: Males



Standardized incidence ratio (SIR) 2007 - 2013: Females

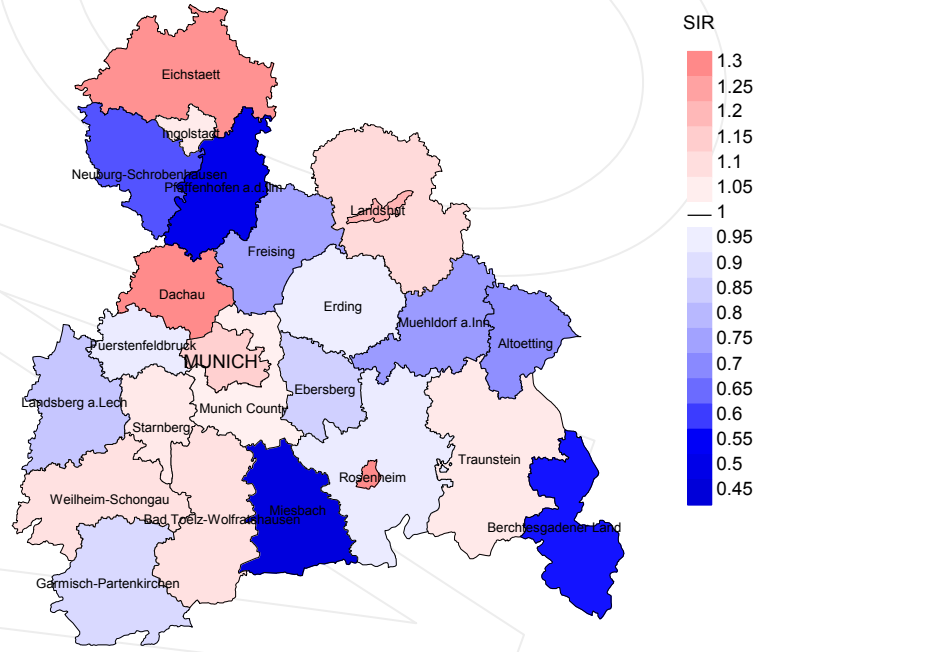


Figure 9b. Map of standardized incidence ratio (SIR, incl. DCO cases) by county averaged for period 2007 to 2013. According to their individual SIR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=691, females N=656).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 64,642 female residents (averaged) in the period from 2007 to 2013 a total of 15 women were identified with newly diagnosed acute myelobl. leukemia. Therefore, the mean standardized incidence ratio (SIR) for this cancer type in this area can be calculated at 0.86. Though, the value of this parameter may vary with an underlying probability of 99% between 0.39 and 1.61, and is therefore not statistically striking.

MORTALITY

Table 10a

Patient cohorts of incident cancers by year of diagnosis, follow-up status, proportion of DCO, deaths among the annual cohorts, and proportion of available death certificates (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 %	Prop. DCO %	Deaths n	Prop. deaths %	Prop. deaths with death certific. %
1998	48	100.0	4.2	41	85.4	97.6
1999	48	97.9	4.2	36	75.0	94.4
2000	80	98.8	23.8	60	75.0	95.0
2001	95	98.9	43.2	83	87.4	100.0
2002	120	96.7	34.2	99	82.5	97.0
2003	163	98.8	35.6	138	84.7	99.3
2004	167	98.8	39.5	137	82.0	99.3
2005	163	96.9	33.7	133	81.6	98.5
2006	190	97.9	38.4	170	89.5	98.2
2007	175	96.0	29.7	144	82.3	97.9
2008	177	86.4	28.2	142	80.2	99.3
2009	192	87.5	20.3	156	81.3	99.4
2010	246	83.7	19.5	190	77.2	97.9
2011	185	87.0	18.4	139	75.1	98.6
2012	232	88.8	23.3	168	72.4	96.4
2013	140	99.3	40.7	105	75.0	94.3
1998-2013	2421	93.1	28.5	1941	80.2	98.0

Table 10b

Annual cohorts of incident cancers and deaths, proportion of death certificates and cases deceased the same year of cancer diagnosis
(incl. DCO)
(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	Prop. deaths with death certific. %	Deaths in same year n	Prop. deaths in same year %
1998	48	47	97.9	21	43.8
1999	48	30	96.7	11	22.9
2000	80	52	98.1	32	40.0
2001	95	86	97.7	49	51.6
2002	120	84	97.6	54	45.0
2003	163	113	98.2	82	50.3
2004	167	102	99.0	79	47.3
2005	163	142	99.3	86	52.8
2006	190	130	98.5	112	58.9
2007	175	138	98.6	85	48.6
2008	177	138	97.8	88	49.7
2009	192	135	97.0	90	46.9
2010	246	177	97.7	119	48.4
2011	185	163	97.5	85	45.9
2012	232	176	98.9	111	47.8
2013	140	152	99.3	92	65.7
1998-2013	2421	1865	98.2	1196	49.4

Table 10c

Annual cohorts of deaths, proportion of cancer-related and non-cancer-related deaths, and cancer recorded on death certificates (incl. DCO)
(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	47	80.9	19.1	95.7
1999	30	80.0	20.0	96.6
2000	52	96.2	3.8	100.0
2001	86	88.4	11.6	98.8
2002	84	94.0	6.0	100.0
2003	113	94.7	5.3	99.1
2004	102	96.1	3.9	99.0
2005	142	95.8	4.2	100.0
2006	130	94.6	5.4	98.4
2007	138	94.2	5.8	98.5
2008	138	92.8	7.2	96.3
2009	135	94.8	5.2	96.9
2010	177	95.5	4.5	98.8
2011	163	91.4	8.6	96.9
2012	176	96.0	4.0	99.4
2013	152	88.2	11.8	99.3
1998-2013	1865	93.2	6.8	98.5

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	24	60.8	61.4	57.0	61.4
1999	17	63.3	62.5	73.3	67.1
2000	33	63.4	63.4	61.4	65.6
2001	44	71.2	72.9	65.7	71.2
2002	43	69.1	67.9	78.9	69.3
2003	64	70.5	69.9	79.2	70.1
2004	50	71.8	72.7	64.7	72.0
2005	70	71.5	71.5	70.9	71.5
2006	76	71.5	71.5	71.0	71.1
2007	69	70.8	71.1	28.3	70.8
2008	73	72.2	72.9	68.1	72.5
2009	67	72.0	72.9	67.6	72.9
2010	86	72.2	72.2	67.5	72.2
2011	78	73.3	73.7	64.9	73.6
2012	88	73.2	73.2	48.8	73.2
2013	86	76.0	75.7	76.6	76.0
1998-2013	968	72.0	72.2	70.1	72.1

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	23	61.9	57.5	83.7	61.5
1999	13	74.3	75.2	63.9	74.7
2000	19	64.6	64.6		64.6
2001	42	68.7	69.6	61.7	69.6
2002	41	73.7	73.6	81.1	73.8
2003	49	71.2	71.2	61.0	71.2
2004	52	74.5	74.5	76.9	74.7
2005	72	71.0	71.4	29.8	71.0
2006	54	77.1	77.2	76.7	77.1
2007	69	70.1	70.6	55.7	70.5
2008	65	73.2	72.9	84.3	72.9
2009	68	74.0	74.1	69.5	74.0
2010	91	77.4	77.7	69.5	77.7
2011	85	72.9	72.9	78.2	73.0
2012	88	72.2	72.6	72.1	72.3
2013	66	75.0	74.0	81.2	74.5
1998-2013	897	72.9	73.1	71.9	73.1

By 2010, life expectancy for a newborn male in Germany is 77.5 years compared with 82.6 years for his female counterpart.

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	19	1.7	0.86	1.5	0.98	1.7	0.89	2.0	0.86
1999	13	1.2	0.41	0.7	0.37	1.0	0.39	1.1	0.39
2000	31	2.7	0.79	1.7	0.59	2.4	0.72	3.0	0.81
2001	40	3.5	0.78	2.0	0.77	3.0	0.81	4.3	0.88
2002	41	2.2	0.65	1.4	0.59	1.9	0.64	2.4	0.67
2003	60	3.2	0.73	1.8	0.73	2.7	0.73	3.5	0.73
2004	48	2.6	0.64	1.4	0.58	2.1	0.63	2.9	0.71
2005	66	3.5	0.80	1.8	0.66	2.7	0.76	3.7	0.82
2006	70	3.7	0.64	1.8	0.57	2.8	0.61	3.8	0.64
2007	67	3.0	0.68	1.6	0.58	2.3	0.64	3.2	0.71
2008	66	3.0	0.73	1.5	0.56	2.2	0.66	3.0	0.74
2009	63	2.8	0.68	1.4	0.58	2.0	0.64	2.8	0.70
2010	82	3.6	0.66	1.8	0.58	2.7	0.63	3.5	0.64
2011	71	3.1	0.77	1.5	0.63	2.2	0.70	3.0	0.80
2012	84	3.7	0.77	1.7	0.70	2.6	0.74	3.5	0.76
2013	76	3.3	0.89	1.4	0.77	2.2	0.86	3.2	0.87
1998-2013	897	3.0	0.72	1.6	0.63	2.3	0.69	3.2	0.74

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	19	1.6	0.73	1.2	0.79	1.4	0.76	1.5	0.78
1999	11	0.9	0.69	0.4	0.42	0.6	0.52	0.8	0.61
2000	19	1.6	0.46	0.8	0.34	1.0	0.38	1.3	0.43
2001	36	3.0	0.82	1.6	0.91	2.2	0.84	2.7	0.83
2002	38	1.9	0.67	0.9	0.58	1.2	0.61	1.6	0.67
2003	47	2.4	0.58	1.1	0.46	1.5	0.52	2.0	0.56
2004	50	2.5	0.55	1.1	0.40	1.6	0.47	2.0	0.51
2005	70	3.5	0.88	1.7	0.73	2.3	0.80	2.8	0.84
2006	53	2.6	0.65	1.0	0.58	1.5	0.63	2.2	0.67
2007	63	2.7	0.82	1.3	0.74	1.8	0.77	2.3	0.80
2008	62	2.7	0.71	1.1	0.60	1.6	0.64	2.1	0.66
2009	65	2.8	0.66	1.2	0.56	1.8	0.62	2.3	0.66
2010	87	3.7	0.71	1.3	0.53	2.0	0.59	2.8	0.66
2011	78	3.3	0.84	1.3	0.58	2.0	0.71	2.6	0.79
2012	85	3.6	0.69	1.6	0.54	2.2	0.59	2.9	0.66
2013	58	2.5	1.05	1.0	1.17	1.5	1.13	1.9	1.05
1998-2013	841	2.7	0.72	1.2	0.60	1.7	0.65	2.2	0.70

Table 13

Age distribution of age at death (cancer-related) for period 1998-2013
(**incl. multiple primaries**)

Age at death Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
0-4	3	0.2	0.2	1	0.1	0.1	2	0.2	0.2
5-9	3	0.2	0.3	2	0.2	0.3	1	0.1	0.4
10-14	6	0.3	0.7	3	0.3	0.7	3	0.4	0.7
15-19	9	0.5	1.2	5	0.6	1.2	4	0.5	1.2
20-24	8	0.5	1.7	5	0.6	1.8	3	0.4	1.5
25-29	16	0.9	2.6	11	1.2	3.0	5	0.6	2.1
30-34	16	0.9	3.5	11	1.2	4.2	5	0.6	2.7
35-39	31	1.8	5.3	16	1.8	6.0	15	1.8	4.5
40-44	48	2.8	8.0	21	2.3	8.3	27	3.2	7.7
45-49	48	2.8	10.8	23	2.6	10.9	25	3.0	10.7
50-54	68	3.9	14.7	38	4.2	15.1	30	3.6	14.3
55-59	101	5.8	20.5	45	5.0	20.1	56	6.7	20.9
60-64	147	8.4	29.0	78	8.7	28.8	69	8.2	29.1
65-69	217	12.5	41.4	124	13.8	42.6	93	11.1	40.2
70-74	286	16.4	57.9	162	18.0	60.6	124	14.7	54.9
75-79	324	18.6	76.5	180	20.0	80.6	144	17.1	72.1
80-84	245	14.1	90.6	106	11.8	92.4	139	16.5	88.6
85+	164	9.4	100.0	68	7.6	100.0	96	11.4	100.0
All ages	1740	100.0		899	100.0		841	100.0	

Included in the statistics are 38.4% multiple primaries in males and 37.0% in females.

Table 14

Age-specific mortality (cancer-related) and proportion of all cancers
for period 1998-2013
(**incl. multiple primaries**)

Age at death Years	Males n	Females n	Males Age-spec. mortal.	MI-index	Females Age-spec. mortal.	MI-index	Males Prop.all cancers %	Females Prop.all cancers %
0- 4	1	2	0.1	0.06	0.1	0.13	3.0	7.7
5- 9	2	1	0.1	0.20	0.1	0.20	5.3	2.5
10-14	3	3	0.2	0.33	0.2	0.38	8.6	9.7
15-19	5	4	0.3	0.42	0.3	0.40	11.1	10.8
20-24	5	3	0.3	0.42	0.2	0.23	5.6	5.9
25-29	11	5	0.5	0.69	0.2	0.56	10.2	4.3
30-34	11	5	0.5	0.41	0.2	0.25	5.9	2.2
35-39	16	15	0.6	0.53	0.6	0.41	4.0	2.9
40-44	21	27	0.8	0.40	1.1	0.53	2.5	2.4
45-49	23	25	1.0	0.55	1.1	0.47	1.3	1.2
50-54	38	30	1.9	0.54	1.5	0.55	1.2	1.0
55-59	45	56	2.5	0.68	2.9	0.62	0.8	1.2
60-64	78	69	4.4	0.65	3.7	0.82	0.9	1.1
65-69	124	93	7.9	0.73	5.4	0.72	1.0	1.1
70-74	162	124	12.6	0.81	8.2	0.86	1.2	1.3
75-79	180	144	21.8	0.94	12.1	0.86	1.4	1.3
80-84	106	139	21.2	0.84	14.9	0.88	1.0	1.2
85+	68	96	19.9	0.89	10.7	0.79	0.8	0.7
All ages	899	841					1.1	1.2
Mortality								
Raw			3.0	0.72	2.7	0.72		
WS			1.6	0.63	1.2	0.60		
ES			2.4	0.69	1.7	0.65		
BRD-S			3.2	0.74	2.2	0.70		
PYLL-70								
per 100,000			20.5		18.4			
ES			19.2		17.1			
AYLL-70			14.3		14.5			

The rates underestimate the prognosis if other synchronous cancers are prognostic unfavorable.

Table 15a

Multiple primaries in deaths in period 1998-2013
MALES

Diagnosis		Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C18	Colon	26	6.6	20	76.9	4	15.4	2	7.7
C19-C20	Rectum	9	2.3	7	77.8	1	11.1	1	11.1
C33-C34	Lung	14	3.6	6	42.9	4	28.6	4	28.6
C43	Malign. melanoma	12	3.1	12	100.0				
C44	Skin others	17	4.3	6	35.3	2	11.8	9	52.9
C61	Prostate	63	16.1	59	93.7	2	3.2	2	3.2
C64	Kidney	9	2.3	9	100.0				
C67	Bladder	22	5.6	19	86.4	1	4.5	2	9.1
C70-C72	CNS cancer	7	1.8	3	42.9	2	28.6	2	28.6
C81	Hodgkin lymphoma	6	1.5	5	83.3			1	16.7
C82-C85	NHL	30	7.7	21	70.0	4	13.3	5	16.7
C90	Mult. myeloma	5	1.3	4	80.0	1	20.0		
C91-C96	Leukaemia	144	36.8			42	29.2	102	70.8
Other primaries		27	6.9	18	66.7	2	7.4	7	25.9
All mult. primaries		391	100.0	189	48.3	65	16.6	137	35.0

Multiple primaries with number of cases 1 to 3 are pooled in category "Other primaries".

ICD-10 C44 (Other malignant neoplasms of skin) is not systematically recorded by MCR and therefore not considered for evaluation as a particular primary but at least as a multiple malignancy.

Table 15b

Multiple primaries in deaths in period 1998-2013
FEMALES

Diagnosis		Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C16	Stomach	4	1.1	4	100.0				
C18	Colon	12	3.4	10	83.3	1	8.3	1	8.3
C19-C20	Rectum	6	1.7	3	50.0	1	16.7	2	33.3
C33-C34	Lung	9	2.5	6	66.7	1	11.1	2	22.2
C43	Malign. melanoma	6	1.7	6	100.0				
C44	Skin others	9	2.5	7	77.8			2	22.2
C50	Breast	101	28.4	94	93.1	4	4.0	3	3.0
C53	Cervix uteri	7	2.0	5	71.4	1	14.3	1	14.3
C54	Corpus uteri	19	5.3	14	73.7	2	10.5	3	15.8
C56	Ovary	7	2.0	6	85.7			1	14.3
C67	Bladder	9	2.5	7	77.8	1	11.1	1	11.1
C70-C72	CNS cancer	4	1.1	3	75.0			1	25.0
C73	Thyroid	10	2.8	10	100.0				
C81	Hodgkin lymphoma	4	1.1	4	100.0				
C82-C85	NHL	17	4.8	17	100.0				
C90	Mult. myeloma	9	2.5	6	66.7	3	33.3		
C91-C96	Leukaemia	105	29.5			32	30.5	73	69.5
Other primaries		18	5.1	8	44.4			10	55.6
All mult. primaries		356	100.0	210	59.0	46	12.9	100	28.1

Multiple primaries with number of cases 1 to 3 are pooled in category "Other primaries".

ICD-10 C44 (Other malignant neoplasms of skin) is not systematically recorded by MCR and therefore not considered for evaluation as a particular primary but at least as a multiple malignancy.

Table 16

Age-specific mortality (cancer-related) and proportion of all cancers
for period 1998-2013
(**Singular primaries only** *)

Age at death Years	Males n	Females n	Males Age-spec. mortal.	MI-index	Females Age-spec. mortal.	MI-index	Males Prop.all cancers %	Females Prop.all cancers %
0- 4	1	2	0.1	0.06	0.1	0.13	3.6	8.3
5- 9	2	1	0.1	0.22	0.1	0.20	5.6	2.7
10-14	3	3	0.2	0.38	0.2	0.38	8.6	10.3
15-19	5	4	0.3	0.50	0.3	0.40	11.9	12.1
20-24	4	2	0.2	0.40	0.1	0.15	4.8	4.3
25-29	9	5	0.4	0.60	0.2	0.63	9.1	4.6
30-34	11	5	0.5	0.44	0.2	0.28	6.1	2.5
35-39	15	13	0.6	0.56	0.5	0.38	4.0	2.8
40-44	17	23	0.6	0.37	0.9	0.52	2.2	2.3
45-49	19	19	0.8	0.56	0.8	0.48	1.2	1.1
50-54	33	22	1.6	0.55	1.1	0.59	1.1	0.8
55-59	40	39	2.2	0.69	2.0	0.56	0.8	1.0
60-64	54	48	3.0	0.61	2.6	0.86	0.7	0.9
65-69	77	68	4.9	0.68	3.9	0.75	0.8	1.0
70-74	101	65	7.9	0.81	4.3	0.72	0.9	0.8
75-79	108	97	13.1	0.91	8.2	0.86	1.1	1.1
80-84	68	105	13.6	0.82	11.3	0.91	0.8	1.2
85+	38	61	11.1	0.86	6.8	0.72	0.6	0.6
All ages	605	582					0.9	1.0
Mortality								
Raw			2.0	0.68	1.9	0.68		
WS			1.1	0.59	0.9	0.55		
ES			1.6	0.65	1.2	0.61		
BRD-S			2.1	0.70	1.5	0.66		
PYLL-70								
per 100,000			17.4		14.9			
ES			16.6		14.1			
AYLL-70			16.1		15.6			

* See corresponding tables with multiple primaries.

Table 17

Age-specific mortality (cancer-related) and proportion of all cancers
for period 1998-2013
(**Single primaries only** *)

Age at death Years	Males n	Females n	Males Age-spec. mortal.	MI-index	Females Age-spec. mortal.	MI-index	Males Prop.all cancers %	Females Prop.all cancers %
0- 4	1	2	0.1	0.06	0.1	0.13	3.7	8.3
5- 9	2	1	0.1	0.22	0.1	0.20	5.7	2.8
10-14	3	3	0.2	0.38	0.2	0.38	8.6	11.1
15-19	5	4	0.3	0.50	0.3	0.40	11.9	14.3
20-24	4	2	0.2	0.44	0.1	0.17	5.1	4.5
25-29	9	5	0.4	0.60	0.2	0.63	9.8	4.9
30-34	11	5	0.5	0.44	0.2	0.29	6.3	2.7
35-39	13	11	0.5	0.50	0.5	0.34	3.6	2.6
40-44	17	22	0.6	0.38	0.9	0.52	2.3	2.4
45-49	17	18	0.7	0.52	0.8	0.46	1.1	1.2
50-54	30	22	1.5	0.56	1.1	0.69	1.2	0.9
55-59	38	37	2.1	0.73	1.9	0.55	0.8	1.0
60-64	51	46	2.9	0.61	2.5	0.92	0.8	1.0
65-69	71	63	4.5	0.65	3.7	0.72	0.8	1.1
70-74	99	63	7.7	0.83	4.1	0.73	1.1	1.0
75-79	103	92	12.5	0.89	7.7	0.84	1.3	1.3
80-84	67	103	13.4	0.82	11.0	0.90	1.0	1.4
85+	37	58	10.9	0.88	6.5	0.70	0.7	0.6
All ages	578	557					1.1	1.1
Mortality								
Raw			1.9	0.68	1.8	0.68		
WS			1.1	0.59	0.8	0.55		
ES			1.5	0.64	1.2	0.61		
BRD-S			2.0	0.69	1.5	0.66		
PYLL-70								
per 100,000			16.6		14.3			
ES			15.9		13.6			
AYLL-70			16.3		15.7			

* See corresponding tables with multiple primaries.

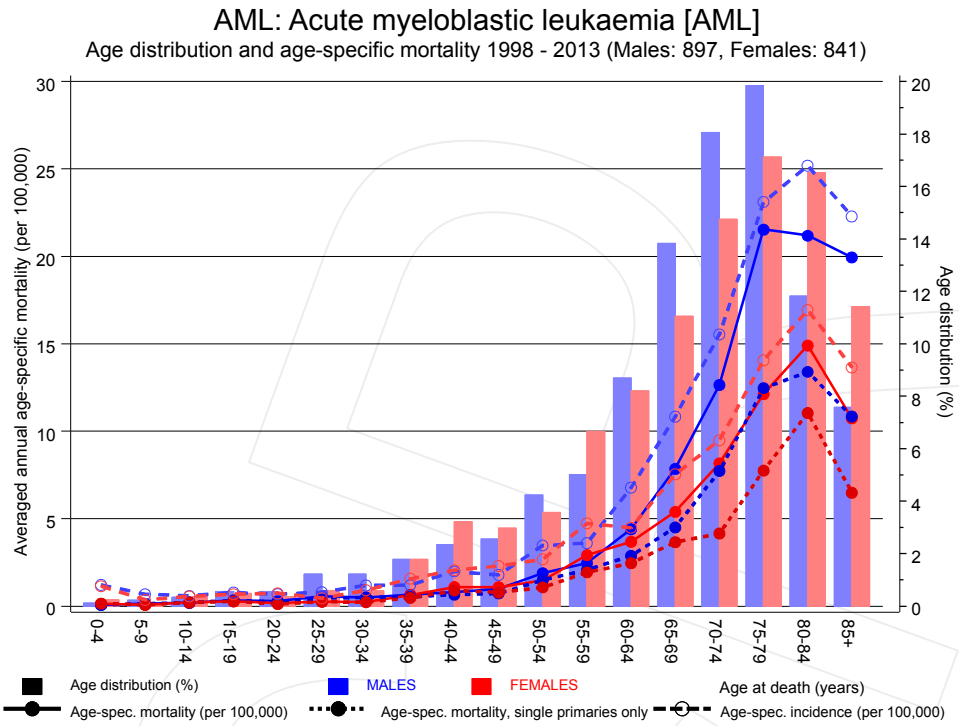
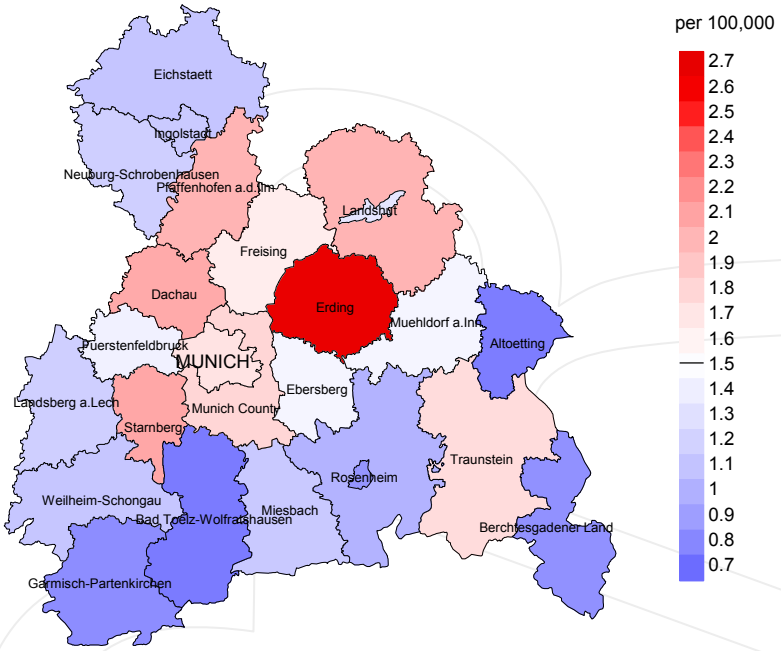


Figure 18. Distribution of age at death (bars) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

The difference between age at diagnosis (Table 3) and age at acute myelobl. leukemia-related death (see Table 10) should be considered.

Average mortality (world standard population) 2007 - 2013: Males



Average mortality (world standard population) 2007 - 2013: Females

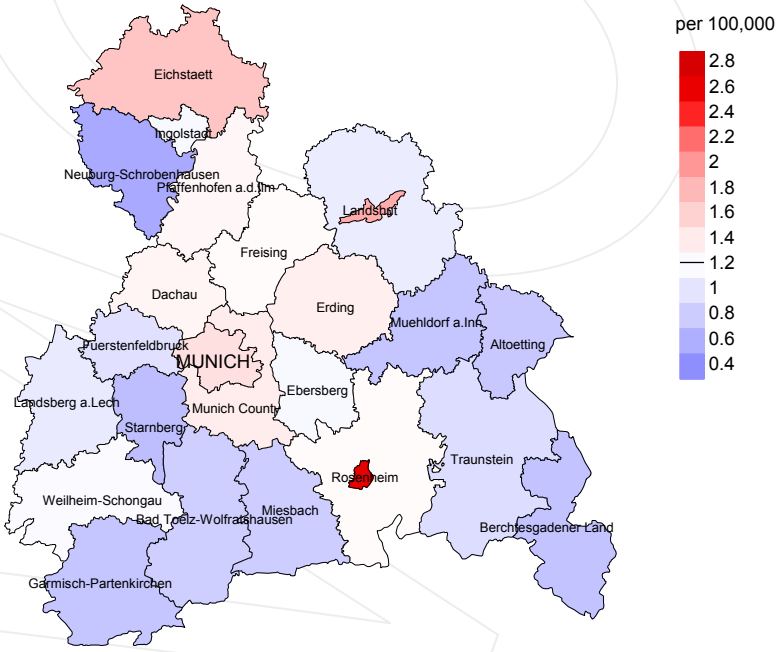
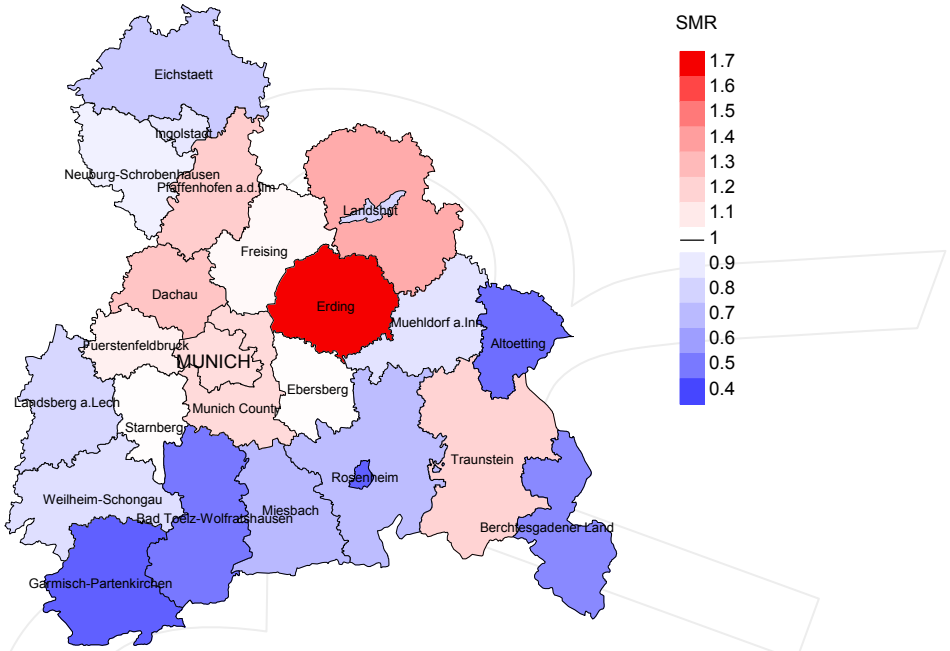


Figure 19a. Map of cancer mortality (world standard population) by county averaged for period 2007 to 2013. According to their individual mortality rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 1.5/100,000 WS N=492, females 1.2/100,000 WS N=484).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 64,928 female residents (averaged) in the period from 2007 to 2013 a total of 12 women died from acute myelobl. leukemia. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 1.2/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.4 and 2.6/100,000.

Standardized mortality ratio (SMR) 2007 - 2013: Males



Standardized mortality ratio (SMR) 2007 - 2013: Females

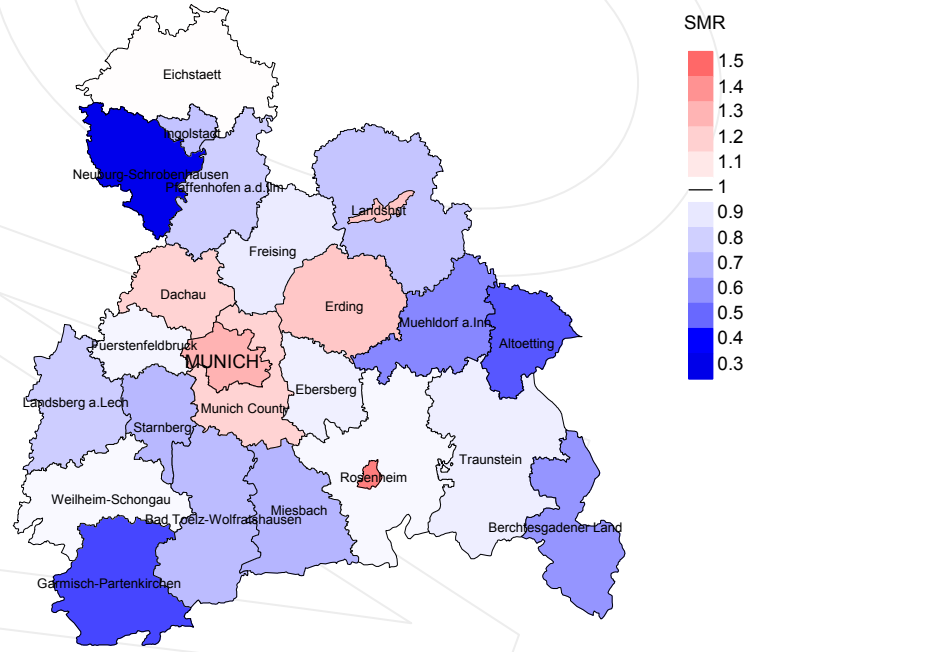


Figure 19b. Map of standardized mortality ratio (SMR, incl. DCO cases) by county averaged for period 2007 to 2013. According to their individual SMR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=492, females N=484).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 64,642 female residents (averaged) in the period from 2007 to 2013 a total of 12 women died from acute myelobl. leukemia. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 0.94. Though, the value of this parameter may vary with an underlying probability of 99% between 0.39 and 1.89, and is therefore not statistically striking.

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. 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

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