Munich Cancer Registry

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

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

Cancer statistics: Baseline statistics

C50: Breast cancer (women)

Year of diagnosis	1998-2013
Patients	49,578
Diseases	51,726
Creation date	05/19/2015
Export date	12/30/2014
Population (females)	2.36 m

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.

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

Code	Description
C50.-	Malignant neoplasm of breast
C50.0	Nipple and areola
C50.1	Central portion of breast
C50.2	Upper-inner quadrant of breast
C50.3	Lower-inner quadrant of breast
C50.4	Upper-outer quadrant of breast
C50.5	Lower-outer quadrant of breast
C50.6	Axillary tail of breast
C50.8	Overlapping lesion of breast
C50.9	Breast, unspecified

Gender: Female

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	1909	110	5.8	30.4	54.1	97.7
1999	1950	88	4.5	27.3	48.3	96.8
2000	1962	81	4.1	27.6	47.8	98.0
2001	1993	91	4.6	28.9	43.1	96.9
2002	3373	264	7.8	25.9	45.4	97.2 #
2003	3169	241	7.6	25.1	44.1	96.8
2004	3272	193	5.9	25.3	38.8	96.7
2005	3380	190	5.6	24.9	36.1	96.4
2006	3355	132	3.9	24.8	31.1	94.3
2007	3692	187	5.1	23.4	31.2	83.0 # ##
2008	4072	167	4.1	23.1	26.3	59.0
2009	4122	185	4.5	23.2	23.4	58.6
2010	4069	165	4.1	22.8	19.8	58.0
2011	3950	164	4.2	22.9	17.7	60.5
2012	4020	130	3.2	21.5	12.2	73.6
2013	3438	144	4.2	21.5	8.6	98.2 ###
1998–2013	51726	2532	4.9	24.4	30.4	82.2

\#   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 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	Cases n	Incidence raw	Incidence WS	Incidence ES	Incidence BRD-S
1998	1909	162.3	92.6	127.5	144.6
1999	1950	164.3	94.0	128.7	146.1
2000	1962	163.3	91.7	126.6	144.3
2001	1993	163.8	93.9	128.9	146.7
2002	3373	172.3	95.3	131.4	151.3
2003	3169	160.9	87.3	120.4	139.2
2004	3272	165.5	91.3	124.9	143.3
2005	3380	169.9	92.6	127.3	145.8
2006	3355	167.0	91.8	125.1	142.5
2007	3692	159.9	87.0	119.4	136.3
2008	4072	175.5	95.3	130.4	149.7
2009	4122	177.2	96.6	132.3	150.8
2010	4069	173.8	93.1	127.9	145.7
2011	3950	167.4	89.3	122.5	140.1
2012	4020	170.4	91.1	125.0	143.7
2013	3438	145.7	78.9	107.6	123.1
1998–2013	51726	166.5	91.2	125.2	143.1

The computation of the incidence measures includes all primaries, irrespective of first or subsequent malignancy.
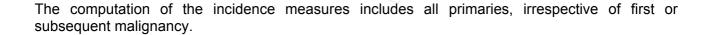
Table 3

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

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	1909	62.5	13.8	28.4	97.5	45.4	52.9	60.9	72.8	82.7
1999	1950	62.2	14.1	23.9	99.3	43.9	52.5	61.3	73.0	81.4
2000	1962	63.0	14.0	20.4	100	44.7	53.3	62.0	74.0	81.8
2001	1993	62.5	13.9	24.3	97.7	44.4	52.8	61.6	72.9	81.2
2002	3373	64.0	14.3	21.5	99.4	45.2	53.8	63.4	74.9	82.6
2003	3169	64.2	14.5	24.4	105	44.1	53.9	63.9	75.5	82.9
2004	3272	63.7	14.5	18.8	98.9	44.6	53.5	63.8	74.3	83.2
2005	3380	64.1	14.1	21.7	102	45.2	54.7	64.1	74.0	83.1
2006	3355	63.5	14.3	23.3	102	43.8	53.3	64.4	72.7	82.6
2007	3692	64.0	14.4	20.7	103	44.6	53.1	64.7	73.7	83.8
2008	4072	63.8	14.1	21.6	109	44.7	53.3	64.7	73.3	82.4
2009	4122	63.7	14.0	25.0	109	45.1	53.3	64.3	73.3	82.7
2010	4069	64.1	14.2	23.9	105	45.2	52.8	64.7	74.0	83.6
2011	3950	64.0	14.4	21.7	102	45.3	52.4	64.6	74.3	83.8
2012	4020	63.8	14.2	23.9	101	45.2	52.3	64.3	74.5	82.4
2013	3438	63.4	14.5	0.3	108	45.0	51.6	64.0	74.2	83.1
1998-2013	51726	63.7	14.2	0.3	109	44.8	53.0	63.8	73.9	82.9

Table 4

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

Age at diagnosis Years	Cases n	%	Cum.%
0-4	1	0.0	0.0
5-9	0	0.0	0.0
10-14	0	0.0	0.0
15-19	1	0.0	0.0
20-24	23	0.0	0.0
25-29	203	0.4	0.4
30-34	590	1.1	1.6
35-39	1509	2.9	4.5
40-44	3010	5.8	10.3
45-49	4464	8.6	18.9
50-54	5109	9.9	28.8
55-59	5712	11.0	39.9
60-64	6927	13.4	53.3
65-69	6898	13.3	66.6
70-74	5405	10.4	77.0
75-79	4555	8.8	85.9
80-84	3519	6.8	92.7
85+	3800	7.3	100.0
All ages	51726	100.0	

Included in the statistics are 24.7% multiple primaries.

Table 5

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

Age at diagnosis Years	Cases n	Age-spec. incidence	DCO rate n=2532 %	Prop. all cancers n=153136 %
0- 4	1	0.1	100.0	0.4
5- 9		0.0		
10-14		0.0		
15-19	1	0.1		0.3
20-24	23	1.3	4.3	4.3
25-29	202	9.9		18.2
30-34	583	26.3		28.3
35-39	1491	63.0	0.6	39.9
40-44	2976	119.6	0.8	47.7
45-49	4367	189.0	0.8	49.9
50-54	4991	242.7	0.9	45.1
55-59	5559	289.1	0.8	40.6
60-64	6760	360.3	1.2	39.2
65-69	6714	389.2	1.6	35.4
70-74	5254	346.1	3.1	28.6
75-79	4400	370.4	6.3	25.0
80-84	3394	363.8	14.2	21.5
85+	3705	414.5	34.3	21.6
All ages	50421		5.0	32.9

Incidence	
Raw	162.3
WS	89.1
ES	122.1
BRD-S	139.5

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 6

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

Diagnosis	Observed n	Expected n	SIR	LCL 95%	UCL 95%		EAR	DCO %
C03-C06 Oral cavity	20	10.9	1.8	1.1	2.8	#	0.5	
C07-C08 Salivary gland	8	2.7	2.9	1.3	5.8	#	0.3	12.5
C09-C10 Oropharynx	14	7.9	1.8	1.0	3.0		0.4	
C15 Oesophagus	26	10.3	2.5	1.6	3.7	#	0.9	11.5
C16 Stomach	119	59.3	2.0	1.7	2.4	#	3.5	9.2
C17 Small intestine	19	8.4	2.3	1.4	3.5	#	0.6	
C18 Colon	261	165.0	1.6	1.4	1.8	#	5.6	6.5
C19-C20 Rectum	109	73.8	1.5	1.2	1.8	#	2.1	4.6
C21 Anus/canal	17	9.4	1.8	1.1	2.9	#	0.4	5.9
C22 Liver	27	19.1	1.4	0.9	2.1		0.5	33.3
C23-C24 Bile	32	23.7	1.3	0.9	1.9		0.5	15.6
C25 Pancreas	128	71.6	1.8	1.5	2.1	#	3.3	21.1
C26 GI cancer	7	2.8	2.5	1.0	5.1	#	0.2	42.9
C33-C34 Lung	233	125.4	1.9	1.6	2.1	#	6.3	16.7
C43 Malign. melanoma	127	65.2	1.9	1.6	2.3	#	3.6	1.6
C46,C49 Soft tissue	31	9.9	3.1	2.1	4.5	#	1.2	6.5
C48 Peritoneal	10	6.4	1.6	0.7	2.9		0.2	
C50 Breast	1629	560.7	2.9	2.8	3.0	#	62.4	
C51 Vulva	28	16.1	1.7	1.2	2.5	#	0.7	3.6
C52 Vagina	8	3.2	2.5	1.1	4.9	#	0.3	12.5
C53 Cervix uteri	39	25.9	1.5	1.1	2.1	#	0.8	7.7
C54 Corpus uteri	201	99.3	2.0	1.8	2.3	#	5.9	1.5
C55,C57 Fem. genitals un	5	3.7	1.4	0.4	3.2		0.1	40.0
C56 Ovary	146	72.6	2.0	1.7	2.4	#	4.3	6.8
C64 Kidney	85	42.5	2.0	1.6	2.5	#	2.5	4.7
C65 Renal pelvis	7	5.0	1.4	0.6	2.9		0.1	
C66 Ureter	6	2.5	2.4	0.9	5.2		0.2	
C67 Bladder	40	30.3	1.3	0.9	1.8		0.6	10.0
C69 Eye melanoma	6	2.3	2.6	1.0	5.7		0.2	
C70-C72 CNS cancer	31	24.3	1.3	0.9	1.8		0.4	16.1
C73 Thyroid	53	35.5	1.5	1.1	2.0	#	1.0	3.8
C76-C79 CUP	19	28.8	0.7	0.4	1.0		-0.6	
C81 Hodgkin lymphoma	6	3.4	1.8	0.6	3.9		0.2	16.7
C82-C85 NHL	109	65.4	1.7	1.4	2.0	#	2.5	3.7
C90 Mult. myeloma	33	20.6	1.6	1.1	2.3	#	0.7	18.2
C91-C96 Leukaemia	72	26.4	2.7	2.1	3.4	#	2.7	9.7
Other primaries	31	22.9	1.4	0.9	1.9		0.5	
Not observed	0	1.3	0.0	0.0	2.9		-0.1	
All mult. primaries	3742	1764.5	2.1	2.1	2.2	#	115.5	4.8

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Patients                                      32470
Median age at second malignancy (years)       69.0
Person-years                                 171273
Mean observation time (years)                   5.3
Median observation time (years)                 4.6
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The occurrence of second malignancy is statistically significant.

Observed second primaries with count 1 to 4 are pooled in category "Other primaries".

C50: Malignant neoplasm of breast (women)
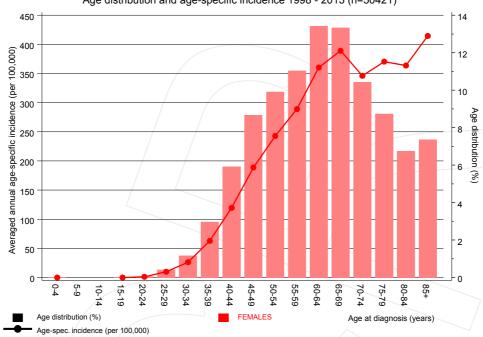### Age distribution and age-specific incidence 1998 - 2013 (n=50421)

Figure 7. Age distribution and age-specific incidence

C50: Malignant neoplasm of breast (women)
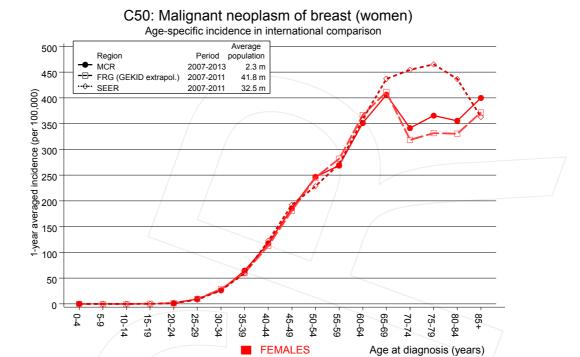### Age-specific incidence in international comparison

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

C50: Malignant neoplasm of breast (women)

Cumulative follow-up years since diagnosis for period 1998 - 2013 (excl. DCO)
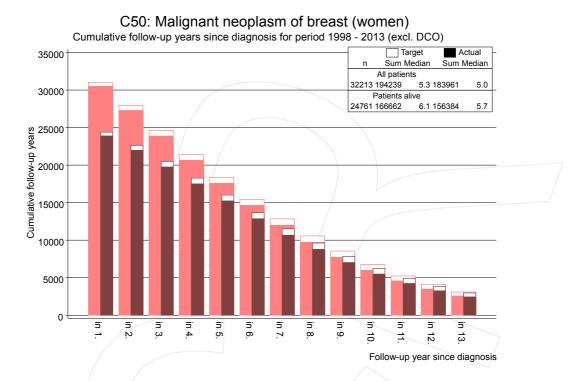
Figure 8. Cumulative follow-up years depending on time since diagnosis

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
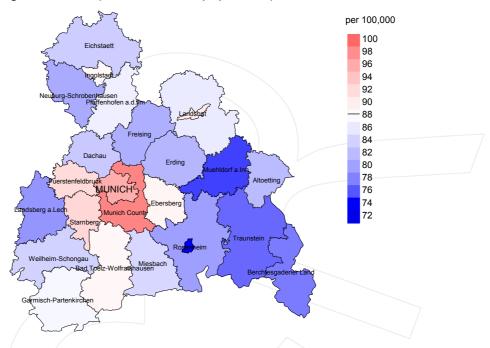
Figure 9a. Map of cancer incidence (world standard population, incl. DCO cases) by county averaged for period 2007 to 2013. According to their individual incidence rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (88.3/100,000 WS N=26,655).

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 749 women were identified with newly diagnosed breast cancer (women). Therefore, the mean incidence rate for this cancer type in this area can be calculated at 89.3/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 80.5 and 99.0/100,000.

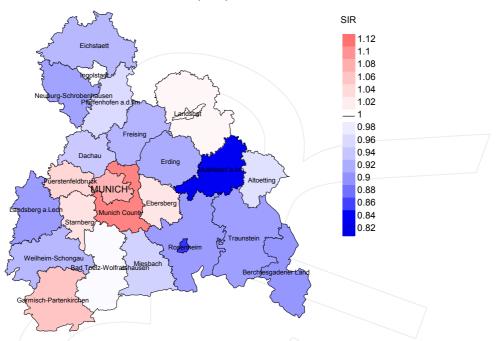## Standardized incidence ratio (SIR) 2007 - 2013

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 (N=26,655).

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 749 women were identified with newly diagnosed breast cancer (women). Therefore, the mean standardized incidence ratio (SIR) for this cancer type in this area can be calculated at 1.03. Though, the value of this parameter may vary with an underlying probability of 99% between 0.93 and 1.13, 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	1909	97.7	5.8	1033	54.1	93.4
1999	1950	96.8	4.5	941	48.3	94.3
2000	1962	98.0	4.1	938	47.8	96.4
2001	1993	96.9	4.6	859	43.1	96.4
2002	3373	97.2	7.8	1531	45.4	98.0
2003	3169	96.8	7.6	1396	44.1	96.3
2004	3272	96.7	5.9	1269	38.8	97.2
2005	3380	96.4	5.6	1220	36.1	97.6
2006	3355	94.3	3.9	1043	31.1	98.1
2007	3692	83.0	5.1	1153	31.2	97.3
2008	4072	59.0	4.1	1069	26.3	97.3
2009	4122	58.6	4.5	964	23.4	96.4
2010	4069	58.0	4.1	805	19.8	97.1
2011	3950	60.5	4.2	699	17.7	95.1
2012	4020	73.6	3.2	491	12.2	91.2
2013	3438	98.2	4.2	294	8.6	89.8
1998-2013	51726	82.2	4.9	15705	30.4	96.3

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	1909	818	87.2	155	8.1
1999	1950	813	87.8	117	6.0
2000	1962	838	90.5	122	6.2
2001	1993	828	90.8	119	6.0
2002	3373	1247	96.9	334	9.9
2003	3169	1376	97.2	304	9.6
2004	3272	1411	97.7	265	8.1
2005	3380	1452	97.0	275	8.1
2006	3355	1417	97.4	227	6.8
2007	3692	1581	98.0	266	7.2
2008	4072	1662	98.5	301	7.4
2009	4122	1655	98.5	250	6.1
2010	4069	1740	98.6	265	6.5
2011	3950	1837	99.0	273	6.9
2012	4020	1829	98.4	240	6.0
2013	3438	1872	98.8	237	6.9
1998-2013	51726	22376	96.7	3750	7.2

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	818	68.9	31.1	84.4
1999	813	71.1	28.9	86.7
2000	838	70.8	29.2	83.1
2001	828	67.0	33.0	83.2
2002	1247	71.9	28.1	86.4
2003	1376	70.0	30.0	84.6
2004	1411	75.8	24.2	85.8
2005	1452	69.4	30.6	81.5
2006	1417	72.1	27.9	83.7
2007	1581	69.7	30.3	81.5
2008	1662	69.0	31.0	80.4
2009	1655	67.8	32.2	79.2
2010	1740	68.6	31.4	80.2
2011	1837	67.7	32.3	80.4
2012	1829	66.6	33.4	78.9
2013	1872	62.6	37.4	75.6
1998-2013	22376	69.0	31.0	81.6

Table 11

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

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	818	76.4	72.8	83.2	76.0
1999	813	75.5	71.1	84.3	75.1
2000	838	76.3	71.2	85.1	74.9
2001	828	75.9	69.4	83.6	73.6
2002	1247	76.9	70.9	85.6	75.5
2003	1376	75.6	69.6	84.6	72.7
2004	1411	76.7	71.7	84.7	74.2
2005	1452	76.9	70.6	84.9	73.8
2006	1417	77.1	71.3	85.4	74.1
2007	1581	77.5	71.0	85.7	73.0
2008	1662	78.7	72.6	86.1	74.9
2009	1655	78.8	72.5	85.9	74.8
2010	1740	78.5	73.3	86.0	75.3
2011	1837	78.7	73.6	86.3	75.5
2012	1829	78.1	73.2	87.0	75.0
2013	1872	79.0	74.2	86.2	76.4
1998-2013	22376	77.5	72.3	85.6	74.8

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 12

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

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	565	48.0	0.30	21.8	0.24	32.1	0.26	40.3	0.29
1999	578	48.7	0.30	22.8	0.25	33.3	0.26	41.2	0.29
2000	593	49.4	0.31	22.9	0.25	33.4	0.27	41.5	0.29
2001	555	45.6	0.28	21.6	0.23	31.4	0.25	38.6	0.27
2002	897	45.8	0.27	20.7	0.22	30.3	0.24	37.6	0.25
2003	965	49.0	0.31	23.0	0.27	33.4	0.28	40.8	0.30
2004	1069	54.1	0.34	23.9	0.27	35.2	0.29	44.0	0.31
2005	1008	50.7	0.31	23.0	0.26	33.4	0.27	41.3	0.29
2006	1023	50.9	0.31	22.3	0.25	32.7	0.27	41.1	0.30
2007	1105	47.9	0.31	21.0	0.25	30.7	0.26	38.2	0.29
2008	1149	49.5	0.29	20.6	0.22	30.4	0.24	38.5	0.26
2009	1124	48.3	0.28	20.5	0.22	30.2	0.23	37.7	0.26
2010	1195	51.1	0.30	20.7	0.23	30.8	0.25	39.2	0.28
2011	1244	52.7	0.32	21.1	0.24	31.3	0.26	39.5	0.29
2012	1220	51.7	0.31	20.9	0.23	31.1	0.25	39.2	0.28
2013	1171	49.6	0.35	19.5	0.25	29.2	0.28	37.6	0.31
1998-2013	15461	49.8	0.31	21.5	0.24	31.6	0.26	39.6	0.28

Table 13

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

Age at death Years	Cases n	%	Cum.%
0-4	1	0.0	0.0
5-9	0	0.0	0.0
10-14	0	0.0	0.0
15-19	0	0.0	0.0
20-24	2	0.0	0.0
25-29	16	0.1	0.1
30-34	70	0.4	0.5
35-39	174	1.0	1.5
40-44	451	2.7	4.2
45-49	699	4.1	8.3
50-54	1011	6.0	14.3
55-59	1401	8.2	22.5
60-64	1767	10.4	32.9
65-69	1998	11.8	44.7
70-74	2161	12.7	57.4
75-79	2227	13.1	70.5
80-84	2180	12.8	83.3
85+	2830	16.7	100.0
All ages	16988	100.0	

Included in the statistics are 24.7% multiple primaries.

Table 14

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

Age at death Years	Cases n	Age-spec. mortality	MI-index	Prop. all cancers %
0- 4	1	0.1	1.00	3.8
5- 9		0.0		
10-14		0.0		
15-19		0.0		
20-24	2	0.1	0.09	3.9
25-29	16	0.8	0.08	13.9
30-34	70	3.2	0.12	30.8
35-39	174	7.4	0.12	33.7
40-44	451	18.1	0.15	39.7
45-49	699	30.2	0.16	34.7
50-54	1011	49.2	0.20	32.6
55-59	1401	72.9	0.25	29.5
60-64	1767	94.2	0.26	27.1
65-69	1998	115.8	0.29	24.0
70-74	2161	142.3	0.40	21.9
75-79	2227	187.5	0.49	20.8
80-84	2180	233.7	0.62	19.4
85+	2830	316.6	0.74	20.7
All ages	16988			23.5
Mortality				
Raw		54.7	0.33	
WS		23.7	0.26	
ES		34.9	0.28	
BRD-S		43.6	0.30	
PYLL-70				
per 100,000		341.9		
ES		292.9		
AYLL-70		12.0		

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

Table 15

Multiple primaries in deaths in period 1998-2013

Diagnosis		Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C15	Oesophagus	61	1.0	4	6.6	4	6.6	53	86.9
C16	Stomach	262	4.1	52	19.8	19	7.3	191	72.9
C18	Colon	497	7.8	134	27.0	34	6.8	329	66.2
C19-C20	Rectum	199	3.1	57	28.6	17	8.5	125	62.8
C23-C24	Bile	65	1.0	2	3.1	2	3.1	61	93.8
C25	Pancreas	267	4.2	14	5.2	12	4.5	241	90.3
C33-C34	Lung	501	7.8	42	8.4	40	8.0	419	83.6
C43	Malign. melanoma	182	2.8	88	48.4	12	6.6	82	45.1
C44	Skin others	196	3.1	59	30.1	21	10.7	116	59.2
C50	Breast	1821	28.5			624	34.3	1197	65.7
C53	Cervix uteri	143	2.2	78	54.5	14	9.8	51	35.7
C54	Corpus uteri	334	5.2	122	36.5	29	8.7	183	54.8
C56	Ovary	366	5.7	86	23.5	36	9.8	244	66.7
C64	Kidney	115	1.8	47	40.9	14	12.2	54	47.0
C67	Bladder	152	2.4	42	27.6	7	4.6	103	67.8
C70-C72	CNS cancer	146	2.3	29	19.9	17	11.6	100	68.5
C73	Thyroid	81	1.3	39	48.1	1	1.2	41	50.6
C76-C79	CUP	91	1.4	26	28.6	7	7.7	58	63.7
C82-C85	NHL	188	2.9	55	29.3	22	11.7	111	59.0
C90	Mult. myeloma	78	1.2	9	11.5	5	6.4	64	82.1
C91-C96	Leukaemia	177	2.8	22	12.4	8	4.5	147	83.1
Other primaries		469	7.3	109	23.2	31	6.6	329	70.1
All mult. primaries		6391	100.0	1116	17.5	976	15.3	4299	67.3

Multiple primaries with number of cases 1 to 60 are pooled in category "Other primaries".

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

Table 16

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

Age at death Years	Cases n	Age-spec. mortality	MI-index	Prop. all cancers %
0- 4		0.0		
5- 9		0.0		
10-14		0.0		
15-19		0.0		
20-24	2	0.1	0.09	4.3
25-29	16	0.8	0.08	14.7
30-34	62	2.8	0.11	30.8
35-39	153	6.5	0.11	32.8
40-44	381	15.3	0.14	38.3
45-49	586	25.4	0.15	33.9
50-54	814	39.6	0.19	31.2
55-59	1129	58.7	0.23	28.2
60-64	1398	74.5	0.25	26.2
65-69	1578	91.5	0.29	23.5
70-74	1667	109.8	0.40	21.3
75-79	1775	149.4	0.52	20.7
80-84	1676	179.7	0.64	18.9
85+	2179	243.8	0.73	19.8
All ages	13416			22.9
Mortality				
Raw		43.2	0.32	
WS		18.9	0.25	
ES		27.8	0.27	
BRD-S		34.6	0.29	
PYLL-70				
per 100,000		280.9		
ES		240.6		
AYLL-70		12.2		

* 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	Cases n	Age-spec. mortality	MI-index	Prop. all cancers %
0- 4		0.0		
5- 9		0.0		
10-14		0.0		
15-19		0.0		
20-24	2	0.1	0.09	4.5
25-29	16	0.8	0.09	15.5
30-34	53	2.4	0.10	29.1
35-39	141	6.0	0.11	33.1
40-44	340	13.7	0.13	37.2
45-49	504	21.8	0.14	32.5
50-54	682	33.2	0.17	29.2
55-59	948	49.3	0.22	26.6
60-64	1098	58.5	0.21	23.7
65-69	1170	67.8	0.23	20.6
70-74	1184	78.0	0.31	18.0
75-79	1265	106.5	0.41	17.6
80-84	1172	125.6	0.49	15.8
85+	1638	183.3	0.57	17.3
All ages	10213			20.3
Mortality				
Raw		32.9	0.26	
WS		14.9	0.21	
ES		21.6	0.22	
BRD-S		26.5	0.24	
PYLL-70				
per 100,000		237.4		
ES		203.8		
AYLL-70		12.7		

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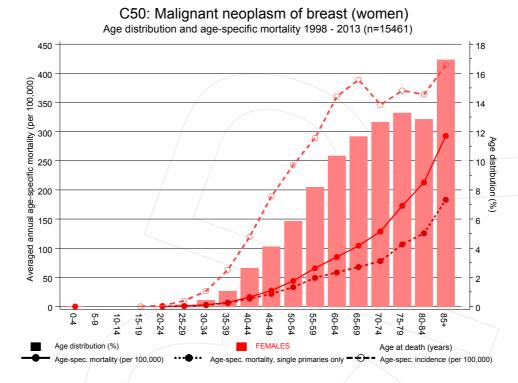
Figure 18. Distribution of age at death (bars) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

The difference between age at diagnosis (Table 3) and age at breast cancer (women)-related death (see Table 10) should be considered.

Average mortality (world standard population) 2007 - 2013
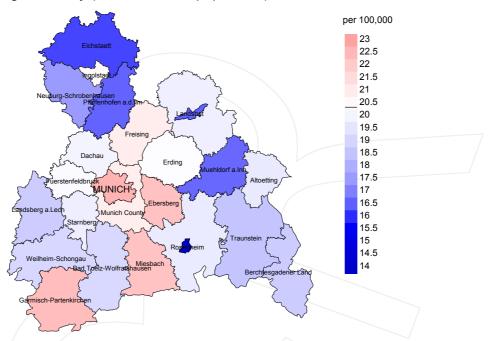
Figure 19a. Map of cancer mortality (world standard population) by county averaged for period 2007 to 2013. According to their individual mortality rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (20.4/100,000 WS N=8,096).

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 237 women died from breast cancer (women). Therefore, the mean mortality rate for this cancer type in this area can be calculated at 22.3/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 18.2 and 27.2/100,000.

Standardized mortality ratio (SMR) 2007 - 2013
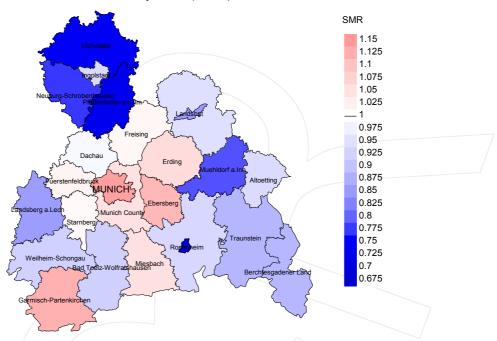
Figure 19b. Map of standardized mortality ratio (SMR, incl. DCO cases) by county averaged for period 2007 to 2013. According to their individual SMR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (N=8,096).

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 237 women died from breast cancer (women). Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 1.11. Though, the value of this parameter may vary with an underlying probability of 99% between 0.94 and 1.31, 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

Recommended Citation

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