Munich Cancer Registry

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BNET: Pulm. neuroend. tumor

Incidence and Mortality

Year of diagnosis	1998-2014
Patients	700
Diseases	702
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/bhBNETE-BNET-Pulm.-neuroend.-tumor-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.

Topography codes (ICD-O-3 2000) used for specifying cancer site

Code	Description
C33	Malignant neoplasm of trachea
C34.-	Malignant neoplasm of bronchus and lung
C34.0	Main bronchus
C34.1	Upper lobe, bronchus or lung
C34.2	Middle lobe, bronchus or lung
C34.3	Lower lobe, bronchus or lung
C34.8	Overlapping lesion of bronchus and lung
C34.9	Bronchus or lung, unspecified

... if additionally existing any of ...

Morphology codes (ICD-O-3 2011) used for specifying cancer site

Code	Description
8013/3	Large cell neuroendocrine carcinoma
8240/3	Carcinoid tumor, NOS
8249/3	Atypical carcinoid tumor

Reference:

Travis WD, Brambilla E, Muller-Hermelink HK, Harris CC, editors. WHO Classification of Tumours. Pathology and Genetics of Tumours of the Lung, Pleura, Thymus and Heart. IARC, Lyon (2004).

INCIDENCE

Table 1

All patients with invasive cancer 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	12	16.7	50.0	83.3
1999	23	26.1	60.9	95.7
2000	21	33.3	52.4	100.0
2001	21	23.8	61.9	95.2
2002	25	28.0	40.0	96.0 #
2003	22	13.6	50.0	100.0
2004	29	17.2	37.9	93.1
2005	29	27.6	31.0	89.7
2006	29	13.8	31.0	86.2
2007	41	17.1	51.2	80.5 #
2008	61	34.4	45.9	72.1
2009	57	29.8	36.8	63.2
2010	50	32.0	46.0	64.0
2011	77	23.4	42.9	72.7
2012	68	27.9	45.6	77.9
2013	73	35.6	37.0	100.0
2014	64	26.6	12.5	92.2 ##
1998-2014	702	26.8	40.7	83.0

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 with invasive cancer
by year of diagnosis and gender

Year of diagnosis	All n	Males n	Females n	Prop. males %
1998	12	6	6	50.0
1999	23	11	12	47.8
2000	21	8	13	38.1
2001	21	14	7	66.7
2002	25	12	13	48.0
2003	22	9	13	40.9
2004	29	14	15	48.3
2005	29	17	12	58.6
2006	29	17	12	58.6
2007	41	24	17	58.5
2008	61	30	31	49.2
2009	57	26	31	45.6
2010	50	29	21	58.0
2011	77	40	37	51.9
2012	68	36	32	52.9
2013	73	39	34	53.4
2014	64	29	35	45.3
1998-2014	702	361	341	51.4

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	6	6	0.5	0.5	0.4	0.3	0.5	0.4	0.6	0.5
1999	11	12	1.0	1.0	0.6	0.5	0.9	0.7	1.1	0.9
2000	8	13	0.7	1.1	0.4	0.8	0.6	1.0	0.7	1.1
2001	14	7	1.2	0.6	0.9	0.4	1.1	0.5	1.3	0.5
2002	12	13	0.6	0.7	0.4	0.4	0.6	0.6	0.7	0.6
2003	9	13	0.5	0.7	0.3	0.4	0.4	0.5	0.5	0.6
2004	14	15	0.7	0.8	0.4	0.5	0.6	0.6	0.7	0.7
2005	17	12	0.9	0.6	0.7	0.4	0.9	0.5	0.9	0.6
2006	17	12	0.9	0.6	0.5	0.4	0.7	0.5	0.8	0.6
2007	24	17	1.1	0.7	0.7	0.4	0.9	0.6	1.1	0.7
2008	30	31	1.3	1.3	0.8	0.8	1.1	1.1	1.2	1.2
2009	26	31	1.2	1.3	0.7	0.8	1.0	1.1	1.1	1.2
2010	29	21	1.3	0.9	0.7	0.5	1.0	0.7	1.2	0.8
2011	40	37	1.8	1.6	1.0	0.9	1.4	1.2	1.7	1.4
2012	36	32	1.6	1.4	0.9	0.7	1.3	1.0	1.5	1.1
2013	39	34	1.7	1.4	0.9	0.7	1.3	1.0	1.6	1.2
2014	29	35	1.3	1.5	0.7	0.8	1.0	1.1	1.2	1.3
1998-2014	361	341	1.1	1.0	0.7	0.6	0.9	0.8	1.1	0.9

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	12	60.1	8.0	49.4	70.9	50.9	51.9	60.3	68.3	69.6
1999	23	64.3	13.8	32.9	81.2	45.5	54.6	67.2	76.7	78.9
2000	21	59.2	15.8	15.8	80.5	44.9	52.5	63.2	71.3	74.9
2001	21	56.2	17.1	17.0	79.8	31.3	41.3	62.2	69.3	70.7
2002	25	63.1	13.4	31.0	82.8	48.2	53.9	67.4	74.9	75.6
2003	22	63.6	10.6	43.9	84.4	49.4	60.1	63.2	72.7	79.5
2004	29	58.8	15.2	27.6	84.1	37.8	47.8	62.6	69.2	78.6
2005	29	51.7	16.3	18.1	82.9	21.7	41.6	52.3	64.9	71.2
2006	29	58.9	16.1	27.5	82.6	30.4	47.3	60.4	70.6	79.5
2007	41	60.0	17.0	18.7	84.2	39.9	47.5	65.8	72.1	79.2
2008	61	63.9	12.2	29.4	88.0	43.3	59.6	65.0	71.7	77.0
2009	57	62.5	12.0	25.9	89.3	48.1	55.8	62.7	70.1	76.7
2010	50	63.1	12.5	15.6	82.0	46.0	56.0	65.7	71.0	75.4
2011	77	63.4	12.2	33.0	85.6	46.7	55.5	63.0	71.5	80.5
2012	68	66.4	10.5	39.5	89.1	53.8	58.7	68.5	73.9	78.5
2013	73	65.7	10.2	36.7	85.4	51.4	58.8	67.5	73.2	78.2
2014	64	64.7	11.4	30.5	84.1	51.4	57.2	66.6	73.2	78.4
1998-2014	702	62.6	13.2	15.6	89.3	44.5	55.4	64.4	71.8	78.2

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	6	57.4	10.0	49.4	70.9	49.4	50.9	51.9	69.6	70.9
1999	11	63.4	13.2	38.6	80.4	45.5	53.5	66.2	74.2	78.9
2000	8	58.7	9.9	44.9	77.6	44.9	53.2	56.6	64.0	77.6
2001	14	56.5	19.5	17.0	79.8	29.8	38.4	65.1	70.7	72.6
2002	12	66.7	10.6	49.8	82.8	53.5	57.3	69.4	74.9	75.4
2003	9	63.5	12.3	49.4	84.4	49.4	53.2	62.7	65.5	84.4
2004	14	58.3	14.6	37.8	80.5	38.9	41.0	60.6	69.2	78.6
2005	17	50.9	15.8	18.1	71.2	21.7	42.5	52.3	64.9	70.1
2006	17	62.3	15.9	28.7	82.6	35.1	56.4	66.5	72.3	80.9
2007	24	61.3	15.9	18.7	80.7	44.2	53.7	65.9	72.1	79.2
2008	30	65.2	12.2	32.3	88.0	47.9	60.2	67.3	72.3	79.6
2009	26	61.4	9.5	30.8	76.7	52.2	55.8	62.6	69.0	70.6
2010	29	63.6	14.7	15.6	82.0	43.8	54.6	69.3	72.7	81.7
2011	40	65.1	11.8	34.4	83.0	50.0	57.1	66.4	74.6	80.7
2012	36	66.7	9.7	44.0	85.1	55.5	59.7	68.0	72.5	81.9
2013	39	65.4	10.4	36.7	82.5	51.4	57.6	65.8	73.2	79.2
2014	29	64.9	10.3	37.3	84.1	53.2	56.8	65.2	73.0	79.3
1998-2014	361	62.9	13.0	15.6	88.0	45.4	55.8	64.9	71.5	79.0

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	6	62.8	4.7	56.6	68.7	56.6	59.9	61.8	67.8	68.7
1999	12	65.2	14.8	32.9	81.2	47.0	56.8	71.6	77.1	78.4
2000	13	59.5	19.0	15.8	80.5	29.3	52.5	67.2	72.2	74.9
2001	7	55.6	12.2	38.0	69.3	38.0	41.3	55.5	66.9	69.3
2002	13	59.8	15.3	31.0	76.2	33.6	51.4	65.9	72.8	75.6
2003	13	63.7	9.8	43.9	79.5	49.2	60.4	63.8	72.7	73.0
2004	15	59.3	16.2	27.6	84.1	29.9	47.8	64.9	69.4	73.2
2005	12	52.9	17.7	21.6	82.9	32.2	41.6	52.3	62.3	77.4
2006	12	54.0	15.8	27.5	78.6	30.4	43.8	56.6	63.9	74.3
2007	17	58.3	18.7	22.3	84.2	29.1	43.9	59.7	72.9	81.5
2008	31	62.6	12.3	29.4	79.9	43.3	56.3	64.3	71.7	75.8
2009	31	63.4	13.8	25.9	89.3	47.2	55.6	62.7	72.7	79.5
2010	21	62.3	8.9	39.9	75.8	51.2	60.0	65.3	66.4	71.8
2011	37	61.5	12.5	33.0	85.6	45.9	53.4	61.5	68.1	80.4
2012	32	66.2	11.5	39.5	89.1	51.2	56.6	69.0	74.3	76.9
2013	34	66.1	10.1	45.0	85.4	51.4	59.7	68.2	73.2	78.2
2014	35	64.6	12.4	30.5	81.8	46.7	58.7	68.2	73.5	78.4
1998-2014	341	62.2	13.4	15.8	89.3	43.9	55.0	63.8	71.8	77.3

Table 4

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

Age at diagnosis	Cases			Males			Females		
Years	n	%	Cum.%	n	%	Cum.%	n	%	Cum.%
15-19	2	0.4	0.4	2	0.8	0.8			0.0
20-24	1	0.2	0.6			0.8	1	0.4	0.4
25-29	4	0.8	1.4	1	0.4	1.2	3	1.3	1.7
30-34	6	1.2	2.6	3	1.2	2.4	3	1.3	2.9
35-39	8	1.6	4.3	3	1.2	3.6	5	2.1	5.0
40-44	17	3.5	7.7	8	3.2	6.7	9	3.8	8.8
45-49	19	3.9	11.6	7	2.8	9.5	12	5.0	13.9
50-54	38	7.7	19.3	19	7.5	17.0	19	8.0	21.8
55-59	63	12.8	32.2	34	13.4	30.4	29	12.2	34.0
60-64	85	17.3	49.5	42	16.6	47.0	43	18.1	52.1
65-69	80	16.3	65.8	45	17.8	64.8	35	14.7	66.8
70-74	86	17.5	83.3	49	19.4	84.2	37	15.5	82.4
75-79	47	9.6	92.9	21	8.3	92.5	26	10.9	93.3
80-84	28	5.7	98.6	17	6.7	99.2	11	4.6	97.9
85+	7	1.4	100.0	2	0.8	100.0	5	2.1	100.0
All ages	491	100.0		253	100.0		238	100.0	

Included in the statistics are 34.9% multiple primaries in males and 37.8% in females.

Table 5

Age-specific incidence and proportion of all cancers
for period 2007-2014

Age at diagnosis Years	Males n	Females n	Males Age-spec. incid.	Females Age-spec. incid.	Males Prop.all cancers n=91183 %	Females Prop.all cancers n=89596 %
0- 4			0.0	0.0		
5- 9			0.0	0.0		
10-14			0.0	0.0		
15-19	2		0.2	0.0	0.9	
20-24		1	0.0	0.1		0.3
25-29	1	3	0.1	0.2	0.2	0.5
30-34	3	3	0.2	0.2	0.4	0.3
35-39	3	5	0.2	0.4	0.3	0.3
40-44	8	9	0.5	0.6	0.4	0.2
45-49	7	12	0.4	0.8	0.2	0.2
50-54	19	19	1.5	1.5	0.4	0.3
55-59	34	29	3.2	2.6	0.5	0.4
60-64	42	43	4.3	4.1	0.4	0.5
65-69	45	35	4.7	3.4	0.3	0.3
70-74	49	37	5.4	3.5	0.3	0.3
75-79	21	26	3.8	3.6	0.2	0.3
80-84	17	11	4.9	2.0	0.2	0.1
85+	2	5	0.9	0.9	0.0	0.0
All ages	253	238			0.3	0.3
Incidence						
Raw			1.4	1.3		
WS			0.8	0.7		
ES			1.1	1.0		
BRD-S			1.3	1.1		

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).

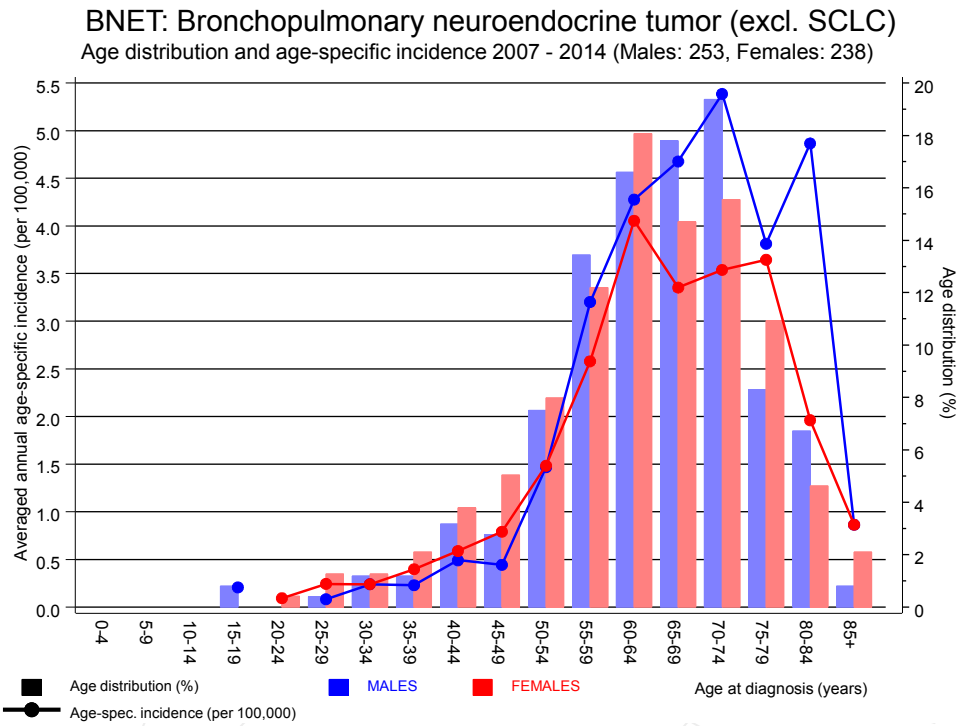


Figure 6. Age distribution and age-specific incidence

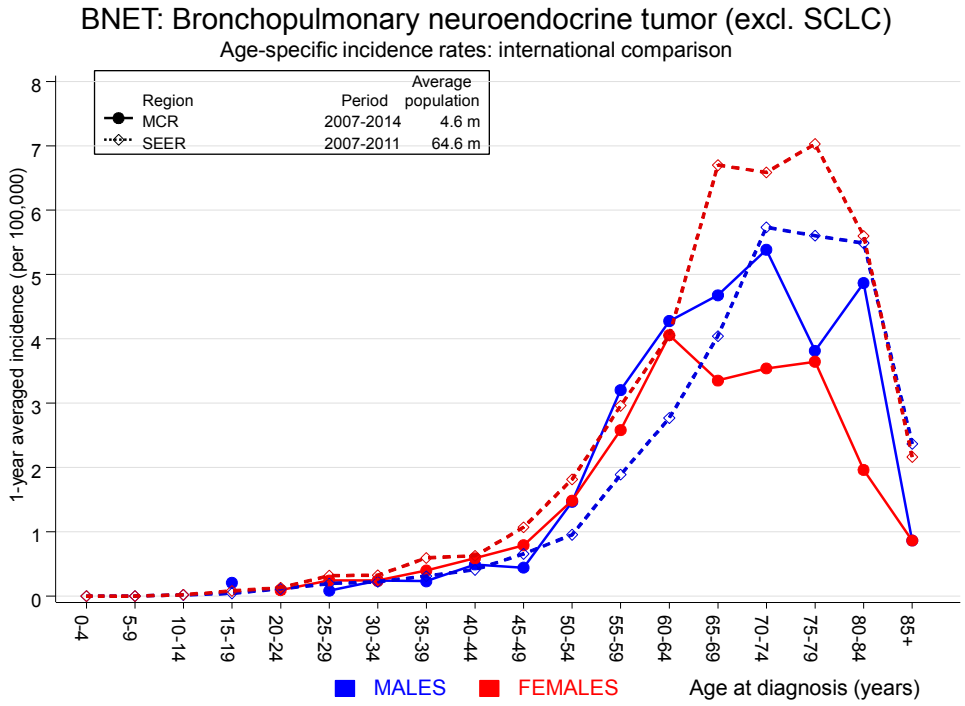


Figure 6a. Age-specific incidence in MCR registry areas compared to SEER (Surveillance, Epidemiology, and End Results, USA).

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.

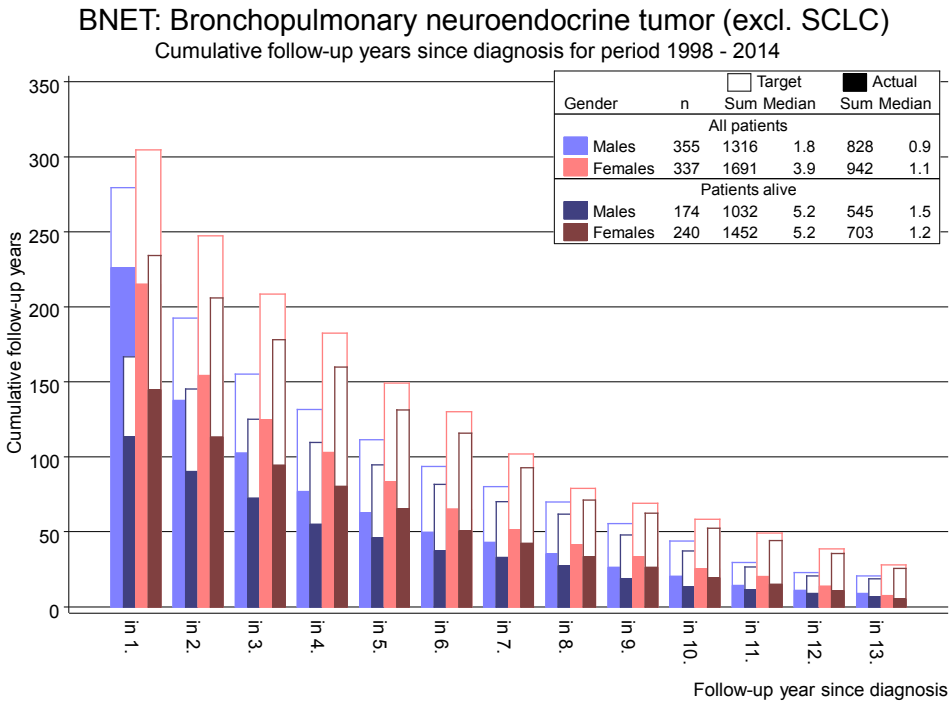


Figure 7. Cumulative follow-up years depending on time since diagnosis

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 %
C16	Stomach	2	0.4	4.6	0.6	16.7		19.1	
C18	Colon	4	1.0	3.8	1.0	9.8	#	36.0	
C19-C20	Rectum	2	0.6	3.3	0.4	11.8		16.9	
C23-C24	Bile	2	0.1	19.2	2.3	69.2	#	23.1	
C33-C34	Lung	11	1.3	8.3	4.1	14.8	#	118.0	
C61	Prostate	3	3.2	0.9	0.2	2.7		-2.5	
C67	Bladder	3	0.5	6.3	1.3	18.5	#	30.8	
Other primaries		6	1.4	4.3	1.6	9.3	#	56.1	
Not observed		0	2.6	0.0	0.0	1.4		-31.7	
All mult. primaries		33	11.2	2.9	2.0	4.1	#	265.9	

Patients	353
Median age at second malignancy (years)	71.3
Person-years	820
Mean observation time (years)	2.3
Median observation time (years)	0.9

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

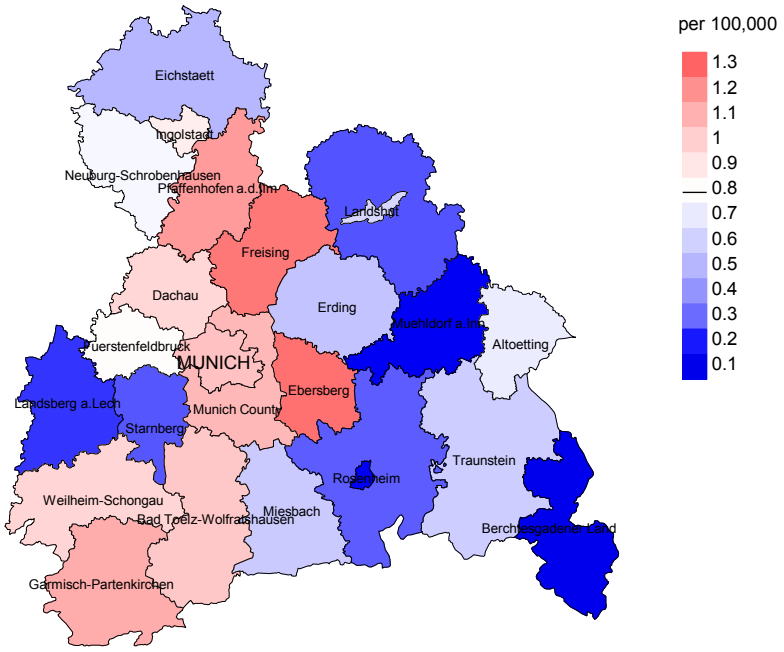
Diagnosis	Observed n	Expected n	SIR	LCL 95%	UCL 95%	EAR	DCO %
C33–C34 Lung	9	0.7	13.1	6.0	24.9 #	90.0	
C50 Breast	9	2.9	3.1	1.4	5.9 #	66.2	
C54 Corpus uteri	2	0.5	3.8	0.5	13.7	15.9	
C56 Ovary	2	0.4	5.4	0.7	19.7	17.7	
C73 Thyroid	2	0.2	11.1	1.3	40.1 #	19.7	
Other primaries	4	1.3	3.0	0.8	7.7	28.8	
Not observed	0	2.9	0.0	0.0	1.3	−31.1	
All mult. primaries	28	8.9	3.2	2.1	4.6 #	207.2	

Patients	332
Median age at second malignancy (years)	67.9
Person-years	924
Mean observation time (years)	2.8
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

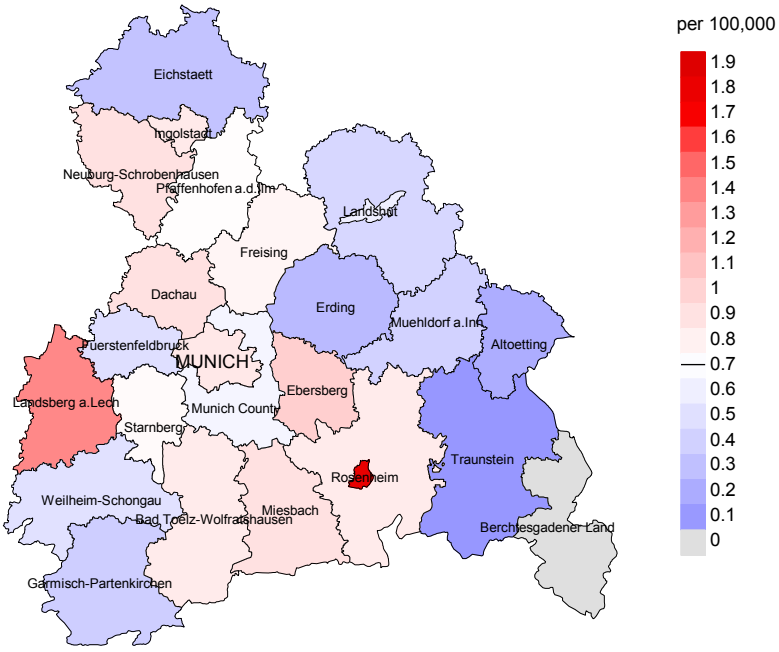
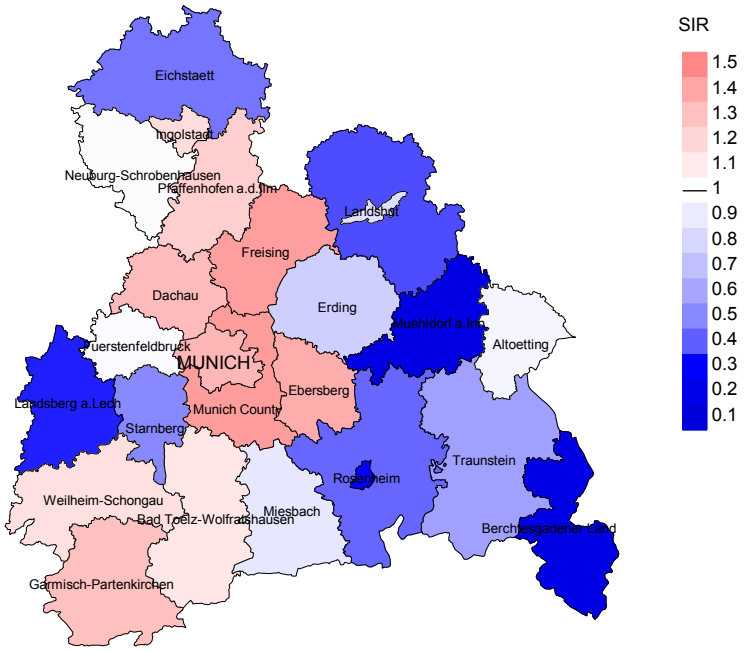


Figure 9a. Map of cancer incidence (world standard population) by county averaged for period 2007 to 2014. According to their individual incidence rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 0.8/100,000 WS N=253, females 0.7/100,000 WS N=238).

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 7 women were identified with newly diagnosed pulm. neuroend. tumor. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 1.0/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.3 and 2.7/100,000.

Standardized incidence ratio (SIR) 2007 - 2014: Males



Standardized incidence ratio (SIR) 2007 - 2014: Females

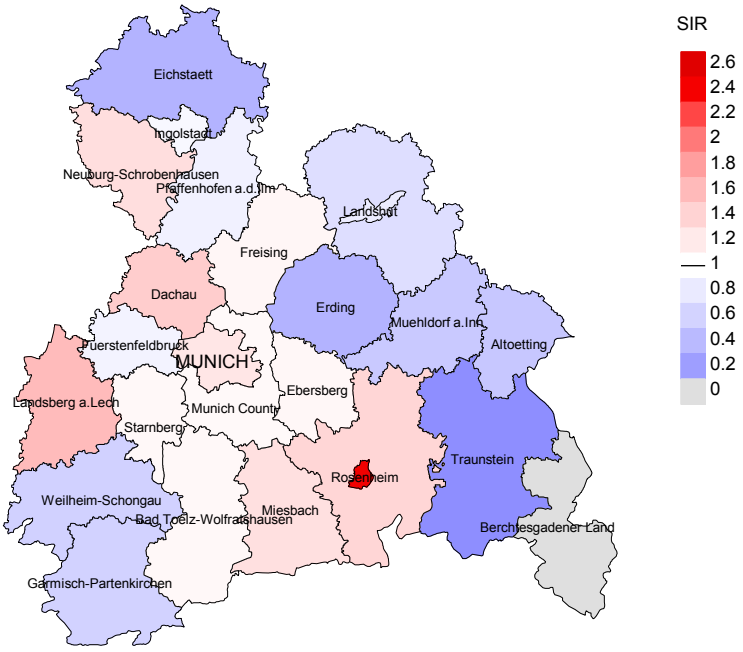


Figure 9b. Map of standardized incidence ratio (SIR) by county averaged for period 2007 to 2014. According to their individual SIR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=253, females N=238).

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 7 women were identified with newly diagnosed pulm. neuroend. tumor. Therefore, the mean standardized incidence ratio (SIR) for this cancer type in this area can be calculated at 1.08. Though, the value of this parameter may vary with an underlying probability of 99% between 0.31 and 2.63, 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	12	83.3	6	50.0	100.0
1999	23	95.7	14	60.9	100.0
2000	21	100.0	11	52.4	90.9
2001	21	95.2	13	61.9	100.0
2002	25	96.0	10	40.0	90.0
2003	22	100.0	11	50.0	81.8
2004	29	93.1	11	37.9	100.0
2005	29	89.7	9	31.0	100.0
2006	29	86.2	9	31.0	100.0
2007	41	80.5	21	51.2	100.0
2008	61	72.1	28	45.9	96.4
2009	57	63.2	21	36.8	95.2
2010	50	64.0	23	46.0	100.0
2011	77	72.7	33	42.9	97.0
2012	68	77.9	31	45.6	96.8
2013	73	100.0	27	37.0	96.3
2014	64	92.2	8	12.5	100.0
1998-2014	702	83.0	286	40.7	96.9

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	12	5	2	16.7
1999	23	8	1	4.3
2000	21	9	2	9.5
2001	21	6	1	4.8
2002	25	12	5	20.0
2003	22	9	3	13.6
2004	29	10	2	6.9
2005	29	15	3	10.3
2006	29	16	2	6.9
2007	41	17	6	14.6
2008	61	25	10	16.4
2009	57	25	10	17.5
2010	50	28	7	14.0
2011	77	34	12	15.6
2012	68	46	15	22.1
2013	73	39	13	17.8
2014	64	39	8	12.5
1998-2014	702	343	102	14.5

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	100.0		80.0
1999	8	75.0	25.0	100.0
2000	9	77.8	22.2	88.9
2001	6	83.3	16.7	80.0
2002	12	83.3	16.7	91.7
2003	9	88.9	11.1	88.9
2004	10	80.0	20.0	88.9
2005	15	73.3	26.7	85.7
2006	16	68.8	31.3	87.5
2007	17	70.6	29.4	81.3
2008	25	80.0	20.0	80.0
2009	25	92.0	8.0	95.8
2010	28	85.7	14.3	92.6
2011	34	85.3	14.7	85.3
2012	46	91.3	8.7	91.1
2013	39	89.7	10.3	92.1
2014	39	92.3	7.7	94.9
1998-2014	343	85.1	14.9	89.5

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	3	71.0	71.0		64.7
1999	4	69.7	69.7		69.7
2000	3	77.7	77.7		77.7
2001	4	60.7	56.1	65.3	62.3
2002	9	68.0	69.1	65.9	68.5
2003	7	71.3	70.0	71.3	70.0
2004	5	57.1	57.1		57.1
2005	10	70.7	71.0	70.7	71.0
2006	13	71.8	75.2	56.1	71.8
2007	11	67.1	66.9	67.1	66.9
2008	18	71.7	70.6	74.2	70.6
2009	18	68.5	67.7	75.7	68.5
2010	18	66.3	67.3	65.3	67.7
2011	23	73.3	71.8	87.6	72.4
2012	29	68.7	68.0	83.5	68.3
2013	27	72.0	72.0	72.6	70.6
2014	18	69.7	69.7		69.7
1998-2014	220	69.7	69.4	71.9	69.4

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	2	74.6	74.6		74.6
1999	4	72.0	77.2	59.5	73.0
2000	6	78.6	76.6	78.7	79.0
2001	2	58.7	58.7		58.7
2002	3	72.9	72.9		72.9
2003	2	73.2	73.2		73.2
2004	5	74.9	73.8	75.5	76.2
2005	5	82.2	82.2	78.2	82.6
2006	3	80.4		80.4	80.4
2007	6	71.6	64.2	76.1	67.4
2008	7	77.3	72.4	84.1	72.4
2009	7	72.8	66.4	86.6	72.8
2010	10	76.2	73.2	80.6	73.2
2011	11	71.4	70.9	78.2	71.4
2012	17	70.3	69.7	87.3	69.7
2013	12	70.9	70.9	74.3	70.9
2014	21	71.3	70.4	83.6	70.6
1998-2014	123	73.0	71.3	79.2	71.9

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	3	0.3	0.50	0.2	0.40	0.2	0.44	0.3	0.50
1999	4	0.4	0.36	0.2	0.32	0.3	0.36	0.4	0.36
2000	3	0.3	0.38	0.1	0.30	0.2	0.36	0.4	0.58
2001	3	0.3	0.21	0.2	0.19	0.2	0.22	0.3	0.21
2002	7	0.4	0.58	0.2	0.55	0.3	0.54	0.4	0.54
2003	6	0.3	0.67	0.2	0.62	0.3	0.69	0.4	0.73
2004	5	0.3	0.36	0.2	0.42	0.3	0.44	0.3	0.39
2005	8	0.4	0.47	0.2	0.31	0.3	0.38	0.5	0.51
2006	11	0.6	0.65	0.3	0.54	0.4	0.67	0.6	0.77
2007	8	0.4	0.33	0.2	0.29	0.3	0.30	0.3	0.30
2008	16	0.7	0.53	0.3	0.45	0.5	0.50	0.7	0.59
2009	17	0.8	0.65	0.4	0.55	0.6	0.56	0.7	0.63
2010	15	0.7	0.52	0.4	0.50	0.5	0.52	0.6	0.49
2011	19	0.8	0.48	0.4	0.42	0.6	0.43	0.8	0.49
2012	26	1.1	0.72	0.6	0.67	0.9	0.71	1.1	0.75
2013	25	1.1	0.64	0.5	0.56	0.8	0.59	1.0	0.64
2014	18	0.8	0.62	0.4	0.56	0.6	0.60	0.8	0.65
1998-2014	194	0.6	0.54	0.3	0.47	0.5	0.51	0.6	0.56

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	2	0.2	0.33	0.1	0.24	0.1	0.27	0.2	0.38
1999	2	0.2	0.18	0.1	0.13	0.1	0.15	0.2	0.19
2000	4	0.3	0.31	0.1	0.15	0.2	0.20	0.3	0.28
2001	2	0.2	0.29	0.1	0.33	0.2	0.32	0.2	0.35
2002	3	0.2	0.23	0.1	0.16	0.1	0.18	0.1	0.23
2003	2	0.1	0.15	0.0	0.09	0.1	0.10	0.1	0.13
2004	3	0.2	0.20	0.1	0.11	0.1	0.14	0.1	0.17
2005	3	0.2	0.25	0.0	0.12	0.1	0.14	0.1	0.19
2006									
2007	4	0.2	0.24	0.1	0.21	0.1	0.22	0.1	0.22
2008	4	0.2	0.13	0.1	0.09	0.1	0.10	0.1	0.12
2009	6	0.3	0.19	0.1	0.17	0.2	0.17	0.2	0.17
2010	9	0.4	0.43	0.1	0.27	0.2	0.30	0.3	0.34
2011	10	0.4	0.27	0.2	0.18	0.2	0.20	0.3	0.24
2012	16	0.7	0.50	0.3	0.43	0.4	0.45	0.5	0.48
2013	10	0.4	0.29	0.2	0.25	0.3	0.26	0.3	0.28
2014	18	0.8	0.51	0.4	0.45	0.5	0.46	0.6	0.50
1998-2014	98	0.3	0.29	0.1	0.22	0.2	0.23	0.2	0.27

Table 13

Age distribution of age at death (cancer-related) for period 2007-2014
(**incl. multiple primaries**)

Age at death	Cases			Males			Females		
Years	n	%	Cum.%	n	%	Cum.%	n	%	Cum.%
40-44	6	2.7	2.7	4	2.8	2.8	2	2.6	2.6
45-49	6	2.7	5.4	3	2.1	4.9	3	3.9	6.5
50-54	10	4.5	10.0	6	4.2	9.0	4	5.2	11.7
55-59	19	8.6	18.6	14	9.7	18.8	5	6.5	18.2
60-64	29	13.1	31.7	18	12.5	31.3	11	14.3	32.5
65-69	43	19.5	51.1	33	22.9	54.2	10	13.0	45.5
70-74	42	19.0	70.1	26	18.1	72.2	16	20.8	66.2
75-79	31	14.0	84.2	20	13.9	86.1	11	14.3	80.5
80-84	25	11.3	95.5	16	11.1	97.2	9	11.7	92.2
85+	10	4.5	100.0	4	2.8	100.0	6	7.8	100.0
All ages	221	100.0		144	100.0		77	100.0	

Included in the statistics are 34.9% multiple primaries in males and 37.8% in females.

Table 14

Age-specific mortality (cancer-related) and proportion of all cancers
for period 2007-2014
(**incl. multiple primaries**)

Age at death Years	Males n	Females n	Males Age-spec. mortal.	Males MI-index	Females Age-spec. mortal.	Females 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			0.0		0.0			
30-34			0.0		0.0			
35-39			0.0		0.0			
40-44	4	2	0.2	0.50	0.1	0.22	0.9	0.3
45-49	3	3	0.2	0.43	0.2	0.25	0.3	0.2
50-54	6	4	0.5	0.32	0.3	0.21	0.3	0.2
55-59	14	5	1.3	0.41	0.4	0.17	0.5	0.2
60-64	18	11	1.8	0.43	1.0	0.26	0.4	0.3
65-69	33	10	3.4	0.73	1.0	0.29	0.5	0.2
70-74	26	16	2.9	0.53	1.5	0.43	0.3	0.2
75-79	20	11	3.6	0.95	1.5	0.42	0.2	0.2
80-84	16	9	4.6	0.94	1.6	0.82	0.2	0.1
85+	4	6	1.7	2.00	1.0	1.20	0.1	0.1
All ages	144	77					0.3	0.2
Mortality								
Raw			0.8	0.57	0.4	0.32		
WS			0.4	0.51	0.2	0.26		
ES			0.6	0.53	0.3	0.27		
BRD-S			0.8	0.58	0.3	0.30		
PYLL-70								
per 100,000			4.2		2.3			
ES			3.6		1.9			
AYLL-70			8.7		10.4			

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

Table 15a

Multiple primaries in deaths in period 1998-2014
MALES

Diagnosis		Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C03-C06	Oral cavity	2	2.9	2	100.0				
C09-C10	Oropharynx	4	5.9	2	50.0	1	25.0	1	25.0
C15	Oesophagus	1	1.5	1	100.0				
C16	Stomach	5	7.4	3	60.0	1	20.0	1	20.0
C17	Small intestine	1	1.5			1	100.0		
C18	Colon	2	2.9	1	50.0	1	50.0		
C19-C20	Rectum	3	4.4	3	100.0				
C22	Liver	2	2.9			1	50.0	1	50.0
C23-C24	Bile	1	1.5					1	100.0
C33-C34	Lung	10	14.7			4	40.0	6	60.0
C43	Malign. melanoma	5	7.4	5	100.0				
C44	Skin others	5	7.4	3	60.0	1	20.0	1	20.0
C48	Peritoneal	1	1.5					1	100.0
C50	Breast	1	1.5	1	100.0				
C61	Prostate	8	11.8	5	62.5			3	37.5
C64	Kidney	2	2.9	1	50.0			1	50.0
C66	Ureter	1	1.5					1	100.0
C67	Bladder	10	14.7	6	60.0	1	10.0	3	30.0
C70-C72	CNS cancer	2	2.9	1	50.0			1	50.0
C81	Hodgkin lymphoma	1	1.5	1	100.0				
C82-C85	NHL	1	1.5	1	100.0				
All mult. primaries		68	100.0	36	52.9	11	16.2	21	30.9

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 1998–2014
FEMALES

Diagnosis		Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C07–C08	Salivary gland	1	1.9	1	100.0				
C09–C10	Oropharynx	1	1.9	1	100.0				
C16	Stomach	1	1.9			1	100.0		
C18	Colon	4	7.4	1	25.0	1	25.0	2	50.0
C19–C20	Rectum	1	1.9	1	100.0				
C32	Larynx	1	1.9	1	100.0				
C33–C34	Lung	7	13.0			4	57.1	3	42.9
C43	Malign. melanoma	2	3.7	2	100.0				
C50	Breast	15	27.8	13	86.7			2	13.3
C51	Vulva	1	1.9					1	100.0
C53	Cervix uteri	2	3.7			2	100.0		
C54	Corpus uteri	3	5.6	3	100.0				
C56	Ovary	1	1.9	1	100.0				
C64	Kidney	3	5.6	2	66.7	1	33.3		
C67	Bladder	1	1.9	1	100.0				
C70–C72	CNS cancer	4	7.4	1	25.0	1	25.0	2	50.0
C73	Thyroid	1	1.9			1	100.0		
C74–C80	Cancer others	1	1.9	1	100.0				
C90	Mult. myeloma	3	5.6	2	66.7			1	33.3
C91–C96	Leukaemia	1	1.9					1	100.0
All mult. primaries		54	100.0	31	57.4	11	20.4	12	22.2

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 2007-2014
(**First primaries only** *)

Age at death Years	Males n	Females n	Males Age-spec. mortal.	Males MI-index	Females Age-spec. mortal.	Females 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			0.0		0.0			
30-34			0.0		0.0			
35-39			0.0		0.0			
40-44	4	1	0.2	0.50	0.1	0.13	0.9	0.2
45-49	3	3	0.2	0.50	0.2	0.25	0.3	0.3
50-54	5	4	0.4	0.28	0.3	0.29	0.3	0.3
55-59	14	5	1.3	0.52	0.4	0.23	0.5	0.2
60-64	13	5	1.3	0.42	0.5	0.16	0.3	0.2
65-69	29	5	3.0	0.78	0.5	0.19	0.5	0.1
70-74	20	8	2.2	0.65	0.8	0.36	0.3	0.2
75-79	14	6	2.5	0.93	0.8	0.40	0.2	0.1
80-84	7	6	2.0	0.88	1.1	0.60	0.1	0.1
85+	2	3	0.9	2.00	0.5	0.75	0.0	0.0
All ages	111	46					0.3	0.1
Mortality								
Raw			0.6	0.58	0.2	0.26		
WS			0.3	0.53	0.1	0.21		
ES			0.5	0.55	0.2	0.23		
BRD-S			0.6	0.58	0.2	0.24		
PYLL-70								
per 100,000			3.8		1.8			
ES			3.3		1.5			
AYLL-70			9.0		12.1			

* See corresponding tables with multiple primaries.

Table 17

Age-specific mortality (cancer-related) and proportion of all cancers
for period 2007-2014
(**Single primaries only** *)

Age at death Years	Males n	Females n	Males Age-spec. mortal.	Males MI-index	Females Age-spec. mortal.	Females 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			0.0		0.0			
30-34			0.0		0.0			
35-39			0.0		0.0			
40-44	4	1	0.2	0.50	0.1	0.13	1.0	0.2
45-49	3	3	0.2	0.50	0.2	0.30	0.3	0.3
50-54	5	3	0.4	0.28	0.2	0.21	0.3	0.2
55-59	14	5	1.3	0.52	0.4	0.24	0.6	0.3
60-64	11	4	1.1	0.39	0.4	0.13	0.3	0.2
65-69	28	4	2.9	0.80	0.4	0.16	0.6	0.1
70-74	19	7	2.1	0.63	0.7	0.35	0.3	0.2
75-79	13	5	2.4	0.93	0.7	0.36	0.3	0.1
80-84	6	5	1.7	0.86	0.9	0.50	0.1	0.1
85+	2	3	0.9	2.00	0.5	0.75	0.1	0.1
All ages	105	40					0.3	0.1
Mortality								
Raw			0.6	0.58	0.2	0.24		
WS			0.3	0.52	0.1	0.19		
ES			0.4	0.54	0.1	0.21		
BRD-S			0.5	0.58	0.2	0.22		
PYLL-70								
per 100,000			3.7		1.6			
ES			3.2		1.3			
AYLL-70			9.1		12.5			

* See corresponding tables with multiple primaries.

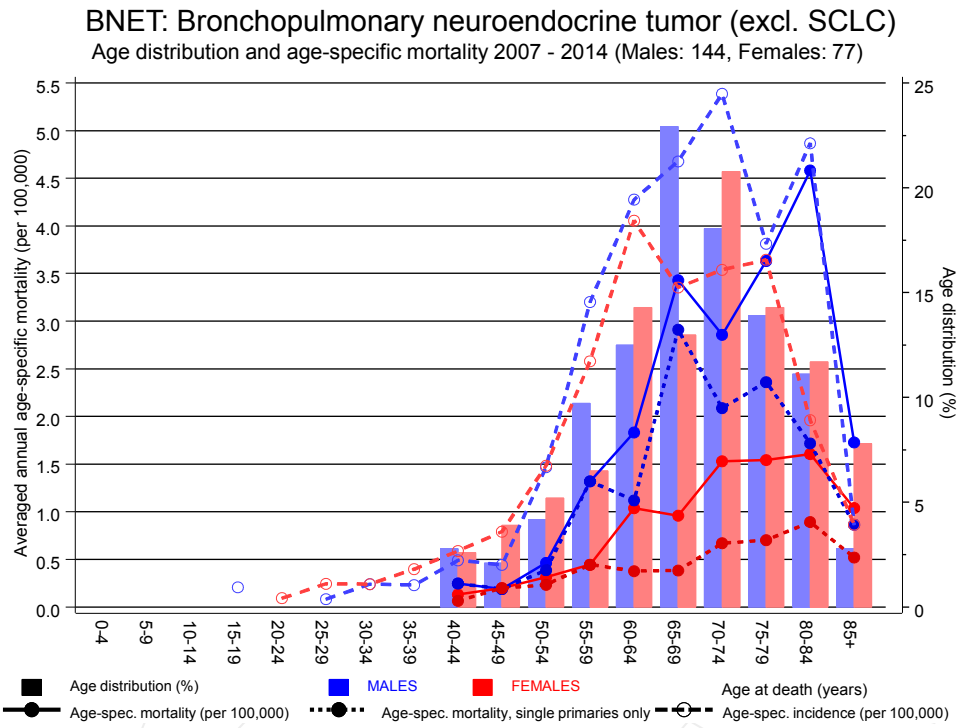
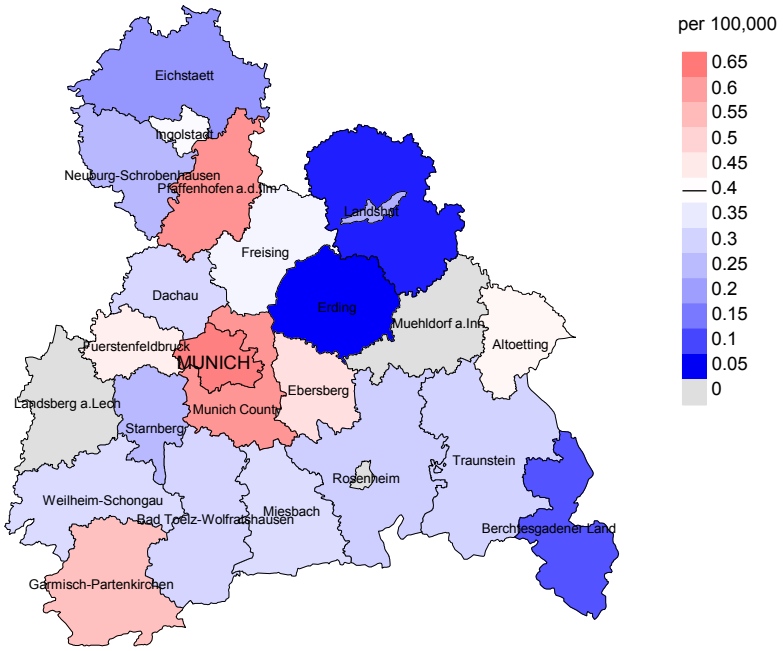


Figure 18. Distribution of age at death (bars) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

The difference between age at diagnosis (Table 3) and age at pulm. neuroend. tumor-related death (see Table 10) should be considered.

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



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

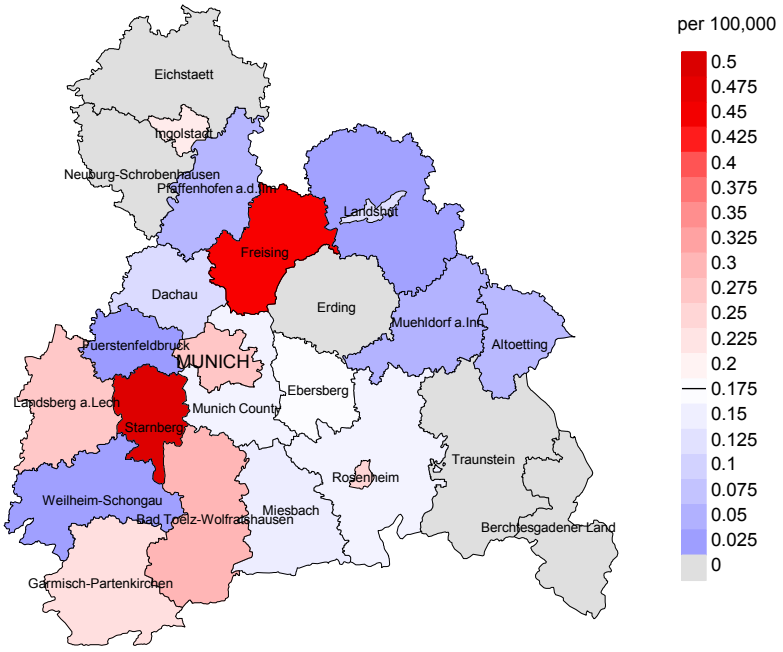
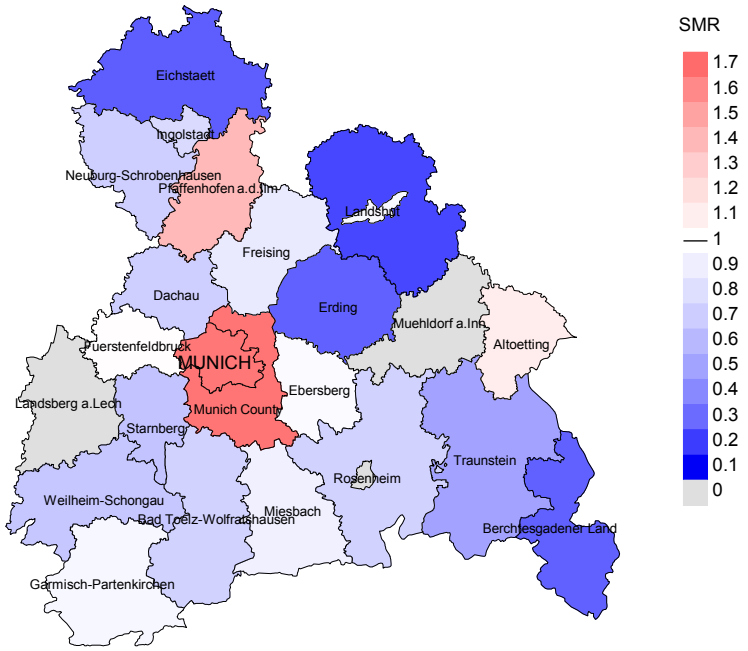


Figure 19a. Map of cancer mortality (world standard population) by county averaged for period 2007 to 2014. According to their individual mortality rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 0.4/100,000 WS N=143, females 0.2/100,000 WS N=76).

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 2 women died from pulm. neuroend. tumor. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 0.2/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.0 and 0.9/100,000.

Standardized mortality ratio (SMR) 2007 - 2014: Males



Standardized mortality ratio (SMR) 2007 - 2014: Females

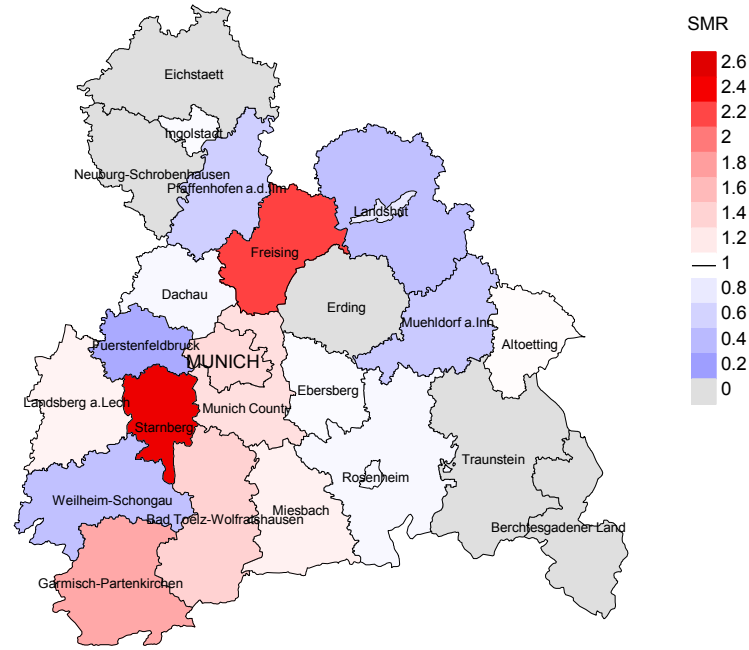


Figure 19b. Map of standardized mortality ratio (SMR) by county averaged for period 2007 to 2014. According to their individual SMR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=143, females N=76).

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 2 women died from pulm. neuroend. tumor. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 0.98. Though, the value of this parameter may vary with an underlying probability of 99% between 0.05 and 4.54, 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, 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

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