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

CML: Chronic myel. leukaemia

Year of diagnosis	1998-2013
Patients	828
Diseases	828
Creation date	05/19/2015
Export date	12/30/2014
Population	4.64 m

http://www.tumorregister-muenchen.de/en/facts/base/base_C921_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
C92.1	Chronic myeloid leukaemia [CML], BCR/ABL-positive

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	17	1	5.9	5.9	76.5	100.0	
1999	34	5	14.7	11.8	70.6	100.0	
2000	37	10	27.0	8.1	62.2	100.0	
2001	39	17	43.6	20.5	71.8	97.4	
2002	57	21	36.8	19.3	68.4	96.5	#
2003	70	25	35.7	14.3	67.1	98.6	
2004	58	19	32.8	20.7	60.3	98.3	
2005	50	18	36.0	26.0	64.0	98.0	
2006	54	22	40.7	37.0	70.4	92.6	
2007	62	19	30.6	33.9	51.6	85.5	# ##
2008	69	25	36.2	30.4	55.1	76.8	
2009	56	14	25.0	26.8	44.6	67.9	
2010	64	16	25.0	31.3	46.9	68.8	
2011	55	15	27.3	29.1	52.7	70.9	
2012	61	16	26.2	31.1	37.7	62.3	
2013	45	20	44.4	26.7	48.9	100.0	###
1998-2013	828	263	31.8	24.9	57.7	86.5	

\# 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	17	7	10	41.2
1999	34	18	16	52.9
2000	37	19	18	51.4
2001	39	18	21	46.2
2002	57	25	32	43.9
2003	70	33	37	47.1
2004	58	35	23	60.3
2005	50	21	29	42.0
2006	54	31	23	57.4
2007	62	35	27	56.5
2008	69	40	29	58.0
2009	56	29	27	51.8
2010	64	31	33	48.4
2011	55	34	21	61.8
2012	61	39	22	63.9
2013	45	29	16	64.4
1998-2013	828	444	384	53.6

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	7	10	0.6	0.9	0.4	0.5	0.6	0.6	0.7	0.7
1999	18	16	1.6	1.3	1.1	0.7	1.4	1.0	1.7	1.2
2000	19	18	1.7	1.5	1.2	0.7	1.5	1.0	1.8	1.2
2001	18	21	1.6	1.7	1.2	0.8	1.4	1.1	1.6	1.5
2002	25	32	1.3	1.6	0.8	0.8	1.1	1.1	1.5	1.4
2003	33	37	1.8	1.9	1.1	0.8	1.5	1.2	1.9	1.6
2004	35	23	1.9	1.2	1.1	0.6	1.5	0.8	1.9	1.0
2005	21	29	1.1	1.5	0.6	0.7	0.9	1.0	1.1	1.2
2006	31	23	1.6	1.1	0.9	0.5	1.3	0.7	1.7	0.9
2007	35	27	1.6	1.2	0.9	0.5	1.3	0.7	1.6	0.9
2008	40	29	1.8	1.2	0.9	0.5	1.3	0.7	1.8	1.0
2009	29	27	1.3	1.2	0.8	0.6	1.1	0.8	1.3	0.9
2010	31	33	1.4	1.4	0.8	0.6	1.1	0.9	1.4	1.1
2011	34	21	1.5	0.9	0.9	0.4	1.2	0.6	1.4	0.7
2012	39	22	1.7	0.9	1.0	0.5	1.3	0.6	1.7	0.7
2013	29	16	1.3	0.7	0.6	0.3	0.9	0.5	1.2	0.5
1998-2013	444	384	1.5	1.2	0.9	0.6	1.2	0.8	1.5	1.0

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	17	59.9	22.9	27.0	87.4	27.0	36.6	69.2	81.5	86.5
1999	34	61.6	18.3	1.5	88.5	35.3	54.9	68.8	72.5	79.7
2000	37	63.5	19.9	16.5	97.6	34.7	49.8	66.7	78.1	88.0
2001	39	61.5	21.4	9.8	96.4	26.8	43.5	64.0	79.1	85.9
2002	57	65.5	16.3	27.4	96.1	38.8	55.4	69.4	76.1	83.8
2003	70	64.7	18.8	21.0	98.9	38.0	50.8	69.2	80.8	85.3
2004	58	65.1	15.6	19.4	93.3	44.6	55.2	66.0	76.2	84.7
2005	50	67.0	16.3	25.2	92.9	42.6	56.7	69.9	78.9	84.4
2006	54	68.9	15.9	28.0	92.5	42.0	61.0	72.7	79.4	86.5
2007	62	65.4	18.9	18.0	94.2	37.6	47.2	69.7	81.9	86.0
2008	69	69.9	17.2	11.3	98.1	41.7	62.5	74.3	81.5	87.2
2009	56	65.5	16.3	28.3	100	43.0	53.6	65.8	76.8	86.3
2010	64	67.8	17.1	15.7	91.4	47.6	55.3	72.8	79.6	87.8
2011	55	65.8	16.3	16.6	91.4	43.6	54.3	67.9	79.5	84.1
2012	61	65.3	21.1	5.5	98.7	35.7	55.9	72.2	80.1	87.0
2013	45	67.4	17.7	21.7	92.6	39.2	52.8	72.2	81.6	88.0
1998-2013	828	65.8	17.9	1.5	100	39.6	54.3	69.6	79.4	85.9

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	7	60.3	21.0	32.4	86.5	32.4	36.6	69.2	76.4	86.5
1999	18	56.3	20.5	1.5	80.3	30.7	43.4	60.2	69.8	78.3
2000	19	59.6	19.0	16.5	97.6	34.7	48.2	60.5	72.4	79.6
2001	18	51.6	22.8	9.8	96.4	23.3	37.7	51.5	64.0	81.6
2002	25	61.5	16.2	32.7	83.8	38.0	49.7	62.4	75.5	78.7
2003	33	60.1	19.5	21.0	91.1	35.2	41.9	63.1	77.3	83.7
2004	35	63.7	16.1	19.4	90.1	41.8	51.0	65.7	75.5	84.6
2005	21	64.1	17.3	30.9	91.0	42.5	46.4	69.5	77.7	81.5
2006	31	68.8	14.9	37.3	92.5	48.2	59.5	70.7	77.2	86.5
2007	35	62.7	19.6	18.0	91.8	33.9	44.6	68.0	79.2	84.0
2008	40	68.4	17.2	11.3	98.1	44.7	61.5	72.6	80.5	84.0
2009	29	64.0	17.1	28.3	92.2	38.2	53.1	65.9	76.3	86.3
2010	31	66.8	17.6	15.7	89.2	49.2	59.9	72.9	78.2	80.0
2011	34	63.6	17.3	16.6	91.4	42.8	53.3	67.6	75.2	83.5
2012	39	64.0	21.3	10.4	94.0	30.4	51.3	70.6	80.8	84.8
2013	29	68.0	16.6	21.7	92.6	39.2	63.2	72.2	76.5	86.1
1998-2013	444	63.5	18.3	1.5	98.1	37.8	51.1	67.7	77.5	84.1

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	10	59.5	25.3	27.0	87.4	27.0	33.6	65.8	81.7	86.5
1999	16	67.6	13.8	35.3	88.5	46.3	58.6	70.8	77.6	79.8
2000	18	67.6	20.5	27.4	93.9	32.2	54.5	73.4	86.2	89.0
2001	21	69.9	16.4	26.8	88.7	53.6	62.4	73.9	82.1	85.9
2002	32	68.7	15.9	27.4	96.1	53.0	58.0	70.4	80.6	88.4
2003	37	68.8	17.4	25.2	98.9	42.2	55.0	74.2	82.3	87.8
2004	23	67.2	14.8	28.0	93.3	49.3	57.1	68.7	80.2	84.7
2005	29	69.0	15.4	25.2	92.9	46.6	62.9	70.3	79.5	85.6
2006	23	69.1	17.5	28.0	92.2	40.9	67.0	74.0	80.2	84.1
2007	27	68.9	17.6	35.1	94.2	43.6	53.2	69.8	84.6	86.4
2008	29	71.9	17.3	26.6	94.9	41.4	62.6	74.9	84.5	88.6
2009	27	67.0	15.6	38.7	100	46.3	56.5	65.8	79.8	89.0
2010	33	68.7	16.7	29.0	91.4	47.6	53.9	72.7	83.6	89.3
2011	21	69.2	14.4	41.3	87.1	50.5	56.2	73.3	81.4	84.1
2012	22	67.5	21.1	5.5	98.7	44.8	55.9	73.1	79.6	90.1
2013	16	66.5	20.1	25.3	92.4	38.9	52.0	70.4	83.0	89.1
1998-2013	384	68.4	17.0	5.5	100	43.7	55.7	72.3	82.0	87.7

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	1	0.1	0.1	1	0.2	0.2			0.0
5-9	2	0.2	0.4	1	0.2	0.5	1	0.3	0.3
10-14	2	0.2	0.6	2	0.5	0.9			0.3
15-19	7	0.8	1.4	7	1.6	2.5			0.3
20-24	4	0.5	1.9	4	0.9	3.4			0.3
25-29	19	2.3	4.2	7	1.6	5.0	12	3.1	3.4
30-34	17	2.1	6.3	13	2.9	7.9	4	1.0	4.4
35-39	32	3.9	10.1	22	5.0	12.8	10	2.6	7.0
40-44	41	5.0	15.1	28	6.3	19.1	13	3.4	10.4
45-49	41	5.0	20.0	22	5.0	24.1	19	4.9	15.4
50-54	54	6.5	26.6	25	5.6	29.7	29	7.6	22.9
55-59	52	6.3	32.9	26	5.9	35.6	26	6.8	29.7
60-64	62	7.5	40.3	37	8.3	43.9	25	6.5	36.2
65-69	89	10.7	51.1	54	12.2	56.1	35	9.1	45.3
70-74	107	12.9	64.0	52	11.7	67.8	55	14.3	59.6
75-79	104	12.6	76.6	65	14.6	82.4	39	10.2	69.8
80-84	100	12.1	88.6	45	10.1	92.6	55	14.3	84.1
85+	94	11.4	100.0	33	7.4	100.0	61	15.9	100.0
All ages	828	100.0		444	100.0		384	100.0	

Included in the statistics are 30.0% multiple primaries in males and 32.0% 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=132 %	Females DCO rate n=131 %	Males Prop.all cancers n=158258 %	Females Prop.all cancers n=153136 %
0- 4	1		0.1	0.0			0.3	
5- 9	1	1	0.1	0.1			0.6	0.8
10-14	2		0.1	0.0			1.2	
15-19	7		0.5	0.0			2.0	
20-24	4		0.2	0.0			0.7	
25-29	7	12	0.3	0.6			0.7	1.1
30-34	13	4	0.6	0.2			0.9	0.2
35-39	22	10	0.9	0.4			1.0	0.3
40-44	28	13	1.1	0.5	7.1		0.9	0.2
45-49	22	19	0.9	0.8	4.5		0.4	0.2
50-54	25	29	1.2	1.4	8.0	3.4	0.3	0.3
55-59	26	26	1.4	1.4	11.5	15.4	0.2	0.2
60-64	37	25	2.1	1.3	16.2	16.0	0.2	0.1
65-69	54	35	3.4	2.0	24.1	22.9	0.2	0.2
70-74	52	55	4.1	3.6	42.3	34.5	0.2	0.3
75-79	65	39	7.9	3.3	43.1	48.7	0.3	0.2
80-84	45	55	9.0	5.9	66.7	54.5	0.3	0.3
85+	33	61	9.7	6.8	75.8	75.4	0.3	0.4
All ages	444	384			29.7	34.1	0.3	0.3
Incidence								
Raw			1.5	1.2				
WS			0.9	0.6				
ES			1.2	0.8				
BRD-S			1.5	1.0				

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).

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	3	1.1	2.7	0.6	7.8		19.2	
C25	Pancreas	2	0.4	4.9	0.6	17.8		16.3	
C33-C34	Lung	2	1.4	1.5	0.2	5.2		6.4	
C43	Malign. melanoma	3	0.5	6.0	1.2	17.4	#	25.5	
C61	Prostate	9	3.4	2.6	1.2	5.0	#	56.8	
C67	Bladder	2	0.5	4.1	0.5	14.8		15.5	
C82-C85	NHL	3	0.5	6.4	1.3	18.7	#	25.9	
C91-C96	Leukaemia	3	0.2	15.9	3.3	46.6	#	28.7	66.7
Other primaries		6	1.6	3.8	1.4	8.2	#	45.1	
Not observed		0	2.3	0.0	0.0	1.6		-23.4	
All mult. primaries		33	11.9	2.8	1.9	3.9	#	215.9	6.1

Patients	250
Median age at second malignancy (years)	71.1
Person-years	979
Mean observation time (years)	3.9
Median observation time (years)	3.1

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 %
C18 Colon	2	0.8	2.6	0.3	9.4	13.8	
C50 Breast	8	2.5	3.2	1.4	6.2 #	61.6	
C54 Corpus uteri	3	0.5	6.6	1.4	19.4 #	28.7	
C82-C85 NHL	2	0.3	6.6	0.8	24.0	19.1	50.0
C91-C96 Leukaemia	3	0.1	23.9	4.9	69.8 #	32.4	33.3
Other primaries	6	1.4	4.3	1.6	9.3 #	51.7	16.7
Not observed	0	2.6	0.0	0.0	1.4	-29.0	
All mult. primaries	24	8.2	2.9	1.9	4.4 #	178.3	12.5

Patients	223
Median age at second malignancy (years)	69.7
Person-years	888
Mean observation time (years)	4.0
Median observation time (years)	3.2

The occurrence of second malignancy is statistically significant.

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

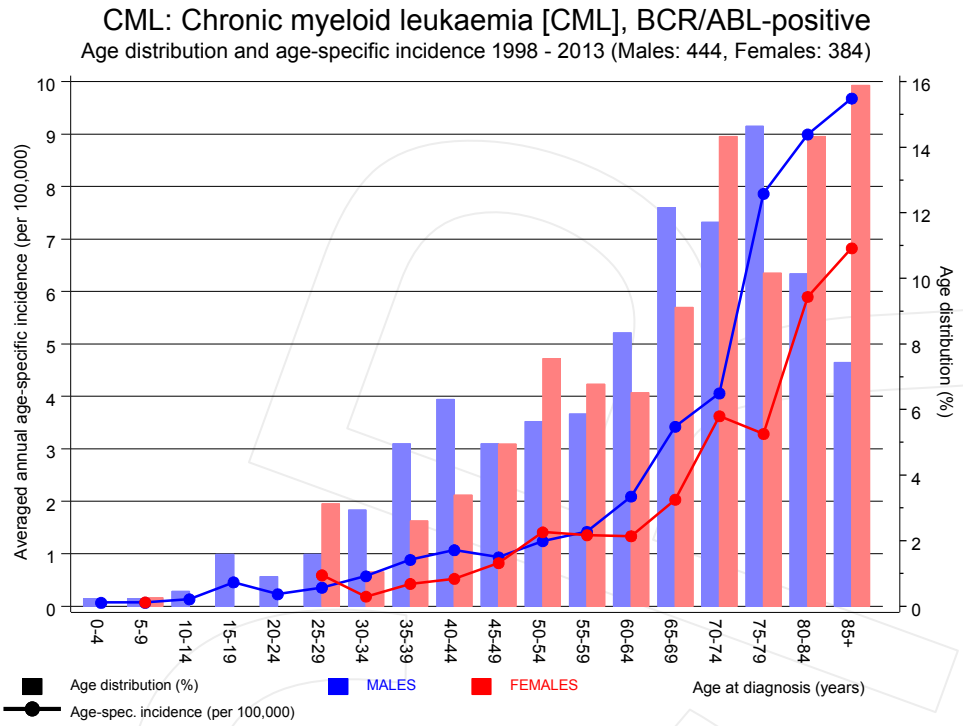


Figure 7. Age distribution and age-specific incidence

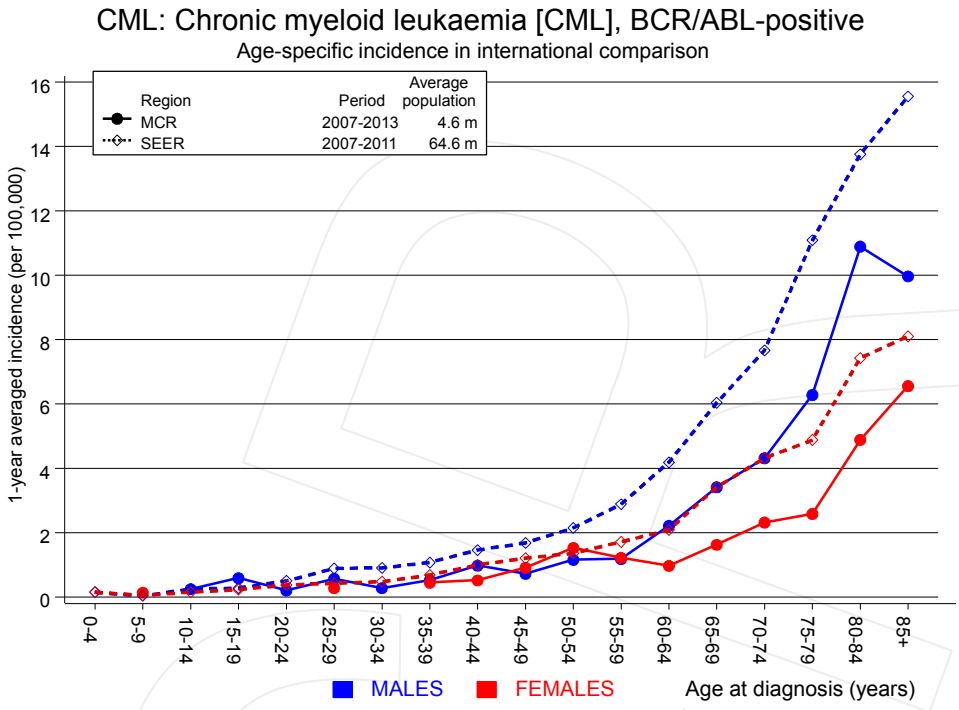


Figure 7a. Age-specific incidence in MCR registry areas compared to SEER (Surveillance, Epidemiology, and End Results, USA).

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.

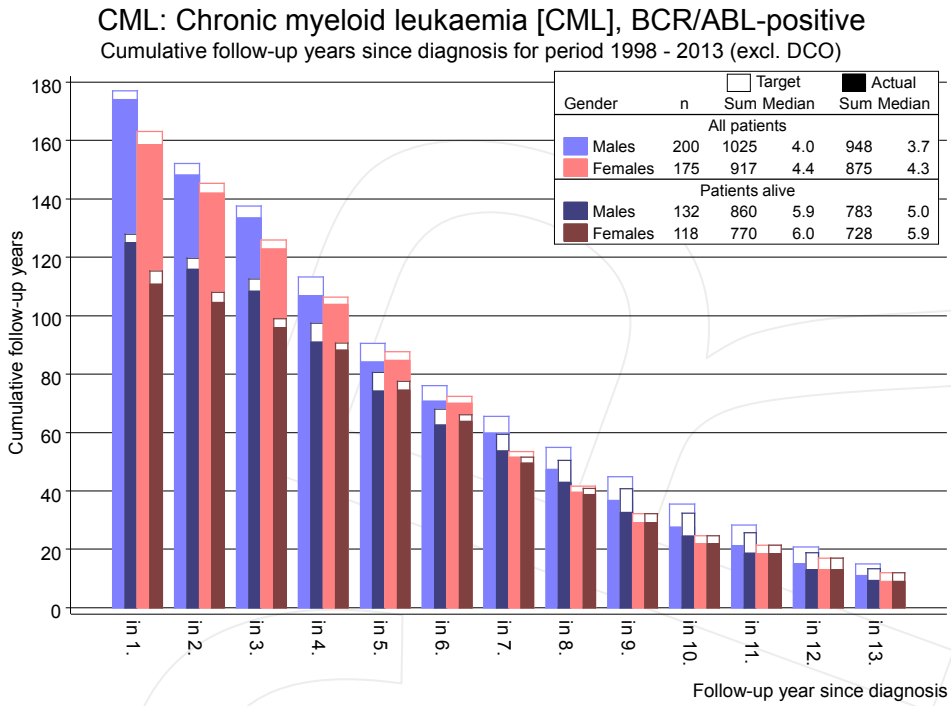
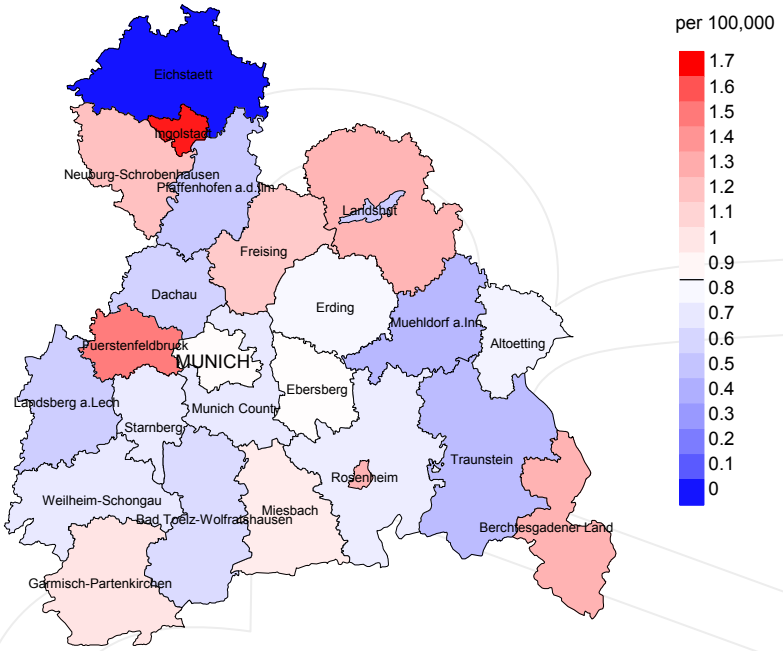


Figure 8. Cumulative follow-up years depending on time since diagnosis

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

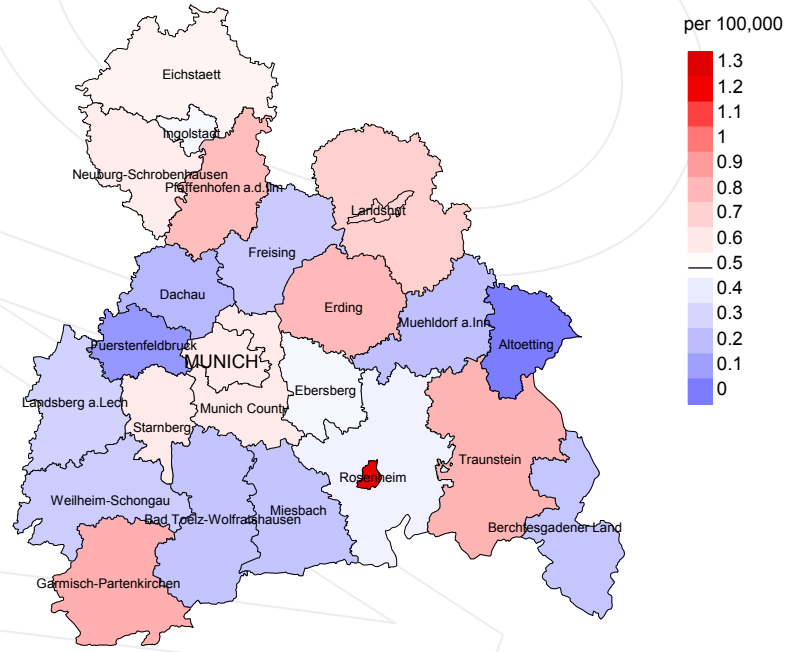
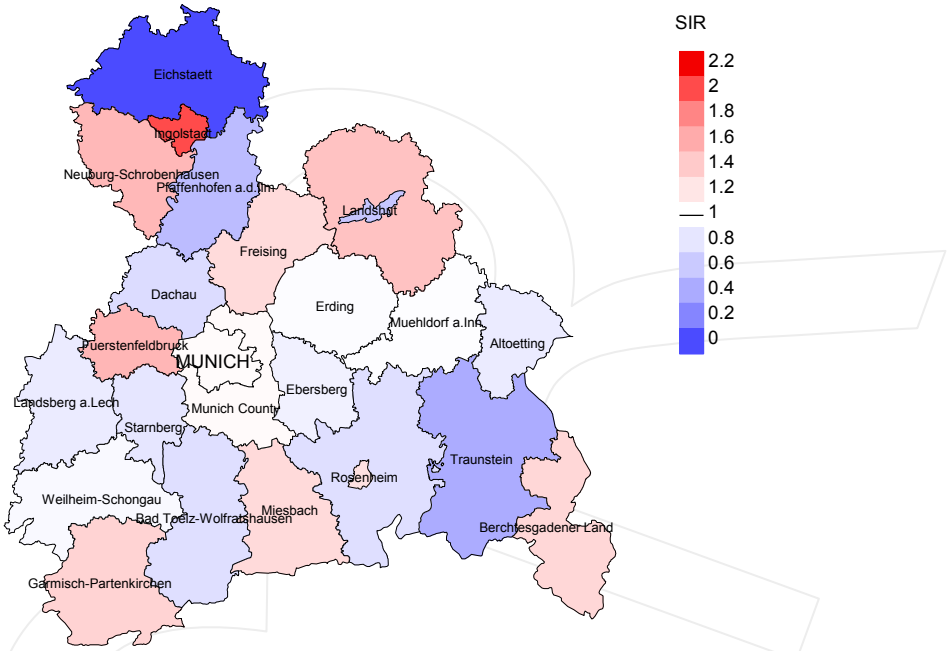


Figure 9a. Map of cancer incidence (world standard population, incl. DCO cases) by county averaged for period 2007 to 2013. According to their individual incidence rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 0.8/100,000 WS N=237, females 0.5/100,000 WS N=175).

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 4 women were identified with newly diagnosed chronic myel. leukaemia. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 0.5/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.1 and 1.6/100,000.

Standardized incidence ratio (SIR) 2007 - 2013: Males



Standardized incidence ratio (SIR) 2007 - 2013: Females

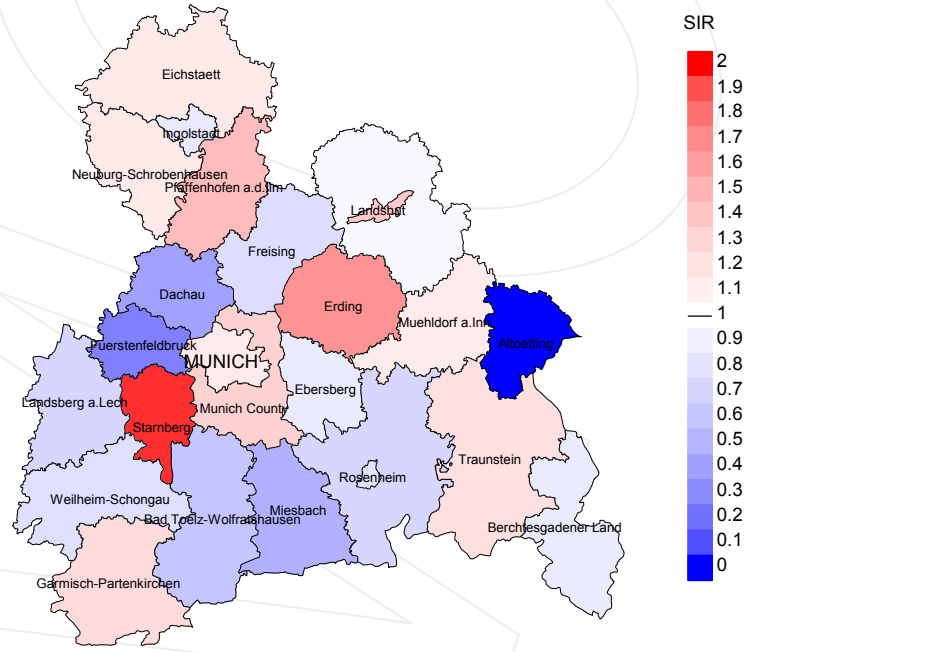


Figure 9b. Map of standardized incidence ratio (SIR, incl. DCO cases) by county averaged for period 2007 to 2013. According to their individual SIR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=237, females N=175).

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 4 women were identified with newly diagnosed chronic myel. leukaemia. 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 0.15 and 2.72, 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	17	100.0	5.9	13	76.5	92.3
1999	34	100.0	14.7	24	70.6	95.8
2000	37	100.0	27.0	23	62.2	100.0
2001	39	97.4	43.6	28	71.8	96.4
2002	57	96.5	36.8	39	68.4	100.0
2003	70	98.6	35.7	47	67.1	100.0
2004	58	98.3	32.8	35	60.3	97.1
2005	50	98.0	36.0	32	64.0	100.0
2006	54	92.6	40.7	38	70.4	100.0
2007	62	85.5	30.6	32	51.6	100.0
2008	69	76.8	36.2	38	55.1	97.4
2009	56	67.9	25.0	25	44.6	100.0
2010	64	68.8	25.0	30	46.9	100.0
2011	55	70.9	27.3	29	52.7	93.1
2012	61	62.3	26.2	23	37.7	100.0
2013	45	100.0	44.4	22	48.9	100.0
1998-2013	828	86.5	31.8	478	57.7	98.5

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	17	14	100.0	2	11.8
1999	34	14	92.9	1	2.9
2000	37	27	92.6	10	27.0
2001	39	30	96.7	13	33.3
2002	57	37	100.0	24	42.1
2003	70	30	100.0	25	35.7
2004	58	37	97.3	20	34.5
2005	50	36	100.0	20	40.0
2006	54	35	100.0	28	51.9
2007	62	28	100.0	22	35.5
2008	69	28	96.4	27	39.1
2009	56	26	100.0	18	32.1
2010	64	22	100.0	17	26.6
2011	55	37	100.0	20	36.4
2012	61	31	100.0	18	29.5
2013	45	42	97.6	21	46.7
1998-2013	828	474	98.5	286	34.5

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	14	57.1	42.9	85.7
1999	14	57.1	42.9	92.3
2000	27	77.8	22.2	100.0
2001	30	70.0	30.0	93.1
2002	37	83.8	16.2	97.3
2003	30	76.7	23.3	100.0
2004	37	81.1	18.9	94.4
2005	36	88.9	11.1	100.0
2006	35	94.3	5.7	100.0
2007	28	85.7	14.3	100.0
2008	28	57.1	42.9	88.9
2009	26	69.2	30.8	96.2
2010	22	77.3	22.7	90.9
2011	37	78.4	21.6	91.9
2012	31	61.3	38.7	93.5
2013	42	64.3	35.7	90.2
1998-2013	474	75.3	24.7	95.1

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	8	61.3	62.9	57.1	66.4
1999	11	69.4	52.7	80.5	62.8
2000	15	74.7	70.2	76.7	77.7
2001	6	61.4	60.3	64.0	61.4
2002	13	65.2	66.4	53.2	66.4
2003	14	74.5	72.4	76.5	74.5
2004	20	75.4	75.8	68.6	75.4
2005	22	72.9	72.3	74.7	72.9
2006	22	75.1	75.0	75.9	75.1
2007	12	76.1	72.8	85.5	76.1
2008	15	72.0	74.8	59.0	72.5
2009	15	77.2	78.3	71.2	78.3
2010	16	78.9	78.4	80.0	78.9
2011	22	76.1	75.2	83.8	76.1
2012	23	75.8	73.4	81.4	75.4
2013	27	75.0	76.6	73.7	75.8
1998-2013	261	74.2	73.2	75.3	74.4

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	6	43.3	43.3	52.3	46.9
1999	3	81.1	79.1	81.2	79.1
2000	12	83.4	78.2	86.9	83.4
2001	24	80.3	77.0	87.3	79.3
2002	24	73.4	72.3	82.8	73.4
2003	16	80.6	77.7	83.3	80.6
2004	17	74.6	74.8	74.6	74.2
2005	14	78.7	73.6	87.5	78.7
2006	13	73.4	74.7	67.0	73.4
2007	16	80.4	77.5	86.4	80.4
2008	13	81.3	72.8	85.7	79.9
2009	11	84.9	86.3	67.7	84.9
2010	6	85.6	85.6		85.6
2011	15	79.5	79.2	87.0	80.0
2012	8	78.5	81.9	77.4	78.5
2013	15	85.4	81.6	87.6	85.4
1998-2013	213	79.3	77.1	84.3	79.3

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	4	0.4	0.57	0.2	0.51	0.3	0.52	0.4	0.53
1999	6	0.5	0.33	0.4	0.34	0.5	0.33	0.5	0.33
2000	13	1.1	0.68	0.7	0.60	1.0	0.68	1.4	0.78
2001	5	0.4	0.28	0.2	0.21	0.3	0.25	0.4	0.26
2002	10	0.5	0.40	0.3	0.41	0.4	0.39	0.6	0.36
2003	13	0.7	0.39	0.4	0.36	0.6	0.39	0.8	0.41
2004	16	0.9	0.46	0.4	0.39	0.7	0.46	1.0	0.51
2005	20	1.1	0.95	0.5	0.89	0.8	0.92	1.1	0.98
2006	21	1.1	0.68	0.5	0.64	0.9	0.66	1.2	0.72
2007	11	0.5	0.31	0.2	0.26	0.4	0.30	0.5	0.31
2008	10	0.4	0.25	0.2	0.23	0.3	0.26	0.5	0.25
2009	10	0.4	0.34	0.2	0.23	0.3	0.30	0.5	0.39
2010	11	0.5	0.35	0.2	0.26	0.3	0.31	0.5	0.35
2011	18	0.8	0.53	0.3	0.39	0.6	0.47	0.8	0.54
2012	15	0.7	0.38	0.3	0.28	0.4	0.33	0.6	0.38
2013	17	0.7	0.59	0.3	0.50	0.5	0.57	0.7	0.62
1998-2013	200	0.7	0.45	0.3	0.38	0.5	0.43	0.7	0.47

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	4	0.3	0.40	0.2	0.50	0.3	0.50	0.3	0.43
1999	2	0.2	0.13	0.0	0.06	0.1	0.08	0.2	0.13
2000	8	0.7	0.44	0.2	0.29	0.4	0.36	0.5	0.44
2001	16	1.3	0.76	0.5	0.64	0.8	0.70	1.1	0.78
2002	21	1.1	0.66	0.5	0.58	0.7	0.60	0.9	0.66
2003	10	0.5	0.27	0.2	0.18	0.3	0.22	0.4	0.27
2004	14	0.7	0.61	0.3	0.49	0.5	0.55	0.6	0.61
2005	12	0.6	0.41	0.2	0.36	0.4	0.38	0.5	0.38
2006	12	0.6	0.52	0.2	0.48	0.4	0.53	0.5	0.53
2007	13	0.6	0.48	0.2	0.40	0.3	0.43	0.4	0.46
2008	6	0.3	0.21	0.1	0.22	0.2	0.23	0.2	0.24
2009	8	0.3	0.30	0.1	0.12	0.1	0.16	0.2	0.21
2010	6	0.3	0.18	0.1	0.10	0.1	0.13	0.2	0.15
2011	11	0.5	0.52	0.2	0.43	0.3	0.46	0.4	0.53
2012	4	0.2	0.18	0.0	0.07	0.1	0.11	0.1	0.17
2013	10	0.4	0.63	0.1	0.36	0.2	0.45	0.3	0.51
1998-2013	157	0.5	0.41	0.2	0.32	0.3	0.35	0.4	0.40

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.%
25-29	2	0.6	0.6	2	1.0	1.0			0.0
30-34	4	1.1	1.7	2	1.0	2.0	2	1.3	1.3
35-39	7	2.0	3.6	5	2.5	4.5	2	1.3	2.5
40-44	9	2.5	6.2	9	4.5	9.0			2.5
45-49	13	3.6	9.8	7	3.5	12.5	6	3.8	6.4
50-54	7	2.0	11.8	5	2.5	15.0	2	1.3	7.6
55-59	27	7.6	19.3	15	7.5	22.5	12	7.6	15.3
60-64	21	5.9	25.2	13	6.5	29.0	8	5.1	20.4
65-69	37	10.4	35.6	24	12.0	41.0	13	8.3	28.7
70-74	48	13.4	49.0	25	12.5	53.5	23	14.6	43.3
75-79	76	21.3	70.3	44	22.0	75.5	32	20.4	63.7
80-84	53	14.8	85.2	26	13.0	88.5	27	17.2	80.9
85+	53	14.8	100.0	23	11.5	100.0	30	19.1	100.0
All ages	357	100.0		200	100.0		157	100.0	

Included in the statistics are 30.0% multiple primaries in males and 32.0% 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			0.0		0.0			
5- 9			0.0		0.0			
10-14			0.0		0.0			
15-19			0.0		0.0			
20-24			0.0		0.0			
25-29	2		0.1	0.29	0.0		1.9	
30-34	2	2	0.1	0.15	0.1	0.50	1.1	0.9
35-39	5	2	0.2	0.23	0.1	0.20	1.3	0.4
40-44	9		0.3	0.32	0.0		1.1	
45-49	7	6	0.3	0.32	0.3	0.32	0.4	0.3
50-54	5	2	0.2	0.20	0.1	0.07	0.2	0.1
55-59	15	12	0.8	0.58	0.6	0.46	0.3	0.3
60-64	13	8	0.7	0.35	0.4	0.32	0.1	0.1
65-69	24	13	1.5	0.44	0.8	0.37	0.2	0.2
70-74	25	23	2.0	0.48	1.5	0.42	0.2	0.2
75-79	44	32	5.3	0.68	2.7	0.82	0.3	0.3
80-84	26	27	5.2	0.58	2.9	0.49	0.2	0.2
85+	23	30	6.7	0.70	3.4	0.49	0.3	0.2
All ages	200	157					0.2	0.2
Mortality								
Raw			0.7	0.45	0.5	0.41		
WS			0.3	0.38	0.2	0.32		
ES			0.5	0.43	0.3	0.35		
BRD-S			0.7	0.47	0.4	0.40		
PYLL-70								
per 100,000			4.3		2.1			
ES			3.7		1.8			
AYLL-70			14.1		12.3			

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 ←%
C09-C10 Oropharynx	1	1.6	1	100.0				
C15 Oesophagus	1	1.6					1	100.0
C16 Stomach	3	4.8	2	66.7			1	33.3
C18 Colon	4	6.3	1	25.0			3	75.0
C19-C20 Rectum	3	4.8	2	66.7	1	33.3		
C22 Liver	4	6.3	2	50.0			2	50.0
C25 Pancreas	3	4.8	1	33.3			2	66.7
C33-C34 Lung	6	9.5	2	33.3	1	16.7	3	50.0
C43 Malign. melanoma	1	1.6					1	100.0
C44 Skin others	3	4.8					3	100.0
C61 Prostate	10	15.9	9	90.0			1	10.0
C62 Testis	1	1.6	1	100.0				
C64 Kidney	3	4.8	3	100.0				
C65 Renal pelvis	1	1.6	1	100.0				
C67 Bladder	5	7.9	5	100.0				
C76-C79 CUP	2	3.2	1	50.0	1	50.0		
C82-C85 NHL	3	4.8	1	33.3			2	66.7
C90 Mult. myeloma	1	1.6	1	100.0				
C91-C96 Leukaemia	8	12.7			2	25.0	6	75.0
All mult. primaries	63	100.0	33	52.4	5	7.9	25	39.7

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 ←%
C09-C10 Oropharynx	1	2.1					1	100.0
C12-C13 Hypopharynx	1	2.1	1	100.0				
C19-C20 Rectum	3	6.4	2	66.7	1	33.3		
C23-C24 Bile	1	2.1	1	100.0				
C25 Pancreas	2	4.3			2	100.0		
C33-C34 Lung	1	2.1			1	100.0		
C43 Malign. melanoma	2	4.3	2	100.0				
C44 Skin others	3	6.4	1	33.3			2	66.7
C50 Breast	10	21.3	6	60.0	1	10.0	3	30.0
C51 Vulva	2	4.3	1	50.0			1	50.0
C52 Vagina	2	4.3	1	50.0			1	50.0
C53 Cervix uteri	3	6.4	2	66.7	1	33.3		
C54 Corpus uteri	5	10.6	4	80.0			1	20.0
C67 Bladder	1	2.1	1	100.0				
C70-C72 CNS cancer	1	2.1	1	100.0				
C74-C80 Cancer others	1	2.1					1	100.0
C82-C85 NHL	1	2.1					1	100.0
C91-C96 Leukaemia	6	12.8			1	16.7	5	83.3
C96 Systemic	1	2.1					1	100.0
All mult. primaries	47	100.0	23	48.9	7	14.9	17	36.2

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			0.0		0.0			
5- 9			0.0		0.0			
10-14			0.0		0.0			
15-19			0.0		0.0			
20-24			0.0		0.0			
25-29	2		0.1	0.29	0.0		2.0	
30-34	2	2	0.1	0.15	0.1	0.67	1.1	1.0
35-39	4	2	0.2	0.20	0.1	0.20	1.1	0.4
40-44	9		0.3	0.33	0.0		1.1	
45-49	7	6	0.3	0.32	0.3	0.33	0.4	0.3
50-54	3	1	0.1	0.14	0.0	0.04	0.1	0.0
55-59	11	9	0.6	0.50	0.5	0.43	0.2	0.2
60-64	12	8	0.7	0.41	0.4	0.38	0.2	0.2
65-69	21	11	1.3	0.51	0.6	0.37	0.2	0.2
70-74	23	19	1.8	0.56	1.3	0.42	0.2	0.2
75-79	35	27	4.2	0.66	2.3	0.93	0.4	0.3
80-84	19	19	3.8	0.68	2.0	0.50	0.2	0.2
85+	19	26	5.6	0.73	2.9	0.57	0.3	0.2
All ages	167	130					0.3	0.2
Mortality								
Raw			0.6	0.46	0.4	0.42		
WS			0.3	0.38	0.2	0.32		
ES			0.4	0.43	0.2	0.36		
BRD-S			0.6	0.47	0.3	0.40		
PYLL-70								
per 100,000			3.8		1.9			
ES			3.3		1.6			
AYLL-70			14.5		12.6			

* 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			0.0		0.0			
5- 9			0.0		0.0			
10-14			0.0		0.0			
15-19			0.0		0.0			
20-24			0.0		0.0			
25-29	2		0.1	0.29	0.0		2.2	
30-34	2	2	0.1	0.17	0.1	0.67	1.1	1.1
35-39	4	2	0.2	0.20	0.1	0.20	1.1	0.5
40-44	8		0.3	0.31	0.0		1.1	
45-49	7	6	0.3	0.32	0.3	0.43	0.5	0.4
50-54	3		0.1	0.14	0.0		0.1	
55-59	11	8	0.6	0.52	0.4	0.50	0.2	0.2
60-64	11	7	0.6	0.52	0.4	0.35	0.2	0.2
65-69	18	10	1.1	0.51	0.6	0.34	0.2	0.2
70-74	18	19	1.4	0.49	1.3	0.44	0.2	0.3
75-79	32	23	3.9	0.68	1.9	0.85	0.4	0.3
80-84	16	17	3.2	0.59	1.8	0.52	0.3	0.2
85+	18	24	5.3	0.69	2.7	0.53	0.3	0.3
All ages	150	118					0.3	0.2
Mortality								
Raw			0.5	0.45	0.4	0.41		
WS			0.3	0.37	0.1	0.32		
ES			0.4	0.42	0.2	0.36		
BRD-S			0.5	0.46	0.3	0.40		
PYLL-70								
per 100,000			3.7		1.7			
ES			3.1		1.4			
AYLL-70			14.9		12.9			

* See corresponding tables with multiple primaries.

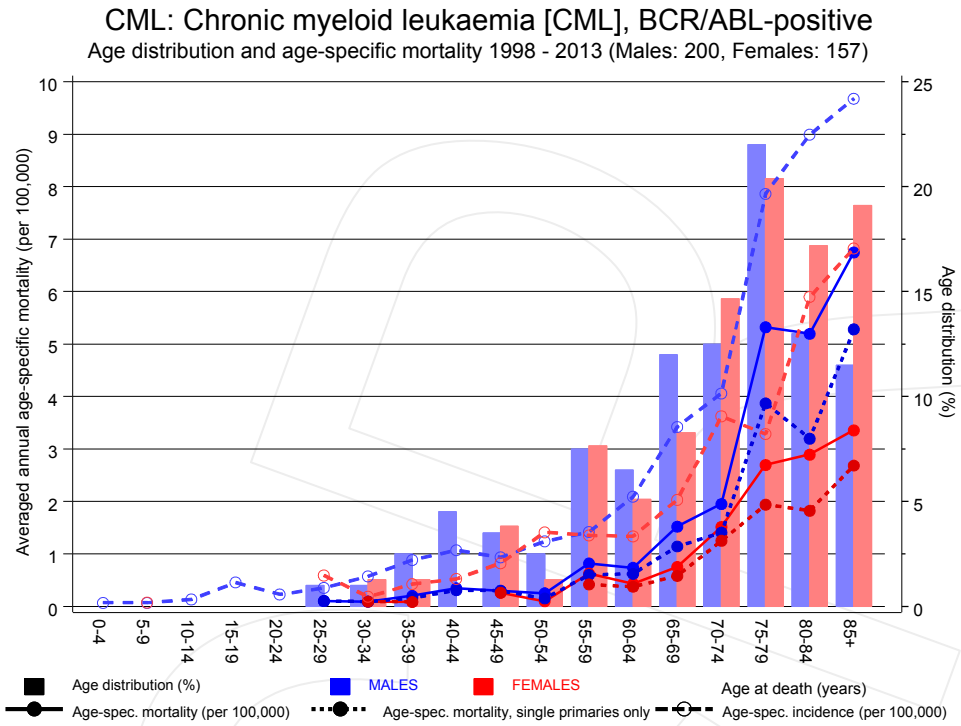
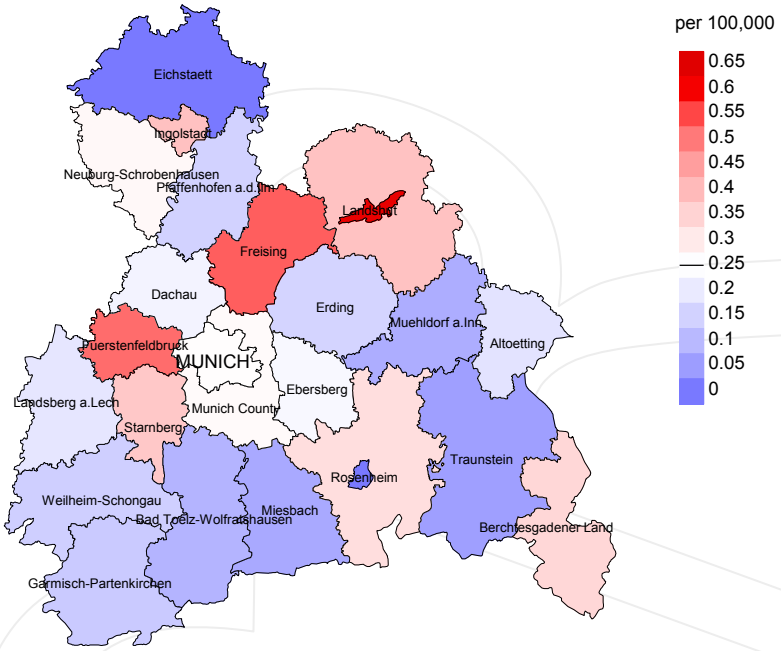


Figure 18. Distribution of age at death (bars) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

The difference between age at diagnosis (Table 3) and age at chronic myel. leukaemia-related death (see Table 10) should be considered.

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



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

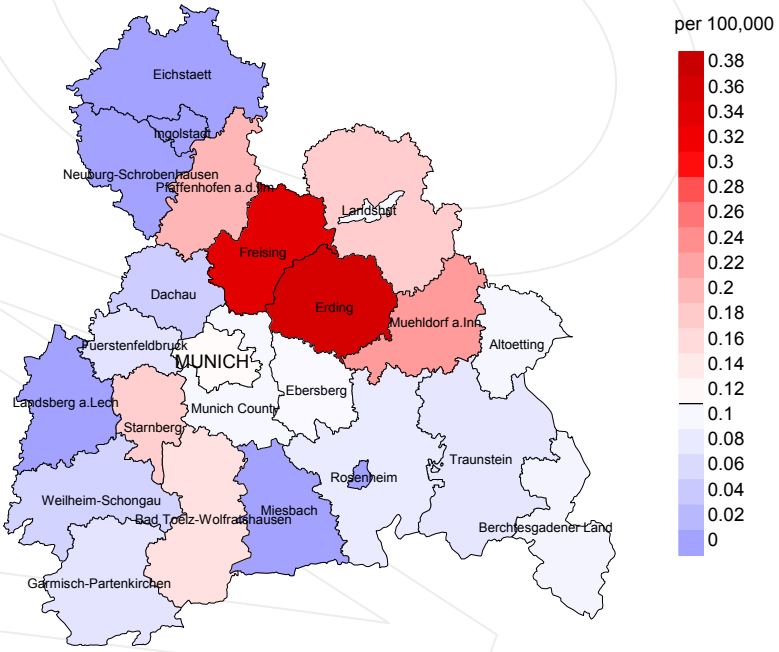
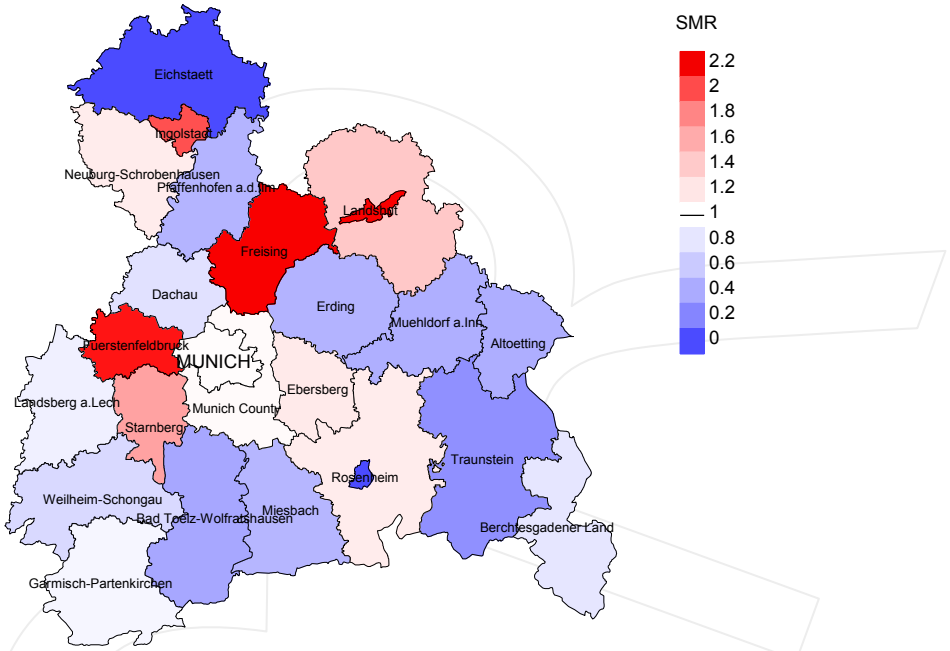


Figure 19a. Map of cancer mortality (world standard population) by county averaged for period 2007 to 2013. According to their individual mortality rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 0.3/100,000 WS N=91, females 0.1/100,000 WS N=58).

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 1 women died from chronic myel. leukaemia. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 0.1/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.0 and 0.8/100,000.

Standardized mortality ratio (SMR) 2007 - 2013: Males



Standardized mortality ratio (SMR) 2007 - 2013: Females

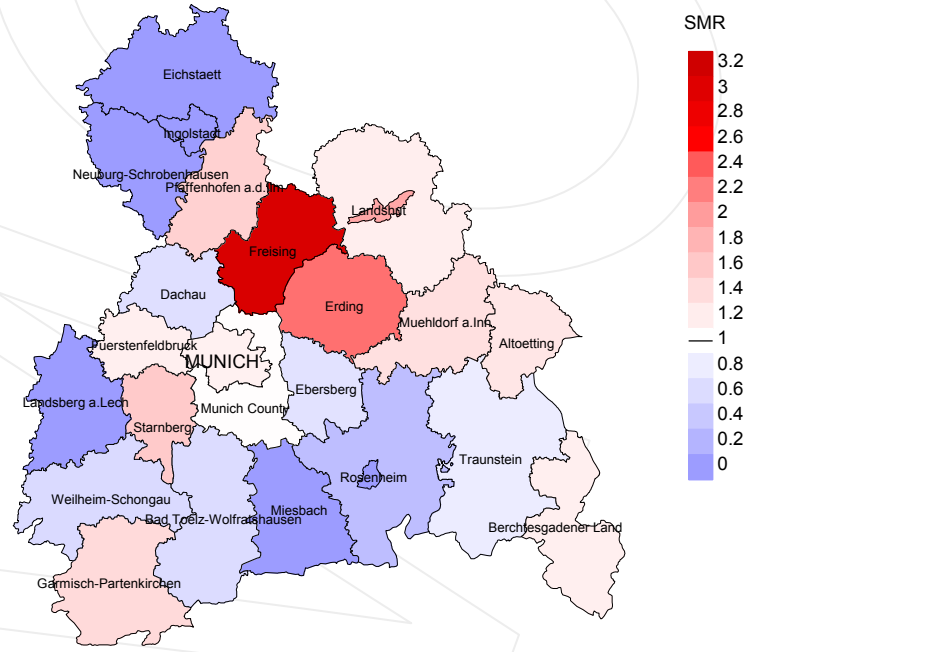


Figure 19b. Map of standardized mortality ratio (SMR, incl. DCO cases) by county averaged for period 2007 to 2013. According to their individual SMR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=91, females N=58).

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 1 women died from chronic myel. leukaemia. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 0.68. Though, the value of this parameter may vary with an underlying probability of 99% between 0.00 and 5.04, 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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