Munich Cancer Registry

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

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

Cancer statistics: Baseline statistics

BNET: Pulm. neuroend. tumor

Year of diagnosis	1998-2012
Patients	545
Diseases	546
Creation date	03/20/2014
Export date	02/12/2014
Population	4.5 m

http://www.tumorregister-muenchen.de/en/facts/base/base_hBNETE.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 4.5 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, March 2014

[#] 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 2013 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.

ICD-10 codes used for specifying cancer site

Code	Description
C33.9	Trachea
C34.0	Main bronchus
C34.1	Upper lobe
C34.2	Middle lobe
C34.3	Lower lobe
C34.8	Overlapping lesion of lung
C34.9	Lung, NOS

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

Code	Description
8013/3	Large cell neuroendocrine carcinoma
8240/3	Typical carcinoid
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

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	12			16.7	41.7	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	40.9	100.0	#
2004	29			17.2	37.9	93.1	#
2005	28			25.0	32.1	89.3	#
2006	29			13.8	27.6	89.7	#
2007	41			17.1	51.2	82.9	# ##
2008	61			32.8	42.6	72.1	
2009	56			26.8	33.9	58.9	
2010	50			32.0	44.0	66.0	
2011	75			20.0	34.7	70.7	
2012	53			30.2	32.1	98.1	###
1998-2012	546			24.7	40.5	81.7	

\# 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	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	28	16	12	57.1
2006	29	17	12	58.6
2007	41	24	17	58.5
2008	61	30	31	49.2
2009	56	25	31	44.6
2010	50	29	21	58.0
2011	75	39	36	52.0
2012	53	28	25	52.8
1998-2012	546	282	264	51.6

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 4.52 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	16	12	0.8	0.6	0.7	0.4	0.8	0.5	0.8	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	25	31	1.1	1.3	0.7	0.8	1.0	1.1	1.0	1.2
2010	29	21	1.3	0.9	0.7	0.5	1.0	0.7	1.2	0.8
2011	39	36	1.7	1.5	0.9	0.9	1.3	1.2	1.6	1.4
2012	28	25	1.2	1.1	0.7	0.6	1.0	0.8	1.2	0.9
1998-2012	282	264	1.0	0.9	0.6	0.5	0.8	0.7	1.0	0.8

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	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	28	51.5	16.6	18.1	82.9	21.7	41.6	52.2	65.4	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	56	62.5	12.1	25.9	89.3	48.1	55.7	62.7	70.4	76.7
2010	50	63.1	12.5	15.6	82.0	46.0	56.0	65.7	71.0	75.4
2011	75	63.7	12.1	33.0	85.6	47.3	55.5	63.2	71.8	80.5
2012	53	65.8	10.7	39.5	89.1	53.8	58.5	67.2	73.7	78.5
1998-2012	546	61.8	13.7	15.6	89.3	42.5	54.6	63.3	71.3	78.4

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	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	16	50.4	16.2	18.1	71.2	21.7	41.0	52.2	66.0	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	25	61.4	9.7	30.8	76.7	52.2	55.8	62.7	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	39	65.3	11.9	34.4	83.0	46.7	56.6	66.7	74.7	80.9
2012	28	65.8	9.1	48.5	83.8	55.5	58.7	64.8	69.7	81.9
1998-2012	282	62.2	13.6	15.6	88.0	44.2	55.0	64.6	71.1	79.0

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	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	36	62.1	12.3	33.0	85.6	47.3	54.1	61.6	69.0	80.4
2012	25	65.7	12.4	39.5	89.1	50.8	55.6	69.0	75.3	78.5
1998-2012	264	61.3	13.9	15.8	89.3	41.6	54.1	63.0	71.6	76.9

Table 4

Age distribution by 5-year age group and gender for period 1998-2012 (incl. DCO)

Age at diagnosis Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
15-19	5	0.9	0.9	4	1.4	1.4	1	0.4	0.4
20-24	3	0.5	1.5	1	0.4	1.8	2	0.8	1.1
25-29	10	1.8	3.3	3	1.1	2.8	7	2.7	3.8
30-34	12	2.2	5.5	5	1.8	4.6	7	2.7	6.4
35-39	12	2.2	7.7	7	2.5	7.1	5	1.9	8.3
40-44	24	4.4	12.1	12	4.3	11.3	12	4.5	12.9
45-49	28	5.1	17.2	11	3.9	15.2	17	6.4	19.3
50-54	48	8.8	26.0	28	9.9	25.2	20	7.6	26.9
55-59	65	11.9	37.9	31	11.0	36.2	34	12.9	39.8
60-64	91	16.7	54.6	45	16.0	52.1	46	17.4	57.2
65-69	86	15.8	70.3	47	16.7	68.8	39	14.8	72.0
70-74	80	14.7	85.0	47	16.7	85.5	33	12.5	84.5
75-79	45	8.2	93.2	19	6.7	92.2	26	9.8	94.3
80-84	32	5.9	99.1	21	7.4	99.6	11	4.2	98.5
85+	5	0.9	100.0	1	0.4	100.0	4	1.5	100.0
All ages	546	100.0		282	100.0		264	100.0	

Included in the statistics are 30.5% multiple primaries in males and 29.3% in females.

Table 5

Age-specific incidence, DCO rate and proportion of all cancers
for period 1998-2012

Age at diagnosis Years	Males n	Females n	Males Age-spec. incid.	Females Age-spec. incid.	Males DCO rate n=0 %	Females DCO rate n=0 %	Males Prop.all cancers n=146755 %	Females Prop.all cancers n=142297 %
0- 4			0.0	0.0				
5- 9			0.0	0.0				
10-14			0.0	0.0				
15-19	4	1	0.3	0.1			1.3	0.4
20-24	1	2	0.1	0.1			0.2	0.4
25-29	3	7	0.2	0.4			0.3	0.7
30-34	5	7	0.2	0.3			0.4	0.4
35-39	7	5	0.3	0.2			0.3	0.1
40-44	12	12	0.5	0.5			0.4	0.2
45-49	11	17	0.5	0.8			0.2	0.2
50-54	28	20	1.5	1.1			0.3	0.2
55-59	31	34	1.8	1.9			0.2	0.3
60-64	45	46	2.7	2.6			0.2	0.3
65-69	47	39	3.2	2.4			0.2	0.2
70-74	47	32	4.1	2.3			0.2	0.2
75-79	19	26	2.5	2.4			0.1	0.2
80-84	21	11	4.6	1.3			0.2	0.1
85+	1	4	0.3	0.5			0.0	0.0
All ages	282	263			0.0	0.0	0.2	0.2
Incidence								
Raw			1.0	0.9				
WS			0.6	0.5				
ES			0.8	0.7				
BRD-S			1.0	0.8				

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 1998-2012
MALES

Diagnosis	Observed n	Expected n	SIR	LCL 95%	UCL 95%	EAR	DCO %
C16 Stomach	2	0.3	6.1	0.7	21.9	27.9	
C33-C34 Lung	3	1.0	3.1	0.6	9.1	34.0	
C67 Bladder	2	0.3	5.9	0.7	21.3	27.8	
Other primaries	6	4.0	1.5	0.6	3.3	34.1	
Not observed	0	2.5	0.0	0.0	1.5	-42.4	
All mult. primaries	13	8.1	1.6	0.9	2.7	81.5	

Patients	194
Mean age at second malignancy (years)	73.5
Person-years	598
Mean observation time (years)	3.1
Median observation time (years)	1.6

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 1998-2012
FEMALES

Diagnosis	Observed n	Expected n	SIR	LCL 95%	UCL 95%	EAR	DCO %
C33-C34 Lung	3	0.5	6.1	1.3	17.8 #	37.2	
C50 Breast	4	2.1	1.9	0.5	4.8	27.8	
Other primaries	5	1.5	3.3	1.1	7.8 #	52.0	20.0
Not observed	0	2.5	0.0	0.0	1.5	-36.8	
All mult. primaries	12	6.6	1.8	0.9	3.2	80.2	8.3

Patients	168
Mean age at second malignancy (years)	65.9
Person-years	674
Mean observation time (years)	4.0
Median observation time (years)	3.1

The occurrence of second malignancy is statistically significant.

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

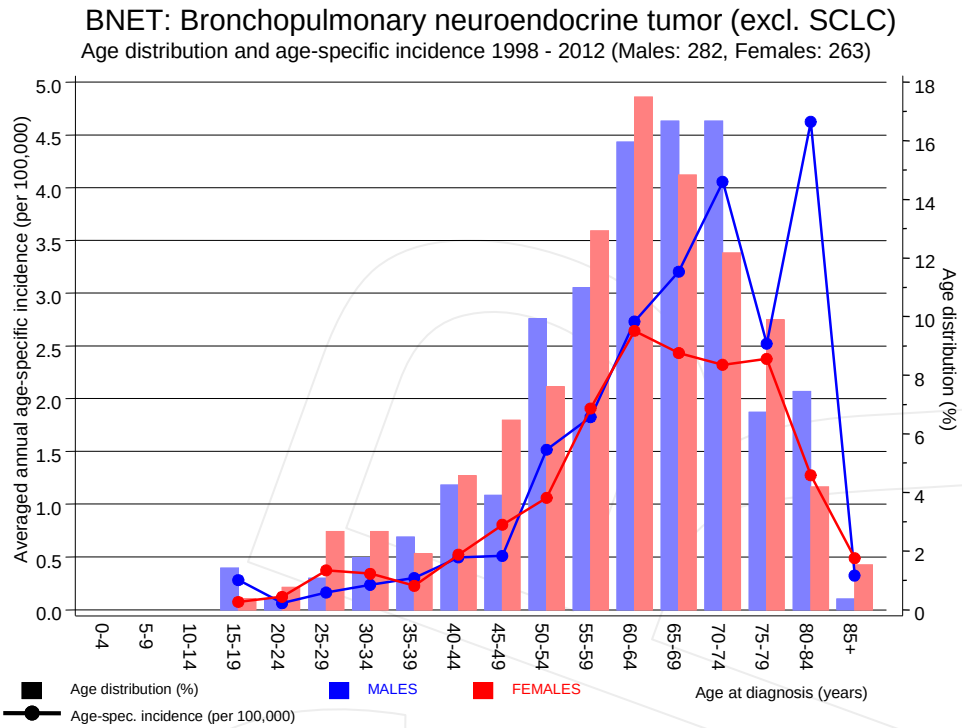


Figure 7. Age distribution and age-specific incidence

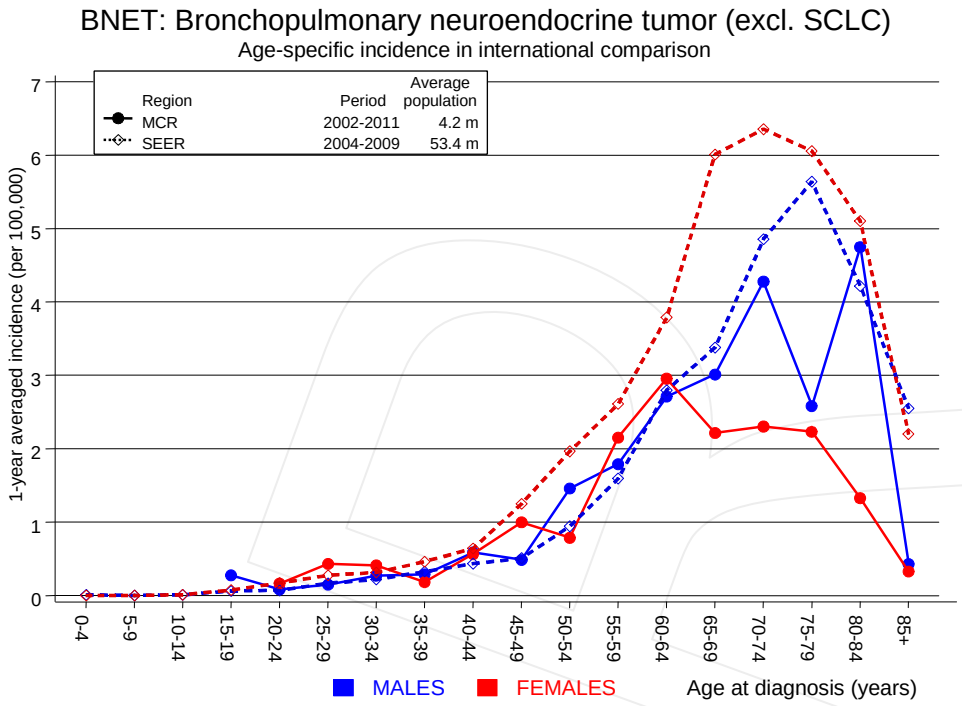


Figure 7a. Age-specific incidence in MCR registry areas compared to SEER (Surveillance, Epidemiology, and End Results, USA).

Reference:

Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Incidence - SEER 18 Regs Research Data, released April 2012, based on the November 2011 submission. http://www.seer.cancer.gov.

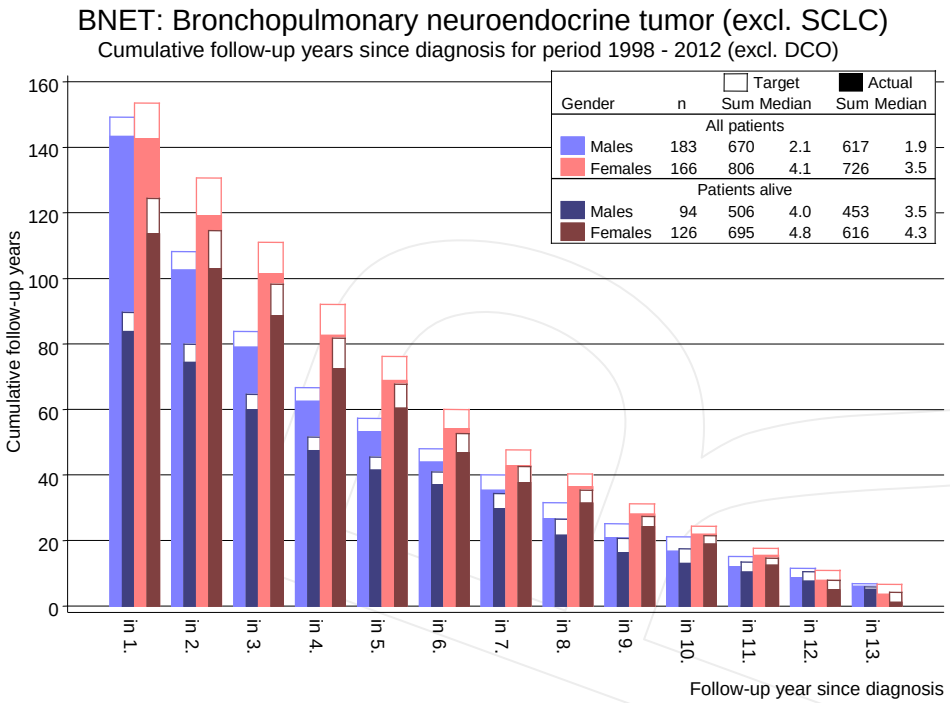
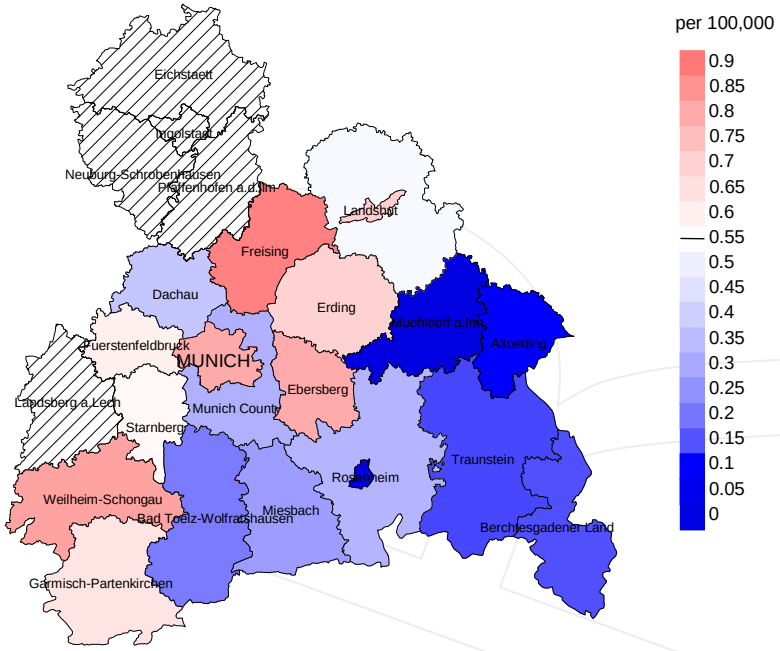


Figure 8. Cumulative follow-up years depending on time since diagnosis

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) 2003 - 2008: Males



Average incidence (world standard population) 2003 - 2008: Females

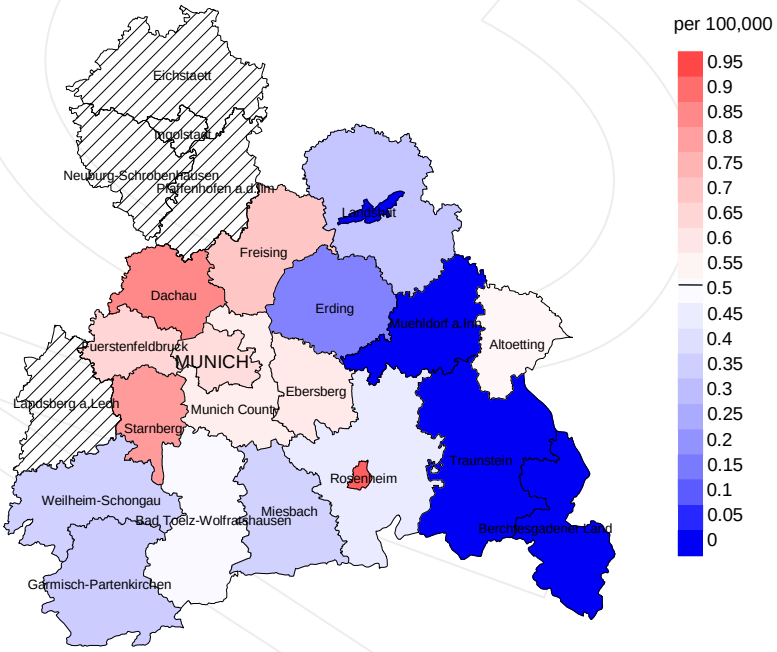
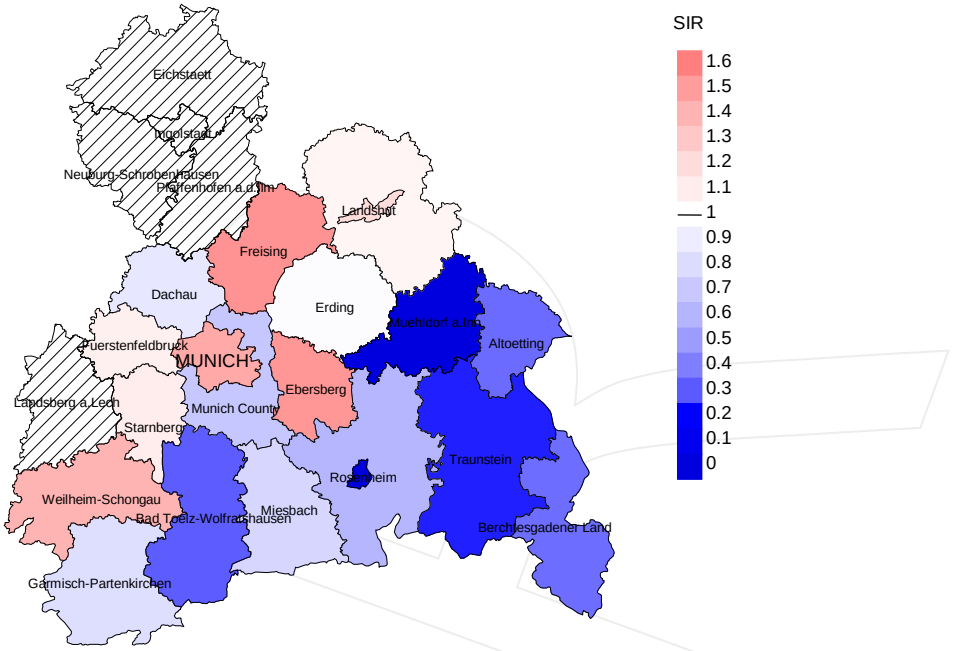


Figure 9a. Map of cancer incidence (world standard population, incl. DCO cases) by county averaged for period 2003 to 2008. According to their individual incidence rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 0.6/100,000 WS N=103, females 0.5/100,000 WS N=98). Since cancer data are not available in some counties until 2007, the local incidence rates were not calculated, and the map tiles show as shaded.

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 63,131 female residents (averaged) in the period from 2003 to 2008 a total of 3 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 0.6/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.1 and 2.2/100,000.

Standardized incidence ratio (SIR) 2003 - 2008: Males



Standardized incidence ratio (SIR) 2003 - 2008: Females

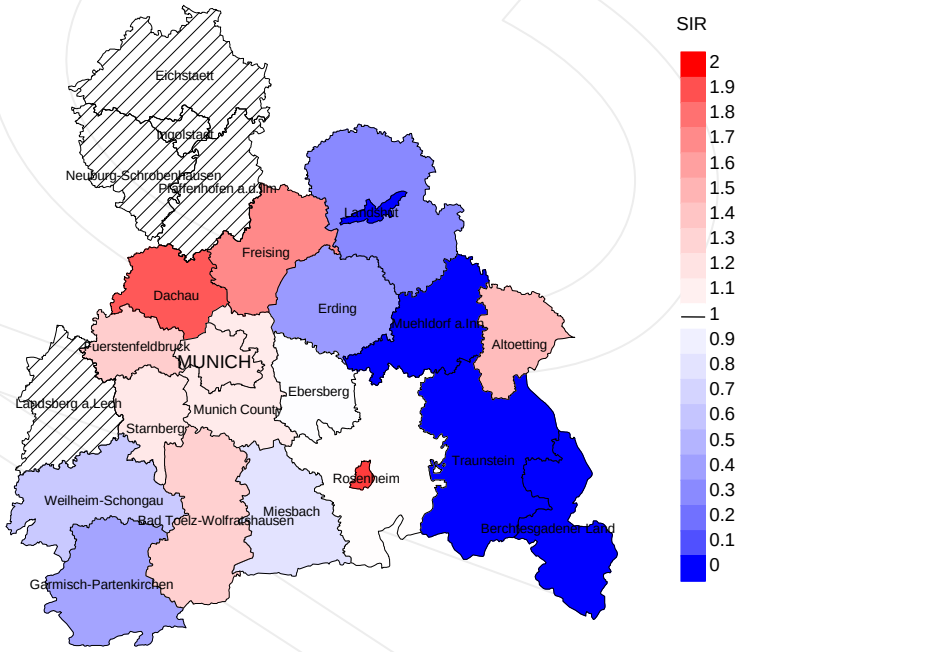


Figure 9b. Map of standardized incidence ratio (SIR, incl. DCO cases) by county averaged for period 2003 to 2008. According to their individual SIR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=103, females N=98). Since cancer data are not available in some counties until 2007, the local SIR values were not calculated, and the map tiles show as shaded.

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 63,131 female residents (averaged) in the period from 2003 to 2008 a total of 3 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 1.00. Though, the value of this parameter may vary with an underlying probability of 99% between 0.11 and 3.66, 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 4.52 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	12	83.3		5	41.7	100.0
1999	23	95.7		14	60.9	85.7
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		9	40.9	77.8
2004	29	93.1		11	37.9	100.0
2005	28	89.3		9	32.1	100.0
2006	29	89.7		8	27.6	100.0
2007	41	82.9		21	51.2	100.0
2008	61	72.1		26	42.6	96.2
2009	56	58.9		19	33.9	94.7
2010	50	66.0		22	44.0	100.0
2011	75	70.7		26	34.7	96.2
2012	53	98.1		17	32.1	100.0
1998-2012	546	81.7		221	40.5	95.9

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 4.52 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	12	5	100.0	2	16.7
1999	23	8	87.5	1	4.3
2000	21	9	100.0	2	9.5
2001	21	6	83.3	1	4.8
2002	25	12	100.0	5	20.0
2003	22	9	100.0	3	13.6
2004	29	10	90.0	2	6.9
2005	28	15	93.3	3	10.7
2006	29	16	100.0	2	6.9
2007	41	17	94.1	6	14.6
2008	61	25	100.0	10	16.4
2009	56	25	96.0	10	17.9
2010	50	28	96.4	7	14.0
2011	75	34	100.0	12	16.0
2012	53	42	100.0	12	22.6
1998-2012	546	261	97.3	78	14.3

Table 10c

Annual cohorts of deaths, proportion of cancer-related and not 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 4.52 m as of 2007, respectively)

Year of death	Deaths n	Prop. cancer-related %	Prop. not 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	42	90.5	9.5	90.5
1998-2012	261	83.1	16.9	88.2

Table 11a

Means 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 (not cancer-related) Years	Age at death (according to death certificate) Years
1998	3	67.5	67.5		64.7
1999	4	69.0	69.0		69.0
2000	3	73.7	73.7		73.7
2001	4	61.5	60.2	65.3	62.3
2002	9	68.0	68.6	65.9	68.5
2003	7	67.7	67.2	71.3	67.2
2004	5	59.8	59.8		59.8
2005	10	68.7	68.2	70.7	68.2
2006	13	71.5	74.3	56.1	71.5
2007	11	65.9	64.1	70.6	64.1
2008	18	71.3	71.0	74.2	71.0
2009	18	66.4	65.8	75.7	66.1
2010	18	65.5	64.3	71.7	66.0
2011	23	72.7	69.7	87.0	70.7
2012	26	71.1	69.5	83.6	69.5
1998-2012	172	68.9	68.1	73.8	68.3

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

Means 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 (not cancer-related) Years	Age at death (according to death certificate) Years
1998	2	74.6	74.6		74.6
1999	4	68.4	77.2	59.5	75.1
2000	6	77.2	76.4	78.7	76.9
2001	2	58.7	58.7		58.7
2002	3	73.2	73.2		73.2
2003	2	73.2	73.2		73.2
2004	5	74.6	74.0	75.5	77.5
2005	5	77.2	76.4	78.2	78.4
2006	3	80.8		80.8	80.4
2007	6	67.0	62.5	76.1	65.1
2008	7	75.7	70.3	83.0	70.3
2009	7	67.9	64.8	86.6	67.9
2010	10	74.5	73.9	80.6	73.2
2011	11	72.8	72.2	78.2	72.8
2012	16	71.9	70.9	87.3	70.7
1998-2012	89	72.7	71.2	78.0	72.0

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	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	0.50	0.2	0.33	0.3	0.41	0.5	0.54
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	0.68	0.4	0.57	0.6	0.58	0.7	0.66
2010	15	0.7	0.52	0.4	0.50	0.5	0.52	0.6	0.49
2011	19	0.8	0.49	0.4	0.43	0.6	0.45	0.8	0.50
2012	23	1.0	0.82	0.5	0.73	0.8	0.77	1.0	0.83
1998-2012	148	0.5	0.52	0.3	0.46	0.4	0.50	0.5	0.54

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	0.28	0.2	0.19	0.2	0.21	0.3	0.25
2012	15	0.6	0.60	0.3	0.49	0.4	0.51	0.5	0.55
1998-2012	69	0.2	0.26	0.1	0.18	0.1	0.20	0.2	0.24

Table 13

Age distribution of age at death (cancer-related) for period 1998-2012
(**incl. multiple primaries**)

Age at death Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
40-44	6	2.8	2.8	4	2.7	2.7	2	2.9	2.9
45-49	6	2.8	5.5	4	2.7	5.4	2	2.9	5.8
50-54	11	5.1	10.6	9	6.1	11.5	2	2.9	8.7
55-59	17	7.8	18.4	14	9.5	20.9	3	4.3	13.0
60-64	25	11.5	30.0	18	12.2	33.1	7	10.1	23.2
65-69	42	19.4	49.3	30	20.3	53.4	12	17.4	40.6
70-74	42	19.4	68.7	28	18.9	72.3	14	20.3	60.9
75-79	28	12.9	81.6	20	13.5	85.8	8	11.6	72.5
80-84	31	14.3	95.9	17	11.5	97.3	14	20.3	92.8
85+	9	4.1	100.0	4	2.7	100.0	5	7.2	100.0
All ages	217	100.0		148	100.0		69	100.0	

Included in the statistics are 30.5% multiple primaries in males and 29.3% in females.

Table 14

Age-specific mortality (cancer-related) and proportion of all cancers
for period 1998-2012
(**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			0.0		0.0			
30-34			0.0		0.0			
35-39			0.0		0.0			
40-44	4	2	0.2	0.33	0.1	0.17	0.5	0.2
45-49	4	2	0.2	0.36	0.1	0.12	0.2	0.1
50-54	9	2	0.5	0.32	0.1	0.10	0.3	0.1
55-59	14	3	0.8	0.45	0.2	0.09	0.3	0.1
60-64	18	7	1.1	0.40	0.4	0.15	0.2	0.1
65-69	30	12	2.0	0.64	0.7	0.31	0.3	0.2
70-74	28	14	2.4	0.60	1.0	0.42	0.2	0.2
75-79	20	8	2.7	1.05	0.7	0.31	0.2	0.1
80-84	17	14	3.7	0.81	1.6	1.27	0.2	0.1
85+	4	5	1.3	4.00	0.6	1.25	0.0	0.0
All ages	148	69					0.2	0.1
Mortality								
Raw			0.5	0.52	0.2	0.26		
WS			0.3	0.46	0.1	0.18		
ES			0.4	0.50	0.1	0.20		
BRD-S			0.5	0.54	0.2	0.23		
PYLL-70								
per 100,000			3.0		1.0			
ES			2.6		0.9			
AYLL-70			9.4		9.1			

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

Table 15a

Multiple primaries in deaths in period 1998-2012
MALES

Diagnosis	Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C03-C06 Oral cavity	1	2.1	1	100.0				
C09-C10 Oropharynx	2	4.3	1	50.0			1	50.0
C15 Oesophagus	1	2.1	1	100.0				
C16 Stomach	3	6.4	1	33.3	1	33.3	1	33.3
C17 Small intestine	1	2.1			1	100.0		
C18 Colon	2	4.3	1	50.0	1	50.0		
C19-C20 Rectum	2	4.3	2	100.0				
C22 Liver	2	4.3			1	50.0	1	50.0
C33-C34 Lung	10	21.3			4	40.0	6	60.0
C43 Malign. melanoma	2	4.3	2	100.0				
C44 Skin others	3	6.4	2	66.7			1	33.3
C48 Peritoneal	1	2.1					1	100.0
C50 Breast	1	2.1	1	100.0				
C61 Prostate	5	10.6	3	60.0			2	40.0
C66 Ureter	1	2.1					1	100.0
C67 Bladder	8	17.0	4	50.0	1	12.5	3	37.5
C70-C72 CNS cancer	1	2.1					1	100.0
C81 Hodgkin lymphoma	1	2.1	1	100.0				
All mult. primaries	47	100.0	20	42.6	9	19.1	18	38.3

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 1998-2012
FEMALES

Diagnosis	Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C07-C08 Salivary gland	1	2.7	1	100.0				
C09-C10 Oropharynx	1	2.7	1	100.0				
C16 Stomach	1	2.7			1	100.0		
C18 Colon	3	8.1			1	33.3	2	66.7
C32 Larynx	1	2.7	1	100.0				
C33-C34 Lung	6	16.2			3	50.0	3	50.0
C43 Malign. melanoma	1	2.7	1	100.0				
C50 Breast	5	13.5	5	100.0				
C51 Vulva	1	2.7					1	100.0
C53 Cervix uteri	2	5.4			2	100.0		
C54 Corpus uteri	1	2.7	1	100.0				
C56 Ovary	1	2.7	1	100.0				
C64 Kidney	3	8.1	2	66.7	1	33.3		
C67 Bladder	1	2.7	1	100.0				
C70-C72 CNS cancer	4	10.8	1	25.0	1	25.0	2	50.0
C73 Thyroid	1	2.7			1	100.0		
C74-C80 Cancer others	1	2.7	1	100.0				
C90 Mult. myeloma	2	5.4	1	50.0			1	50.0
C91-C96 Leukaemia	1	2.7					1	100.0
All mult. primaries	37	100.0	17	45.9	10	27.0	10	27.0

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 1998-2012
(**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			0.0		0.0			
30-34			0.0		0.0			
35-39			0.0		0.0			
40-44	4	1	0.2	0.40	0.0	0.09	0.5	0.1
45-49	4	2	0.2	0.40	0.1	0.12	0.3	0.1
50-54	7	2	0.4	0.26	0.1	0.11	0.3	0.1
55-59	14	3	0.8	0.54	0.2	0.12	0.3	0.1
60-64	14	4	0.8	0.41	0.2	0.12	0.2	0.1
65-69	28	7	1.9	0.65	0.4	0.22	0.3	0.1
70-74	21	9	1.8	0.72	0.7	0.39	0.2	0.1
75-79	14	6	1.9	0.93	0.5	0.33	0.2	0.1
80-84	9	11	2.0	0.90	1.3	1.10	0.1	0.1
85+	3	2	1.0	3.00	0.2	0.67	0.0	0.0
All ages	118	47					0.2	0.1
Mortality								
Raw			0.4	0.53	0.2	0.22		
WS			0.2	0.46	0.1	0.15		
ES			0.3	0.50	0.1	0.17		
BRD-S			0.4	0.54	0.1	0.20		
PYLL-70								
per 100,000			2.7		0.8			
ES			2.4		0.7			
AYLL-70			9.5		10.1			

* See corresponding tables with multiple primaries.

Table 17

Age-specific mortality (cancer-related) and proportion of all cancers
for period 1998-2012
(**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			0.0		0.0			
30-34			0.0		0.0			
35-39			0.0		0.0			
40-44	4	1	0.2	0.40	0.0	0.09	0.6	0.1
45-49	3	2	0.1	0.30	0.1	0.13	0.2	0.1
50-54	7	2	0.4	0.27	0.1	0.13	0.3	0.1
55-59	13	3	0.8	0.50	0.2	0.13	0.3	0.1
60-64	11	3	0.7	0.37	0.2	0.09	0.2	0.1
65-69	28	5	1.9	0.70	0.3	0.18	0.4	0.1
70-74	19	8	1.6	0.70	0.6	0.36	0.2	0.1
75-79	12	6	1.6	0.80	0.5	0.35	0.2	0.1
80-84	8	10	1.8	1.00	1.2	1.00	0.1	0.1
85+	3	2	1.0	3.00	0.2	0.67	0.1	0.0
All ages	108	42					0.2	0.1
Mortality								
Raw			0.4	0.51	0.1	0.21		
WS			0.2	0.44	0.1	0.14		
ES			0.3	0.48	0.1	0.16		
BRD-S			0.4	0.52	0.1	0.19		
PYLL-70								
per 100,000			2.5		0.7			
ES			2.2		0.6			
AYLL-70			9.3		11.3			

* See corresponding tables with multiple primaries.

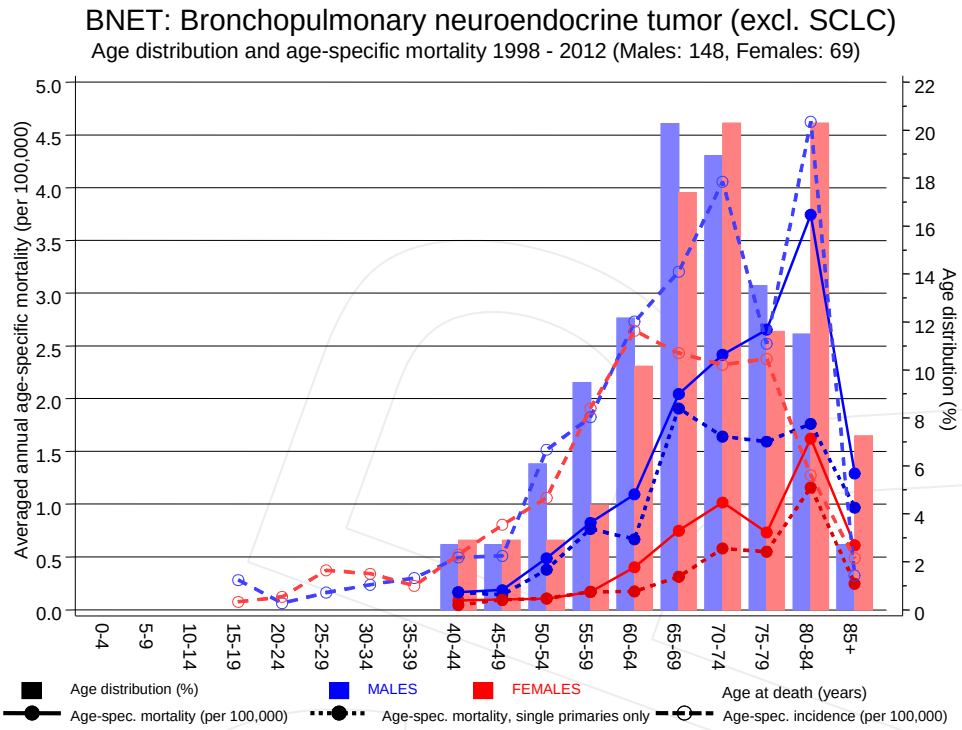
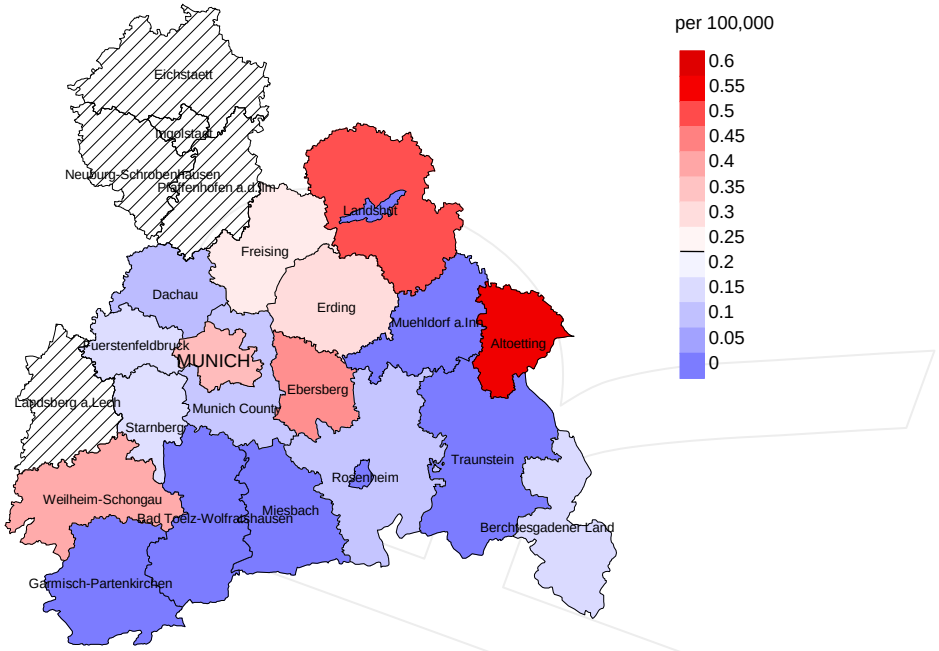


Figure 18. Distribution of age at death (bars) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

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) 2003 - 2008: Males



Average mortality (world standard population) 2003 - 2008: Females

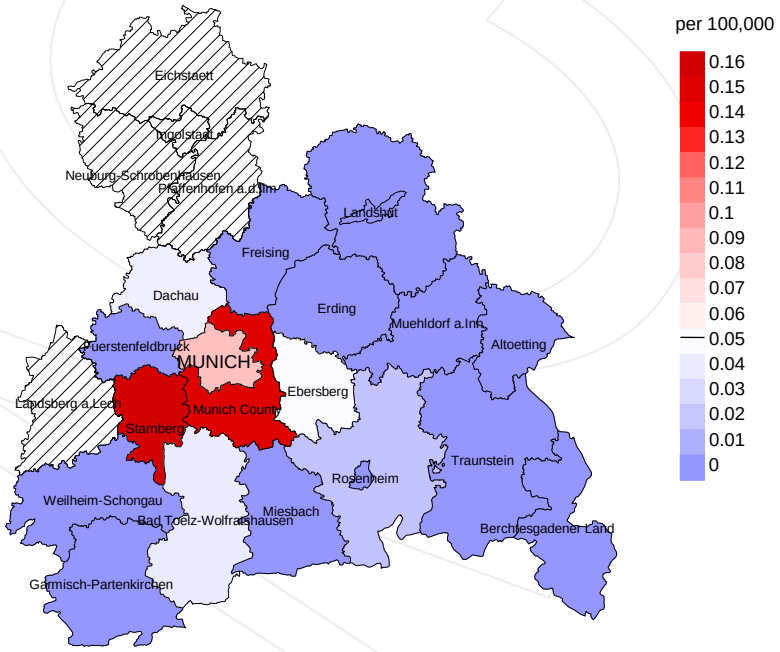
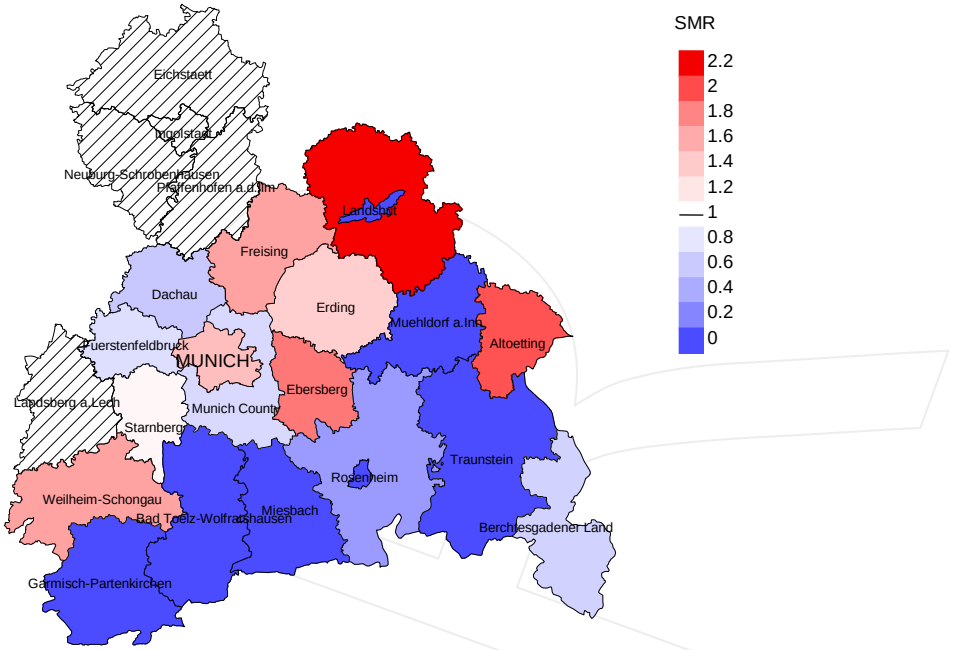


Figure 19a. Map of cancer mortality (world standard population) by county averaged for period 2003 to 2008. According to their individual mortality rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 0.2/100,000 WS N=51, females 0.1/100,000 WS N=15). Since cancer data are not available in some counties until 2007, the local mortality rates were not calculated, and the map tiles show as shaded.

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 63,131 female residents (averaged) in the period from 2003 to 2008 a total of 1 women died from pulm. neuroend. tumor. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 0.0/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.0 and 0.4/100,000.

Standardized mortality ratio (SMR) 2003 - 2008: Males



Standardized mortality ratio (SMR) 2003 - 2008: Females

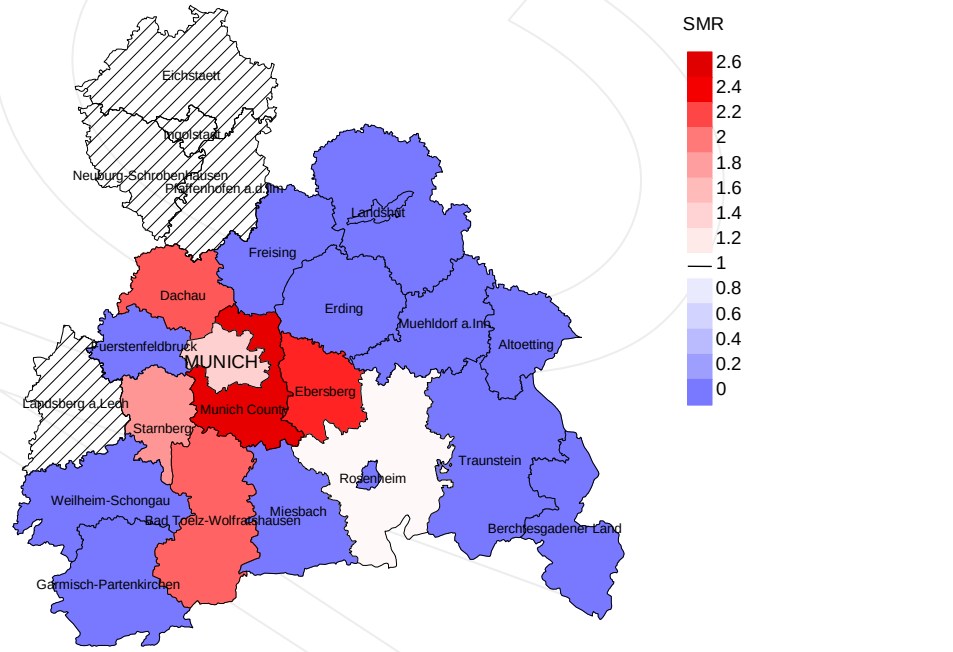


Figure 19b. Map of standardized mortality ratio (SMR, incl. DCO cases) by county averaged for period 2003 to 2008. According to their individual SMR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=51, females N=15). Since cancer data are not available in some counties until 2007, the local SMR values were not calculated, and the map tiles show as shaded.

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 63,131 female residents (averaged) in the period from 2003 to 2008 a total of 1 women died from pulm. neuroend. tumor. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 2.27. Though, the value of this parameter may vary with an underlying probability of 99% between 0.01 and 16.89, 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 tumor-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

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)
FRG	Federal Republic of Germany
GEKID	Association of Population-based Cancer Registries in Germany (Gesellschaft der epidemiologischen Krebsregister in Deutschland e.V.)
LCL	Lower confidence limit
MI-index	Ratio between mortality and incidence
MCR	Munich Cancer Registry (Tumorregister München)
PYLL-70	Potential years of life lost prior to age 70 given a person dies before that age
SEER	Surveillance, Epidemiology, and End Results (USA)
SIR	Standardized incidence ratio
SMR	Standardized mortality ratio
UCL	Upper confidence limit
WS	World standard population

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