Munich Cancer Registry

- Survival
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- *Deutsch*

ICD-10 C50: Breast cancer (women)

Incidence and Mortality

Year of diagnosis	1998-2014
Patients	53,128
Diseases	55,500
Creation date	04/13/2016
Export date	12/23/2015
Population (females)	2.36 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/bC50f_E-ICD-10-C50-Breast-cancer-women-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.

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

All patients with invasive cancer by year of diagnosis, proportions of DCO, multiple primaries, deaths, and active follow-up (incl. DCO)

Year of diagnosis	Cases n	DCO cases n	Prop. DCO %	Prop. mult. primaries %	Prop. deaths %	Prop. actively followed %	
1998	1909	110	5.8	31.1	55.0	97.3	
1999	1955	88	4.5	28.1	48.8	96.2	
2000	1964	81	4.1	28.4	48.6	97.2	
2001	1994	91	4.6	29.4	44.7	96.3	
2002	3378	264	7.8	26.6	46.9	96.6	#
2003	3169	240	7.6	26.0	45.5	95.9	
2004	3279	194	5.9	25.9	39.9	95.1	
2005	3385	191	5.6	25.7	38.0	95.5	
2006	3363	133	4.0	25.6	32.6	92.4	
2007	3696	186	5.0	24.1	33.1	73.1	#
2008	4085	168	4.1	23.9	27.8	61.5	
2009	4142	187	4.5	23.9	25.5	61.5	
2010	4094	169	4.1	23.5	22.2	61.6	
2011	3963	164	4.1	23.8	19.9	63.6	
2012	4056	132	3.3	22.2	15.0	76.9	
2013	3841	148	3.9	22.9	11.7	98.9	
2014	3227	138	4.3	22.5	6.9	94.9	##
1998-2014	55500	2684	4.8	25.0	30.6	83.1	

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 2

Incidence measures by year of diagnosis 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	1955	164.8	94.3	129.1	146.5
2000	1964	163.5	91.8	126.8	144.5
2001	1994	163.9	94.0	129.0	146.8
2002	3378	172.5	95.5	131.6	151.5
2003	3169	160.9	87.2	120.4	139.1
2004	3279	165.9	91.5	125.1	143.6
2005	3385	170.1	92.7	127.5	146.0
2006	3363	167.4	92.0	125.4	142.8
2007	3696	160.1	87.1	119.6	136.4
2008	4085	176.0	95.6	130.8	150.2
2009	4142	178.1	97.0	132.9	151.5
2010	4094	174.9	93.5	128.6	146.6
2011	3963	167.9	89.6	122.9	140.5
2012	4056	171.9	91.8	126.0	144.9
2013	3841	162.8	87.1	119.2	136.9
2014	3227	136.8	74.1	101.4	115.9
1998-2014	55500	166.1	90.8	124.6	142.6

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	1955	62.2	14.1	23.9	99.3	43.9	52.5	61.3	73.0	81.4
2000	1964	63.0	14.0	20.4	100	44.7	53.3	62.0	74.0	81.8
2001	1994	62.5	13.9	24.3	97.7	44.4	52.8	61.6	72.9	81.2
2002	3378	64.0	14.3	21.5	99.4	45.1	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	3279	63.7	14.5	18.8	98.9	44.6	53.5	63.8	74.3	83.2
2005	3385	64.1	14.1	21.7	102	45.1	54.7	64.1	74.0	83.1
2006	3363	63.5	14.3	23.3	102	43.8	53.3	64.4	72.7	82.6
2007	3696	64.0	14.4	20.7	103	44.6	53.1	64.7	73.7	83.8
2008	4085	63.8	14.1	21.6	109	44.6	53.3	64.7	73.4	82.4
2009	4142	63.8	14.0	25.0	109	45.1	53.3	64.3	73.4	82.7
2010	4094	64.1	14.2	23.9	105	45.2	52.8	64.7	74.0	83.7
2011	3963	64.0	14.4	21.7	102	45.3	52.4	64.6	74.3	83.8
2012	4056	63.8	14.2	23.9	101	45.2	52.3	64.4	74.5	82.5
2013	3841	63.8	14.6	0.3	108	45.1	52.1	64.3	74.7	83.4
2014	3227	63.5	14.3	1.1	106	45.2	51.7	63.9	74.1	81.7
1998-2014	55500	63.7	14.3	0.3	109	44.8	52.9	63.8	74.0	82.9

Table 4

Age distribution by 5-year age group for period 2007-2014
(incl. DCO)

Age at diagnosis Years	Cases n	%	Cum.%
0-4	2	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	12	0.0	0.0
25-29	124	0.4	0.4
30-34	337	1.1	1.5
35-39	807	2.6	4.1
40-44	1805	5.8	9.9
45-49	2879	9.3	19.2
50-54	3242	10.4	29.6
55-59	3043	9.8	39.4
60-64	3746	12.0	51.4
65-69	4293	13.8	65.2
70-74	3648	11.7	77.0
75-79	2755	8.9	85.8
80-84	2036	6.5	92.4
85+	2375	7.6	100.0
All ages	31104	100.0	

Included in the statistics are 24.5% multiple primaries.

Table 5

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

Age at diagnosis Years	Cases n	Age-spec. incidence	DCO rate n=1292 %	Prop. all cancers n=89596 %
0- 4	2	0.2	100.0	1.4
5- 9		0.0		
10-14		0.0		
15-19		0.0		
20-24	12	1.1		3.9
25-29	123	10.0		18.6
30-34	333	26.7		28.8
35-39	800	63.5	0.5	40.3
40-44	1781	116.4	0.5	47.4
45-49	2814	185.6	0.6	51.6
50-54	3171	247.7	0.6	46.8
55-59	2968	264.1	0.7	39.8
60-64	3664	345.5	1.0	39.8
65-69	4176	400.1	1.2	36.5
70-74	3542	338.8	2.2	29.9
75-79	2651	371.6	4.6	26.4
80-84	1963	350.1	11.8	22.3
85+	2299	397.8	30.4	22.4
All ages	30299		4.3	33.8
Incidence				
Raw		161.7		
WS		87.5		
ES		119.8		
BRD-S		136.9		

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).

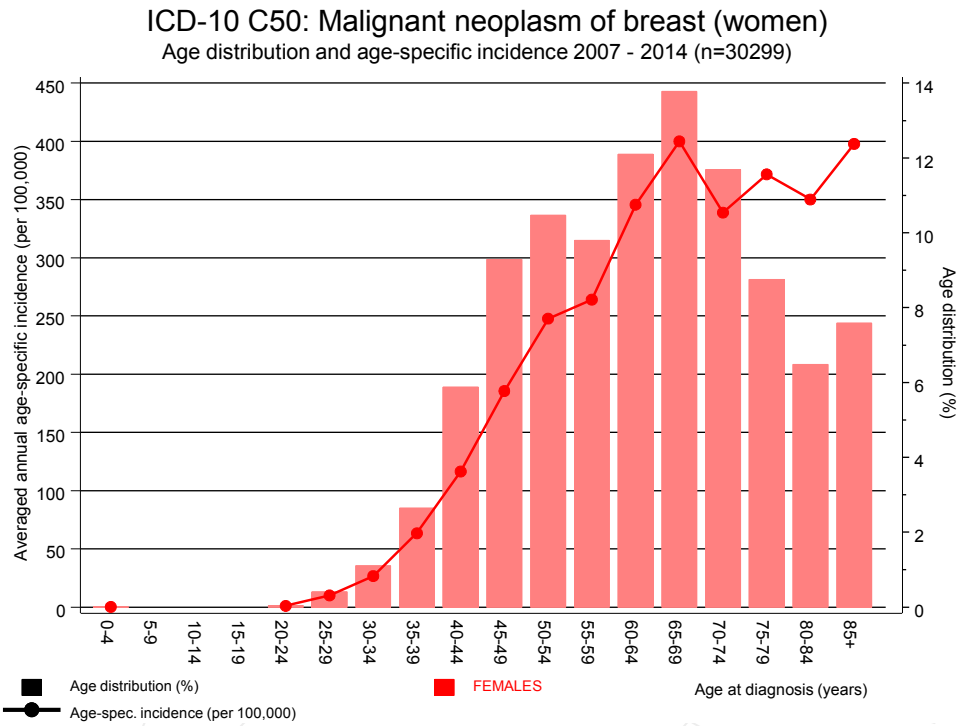

Figure 6. Age distribution and age-specific incidence

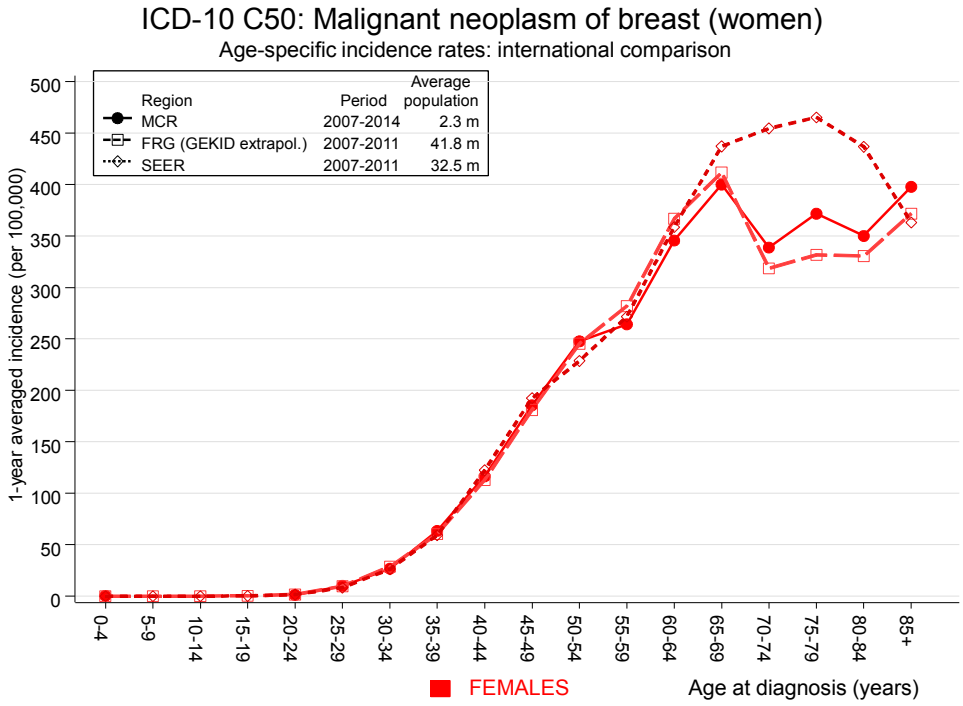

Figure 6a. Age-specific incidence in MCR registry areas compared to Germany (FRG, GEKID extrapolation) and SEER (Surveillance, Epidemiology, and End Results, USA).

Reference:

Extrapolated age-specific patient population of Germany, data status middle of 2010. Association of Population-based Cancer Registries in Germany (GEKID e.V.). Berlin, 2014. http://www.gekid.de. Last access: 02/11/2015

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.

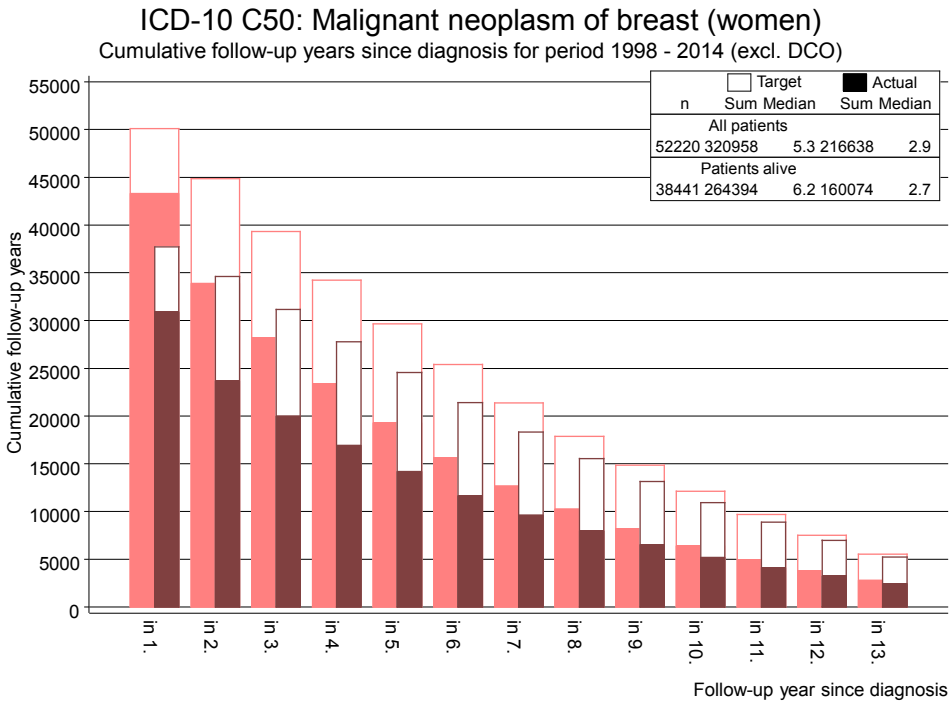

Figure 7. Cumulative follow-up years depending on time since diagnosis

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

Table 8

Standardized incidence ratio (SIR, with 95% confidence limits), excess absolute risk (EAR) and DCO rate of second primaries for period 1998-2014

Diagnosis		Observed n	Expected n	SIR	LCL 95%	UCL 95%		EAR	DCO %
C03-C06	Oral cavity	25	13.0	1.9	1.2	2.8	#	0.6	
C07-C08	Salivary gland	10	3.3	3.0	1.5	5.6	#	0.3	10.0
C09-C10	Oropharynx	16	9.5	1.7	1.0	2.7		0.3	
C15	Oesophagus	31	12.8	2.4	1.6	3.4	#	0.9	9.7
C16	Stomach	156	69.1	2.3	1.9	2.6	#	4.2	8.3
C17	Small intestine	22	10.3	2.1	1.3	3.2	#	0.6	
C18	Colon	331	194.9	1.7	1.5	1.9	#	6.5	6.3
C19-C20	Rectum	137	86.3	1.6	1.3	1.9	#	2.4	5.1
C21	Anus/canal	20	11.2	1.8	1.1	2.8	#	0.4	5.0
C22	Liver	33	23.4	1.4	1.0	2.0		0.5	30.3
C23-C24	Bile	43	27.8	1.5	1.1	2.1	#	0.7	18.6
C25	Pancreas	172	87.0	2.0	1.7	2.3	#	4.1	20.3
C26	GI cancer	9	3.4	2.7	1.2	5.1	#	0.3	44.4
C30-C31	Sinuses	6	2.5	2.4	0.9	5.2		0.2	16.7
C33-C34	Lung	319	154.6	2.1	1.8	2.3	#	7.9	13.5
C43	Malign. melanoma	165	81.7	2.0	1.7	2.4	#	4.0	2.4
C46,C49	Soft tissue	39	11.8	3.3	2.4	4.5	#	1.3	5.1
C48	Peritoneal	17	8.1	2.1	1.2	3.4	#	0.4	
C50	Breast	2349	676.4	3.5	3.3	3.6	#	80.3	
C51	Vulva	42	20.0	2.1	1.5	2.8	#	1.1	2.4
C52	Vagina	9	3.9	2.3	1.0	4.3	#	0.2	11.1
C53	Cervix uteri	53	31.0	1.7	1.3	2.2	#	1.1	5.7
C54	Corpus uteri	259	119.2	2.2	1.9	2.5	#	6.7	1.9
C55,C57	Fem. genitals un	9	4.3	2.1	0.9	3.9		0.2	33.3
C56	Ovary	194	86.4	2.2	1.9	2.6	#	5.2	7.2
C64	Kidney	113	50.7	2.2	1.8	2.7	#	3.0	5.3
C65	Renal pelvis	10	6.2	1.6	0.8	3.0		0.2	
C66	Ureter	6	3.1	1.9	0.7	4.2		0.1	
C67	Bladder	56	36.5	1.5	1.2	2.0	#	0.9	7.1
C69	Eye melanoma	8	2.5	3.1	1.4	6.2	#	0.3	
C70-C72	CNS cancer	40	29.1	1.4	1.0	1.9		0.5	15.0
C73	Thyroid	67	41.5	1.6	1.3	2.0	#	1.2	4.5
C76-C79	CUP	31	35.0	0.9	0.6	1.3		-0.2	6.5
C81	Hodgkin lymphoma	9	3.9	2.3	1.0	4.3	#	0.2	11.1
C82-C85	NHL	143	78.6	1.8	1.5	2.1	#	3.1	4.2
C90	Mult. myeloma	42	24.4	1.7	1.2	2.3	#	0.8	21.4
C91-C96	Leukaemia	101	32.2	3.1	2.6	3.8	#	3.3	10.9
Other primaries		32	24.5	1.3	0.9	1.8		0.4	
Not observed		0	1.7	0.0	0.0	2.2		-0.1	
All mult. primaries		5124	2122.0	2.4	2.3	2.5	#	144.2	4.4

Table 8

Standardized incidence ratio (SIR, with 95% confidence limits), excess absolute risk (EAR) and DCO rate of second primaries for period 1998-2014

Diagnosis	Observed n	Expected n	SIR	LCL 95%	UCL 95%	EAR	DCO %
Patients			50200				
Median age at second malignancy (years)			69.2				
Person-years			208197				
Mean observation time (years)			4.1				
Median observation time (years)			2.9				

The occurrence of second malignancy is statistically significant.

Observed second primaries with count 1 to 5 are pooled in category “Other primaries”

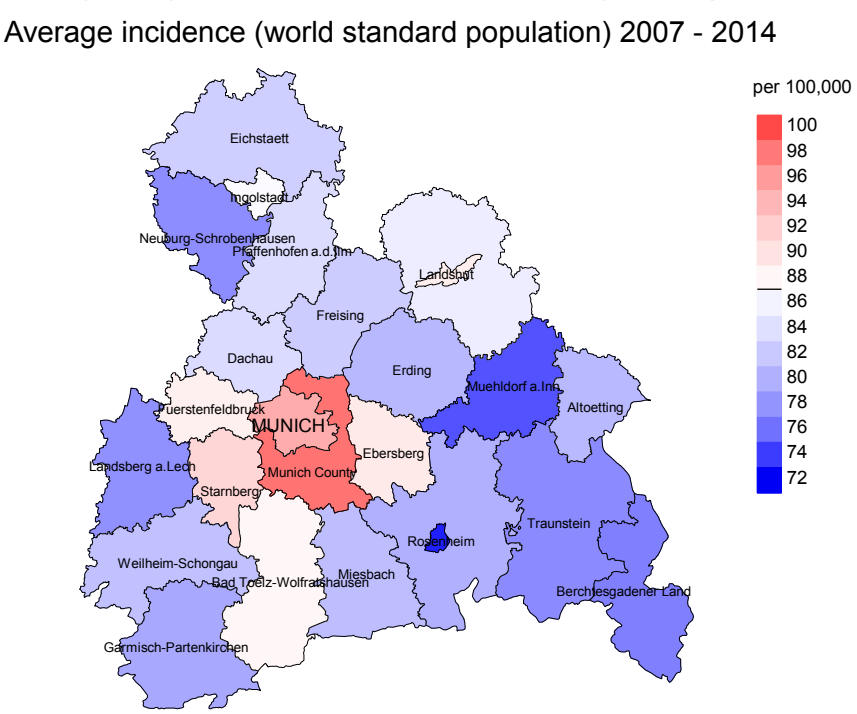

Figure 9a. Map of cancer incidence (world standard population, incl. DCO cases) by county averaged for period 2007 to 2014. According to their individual incidence rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (87.2/100,000 WS N=30,299).

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 867 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 89.4/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 81.2 and 98.3/100,000.

Standardized incidence ratio (SIR) 2007 - 2014

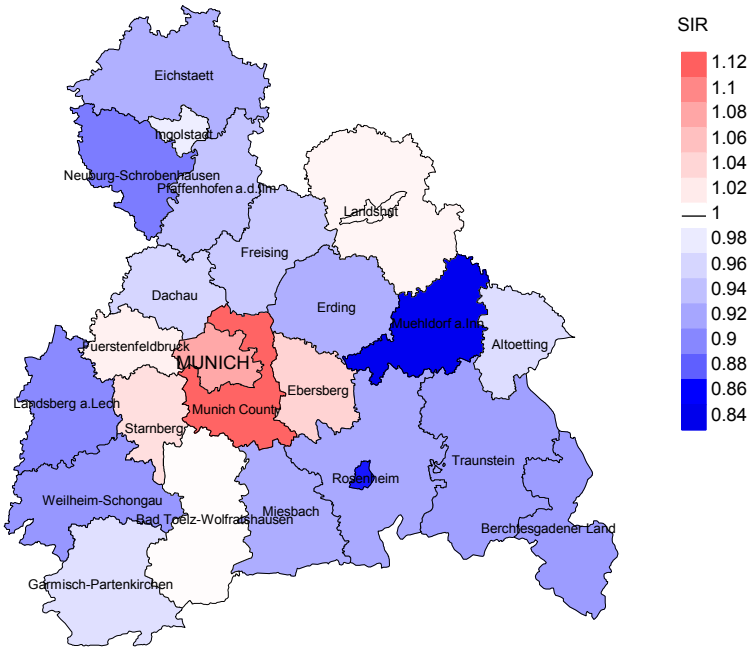

Figure 9b. Map of standardized incidence ratio (SIR, incl. DCO cases) by county averaged for period 2007 to 2014. According to their individual SIR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (N=30,299).

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 867 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 1.04. Though, the value of this parameter may vary with an underlying probability of 99% between 0.95 and 1.14, 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	97.3	5.8	1049	55.0	94.2
1999	1955	96.2	4.5	955	48.8	95.0
2000	1964	97.2	4.1	955	48.6	97.1
2001	1994	96.3	4.6	891	44.7	96.3
2002	3378	96.6	7.8	1585	46.9	98.0
2003	3169	95.9	7.6	1441	45.5	97.0
2004	3279	95.1	5.9	1308	39.9	97.9
2005	3385	95.5	5.6	1285	38.0	98.3
2006	3363	92.4	4.0	1098	32.6	98.8
2007	3696	73.1	5.0	1225	33.1	97.8
2008	4085	61.5	4.1	1136	27.8	98.3
2009	4142	61.5	4.5	1058	25.5	98.5
2010	4094	61.6	4.1	909	22.2	97.1
2011	3963	63.6	4.1	787	19.9	98.5
2012	4056	76.9	3.3	610	15.0	97.2
2013	3841	98.9	3.9	450	11.7	97.1
2014	3227	94.9	4.3	222	6.9	97.3
1998-2014	55500	83.1	4.8	16964	30.6	97.4

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	1955	813	87.8	117	6.0
2000	1964	838	90.5	122	6.2
2001	1994	828	90.8	119	6.0
2002	3378	1247	96.9	334	9.9
2003	3169	1378	97.2	303	9.6
2004	3279	1411	97.7	265	8.1
2005	3385	1452	97.0	275	8.1
2006	3363	1417	97.4	227	6.7
2007	3696	1581	98.0	266	7.2
2008	4085	1663	98.5	301	7.4
2009	4142	1655	98.5	250	6.0
2010	4094	1742	98.5	265	6.5
2011	3963	1838	99.0	273	6.9
2012	4056	1831	98.3	240	5.9
2013	3841	1929	98.6	265	6.9
2014	3227	1774	98.7	206	6.4
1998-2014	55500	24215	96.9	3983	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	1378	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	1663	69.1	30.9	80.4
2009	1655	68.0	32.0	79.2
2010	1742	68.7	31.3	80.2
2011	1838	67.9	32.1	80.4
2012	1831	66.8	33.2	78.9
2013	1929	63.3	36.7	76.1
2014	1774	63.6	36.4	76.5
1998-2014	24215	68.7	31.3	81.3

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	1378	75.7	69.6	84.7	72.8
2004	1411	76.7	71.7	84.7	74.2
2005	1452	76.9	70.6	85.0	73.8
2006	1417	77.1	71.3	85.4	74.1
2007	1581	77.5	71.0	85.7	73.0
2008	1663	78.7	72.6	86.1	74.9
2009	1655	78.8	72.5	85.9	74.8
2010	1742	78.4	73.3	86.0	75.3
2011	1838	78.7	73.6	86.4	75.5
2012	1831	78.2	73.2	87.0	75.0
2013	1929	79.0	74.3	86.2	76.4
2014	1774	80.1	75.0	87.3	77.2
1998-2014	24215	77.7	72.5	85.8	75.0

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 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	966	49.0	0.31	23.0	0.27	33.4	0.28	40.9	0.30
2004	1069	54.1	0.33	23.9	0.27	35.2	0.29	44.0	0.31
2005	1009	50.7	0.31	23.0	0.26	33.5	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	1151	49.6	0.29	20.6	0.22	30.5	0.24	38.6	0.26
2009	1128	48.5	0.28	20.5	0.22	30.3	0.23	37.8	0.26
2010	1198	51.2	0.30	20.8	0.23	30.9	0.25	39.3	0.28
2011	1248	52.9	0.32	21.2	0.24	31.4	0.26	39.6	0.29
2012	1224	51.9	0.31	20.9	0.23	31.1	0.25	39.3	0.28
2013	1221	51.7	0.33	20.3	0.24	30.4	0.26	39.2	0.29
2014	1130	47.9	0.36	18.0	0.25	27.3	0.28	35.7	0.32
1998-2014	16660	49.9	0.31	21.3	0.24	31.5	0.26	39.5	0.28

Table 13

Age distribution of age at death (cancer-related) for period 2007-2014
(**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	0	0.0	0.0
25-29	7	0.1	0.1
30-34	33	0.3	0.4
35-39	82	0.8	1.2
40-44	231	2.2	3.4
45-49	408	3.9	7.3
50-54	547	5.3	12.6
55-59	752	7.2	19.8
60-64	927	8.9	28.7
65-69	1207	11.6	40.3
70-74	1520	14.6	55.0
75-79	1340	12.9	67.8
80-84	1387	13.3	81.2
85+	1958	18.8	100.0
All ages	10400	100.0	

Included in the statistics are 24.5% multiple primaries.

Table 14

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

Age at death Years	Cases n	Age-spec. mortality	MI-index	Prop. all cancers %
0- 4	1	0.1	0.50	6.7
5- 9		0.0		
10-14		0.0		
15-19		0.0		
20-24		0.0		
25-29	7	0.6	0.06	10.9
30-34	33	2.6	0.10	30.0
35-39	82	6.5	0.10	31.8
40-44	231	15.1	0.13	36.6
45-49	408	26.9	0.14	33.5
50-54	547	42.7	0.17	30.7
55-59	752	66.9	0.25	28.8
60-64	927	87.4	0.25	26.0
65-69	1207	115.6	0.28	23.1
70-74	1520	145.4	0.42	23.1
75-79	1340	187.9	0.49	21.3
80-84	1387	247.4	0.68	21.1
85+	1958	338.8	0.82	22.6
All ages	10400			23.8
Mortality				
Raw		55.5	0.33	
WS		22.6	0.25	
ES		33.6	0.27	
BRD-S		42.6	0.30	
PYLL-70				
per 100,000		307.8		
ES		260.7		
AYLL-70		11.6		

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

Table 15

Multiple primaries in deaths in period 1998-2014

Diagnosis		Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C16	Stomach	281	4.0	56	19.9	19	6.8	206	73.3
C18	Colon	535	7.6	147	27.5	37	6.9	351	65.6
C19-C20	Rectum	217	3.1	63	29.0	17	7.8	137	63.1
C23-C24	Bile	75	1.1	2	2.7	3	4.0	70	93.3
C25	Pancreas	302	4.3	14	4.6	13	4.3	275	91.1
C33-C34	Lung	560	8.0	47	8.4	44	7.9	469	83.8
C43	Malign. melanoma	200	2.9	97	48.5	12	6.0	91	45.5
C44	Skin others	226	3.2	69	30.5	24	10.6	133	58.8
C50	Breast	1971	28.1			674	34.2	1297	65.8
C53	Cervix uteri	160	2.3	88	55.0	14	8.8	58	36.3
C54	Corpus uteri	370	5.3	136	36.8	31	8.4	203	54.9
C56	Ovary	399	5.7	94	23.6	39	9.8	266	66.7
C64	Kidney	131	1.9	56	42.7	16	12.2	59	45.0
C67	Bladder	165	2.4	45	27.3	8	4.8	112	67.9
C70-C72	CNS cancer	172	2.5	36	20.9	20	11.6	116	67.4
C73	Thyroid	89	1.3	45	50.6	1	1.1	43	48.3
C76-C79	CUP	99	1.4	28	28.3	7	7.1	64	64.6
C82-C85	NHL	204	2.9	59	28.9	23	11.3	122	59.8
C90	Mult. myeloma	87	1.2	12	13.8	6	6.9	69	79.3
C91-C96	Leukaemia	197	2.8	23	11.7	9	4.6	165	83.8
Other primaries		570	8.1	126	22.1	36	6.3	408	71.6
All mult. primaries		7010	100.0	1243	17.7	1053	15.0	4714	67.2

Multiple primaries with number of cases 1 to 64 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 2007-2014
(**First 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		0.0		
25-29	7	0.6	0.06	11.9
30-34	28	2.2	0.09	29.5
35-39	72	5.7	0.10	31.7
40-44	194	12.7	0.12	35.0
45-49	340	22.4	0.14	33.2
50-54	434	33.9	0.16	29.2
55-59	580	51.6	0.23	27.0
60-64	719	67.8	0.24	25.3
65-69	948	90.8	0.28	23.1
70-74	1154	110.4	0.43	22.7
75-79	1035	145.1	0.53	21.3
80-84	1043	186.0	0.71	20.7
85+	1455	251.8	0.81	21.4
All ages	8009			23.3
Mortality				
Raw		42.7	0.32	
WS		17.7	0.24	
ES		26.1	0.26	
BRD-S		33.0	0.29	
PYLL-70				
per 100,000		248.0		
ES		209.7		
AYLL-70		11.8		

* 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	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		0.0		
25-29	7	0.6	0.06	12.5
30-34	23	1.8	0.08	27.7
35-39	66	5.2	0.09	32.2
40-44	174	11.4	0.11	34.2
45-49	292	19.3	0.12	31.9
50-54	360	28.1	0.13	27.1
55-59	467	41.6	0.19	24.9
60-64	544	51.3	0.19	22.5
65-69	674	64.6	0.21	19.9
70-74	770	73.7	0.30	18.6
75-79	716	100.4	0.39	18.0
80-84	705	125.7	0.51	17.2
85+	1052	182.0	0.61	18.7
All ages	5850			20.4
Mortality				
Raw		31.2	0.25	
WS		13.4	0.19	
ES		19.6	0.20	
BRD-S		24.3	0.22	
PYLL-70				
per 100,000		205.6		
ES		174.2		
AYLL-70		12.5		

* See corresponding tables with multiple primaries.

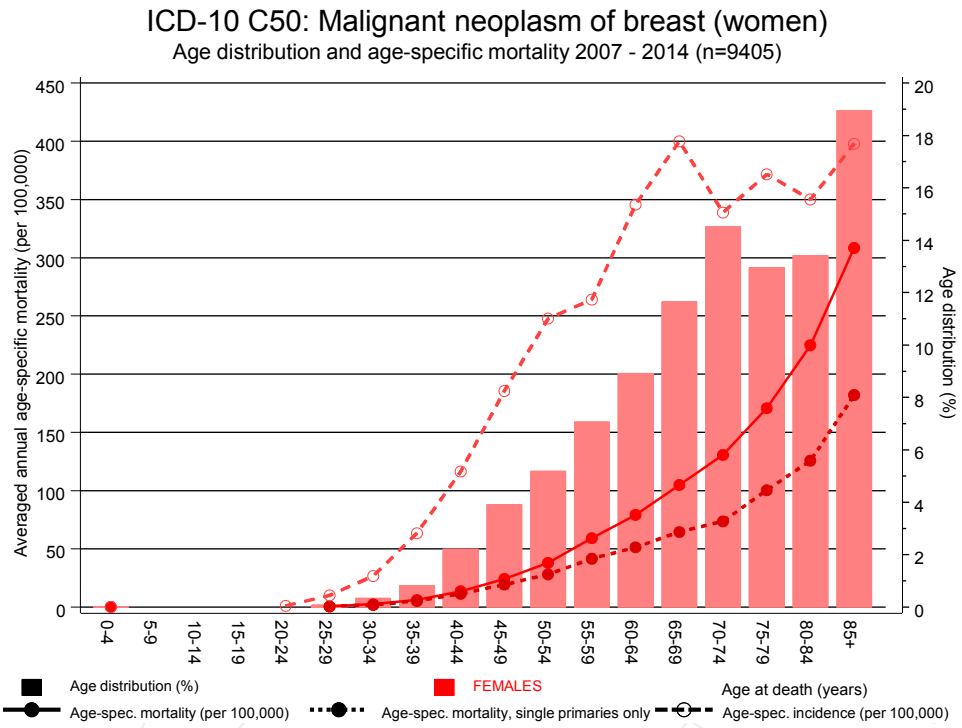

Figure 18. Distribution of age at death (bars) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

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

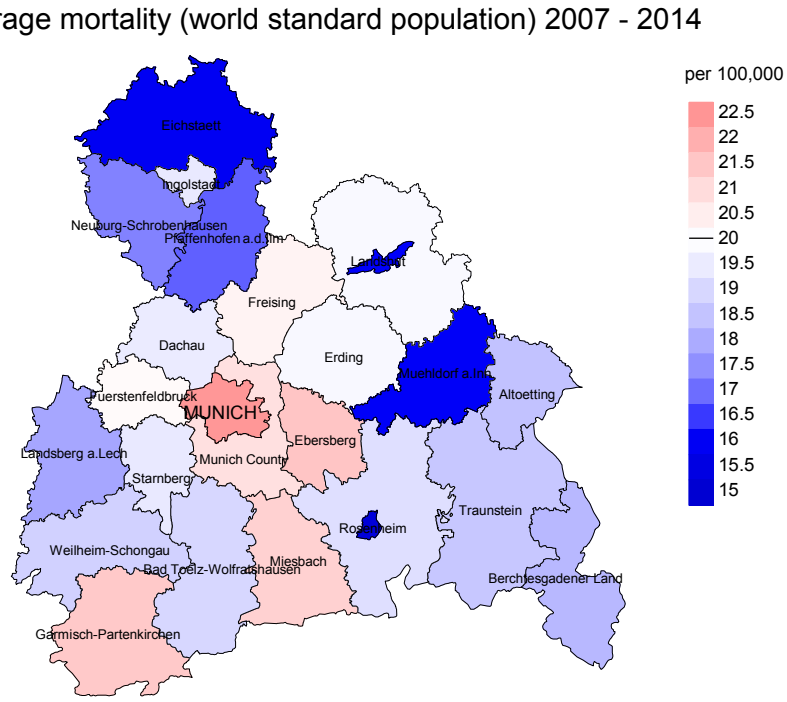

Figure 19a. Map of cancer mortality (world standard population) by county averaged for period 2007 to 2014. According to their individual mortality rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (20.1/100,000 WS N=9,277).

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 272 women died from breast cancer (women). Therefore, the mean mortality rate for this cancer type in this area can be calculated at 21.6/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 17.9 and 26.0/100,000.

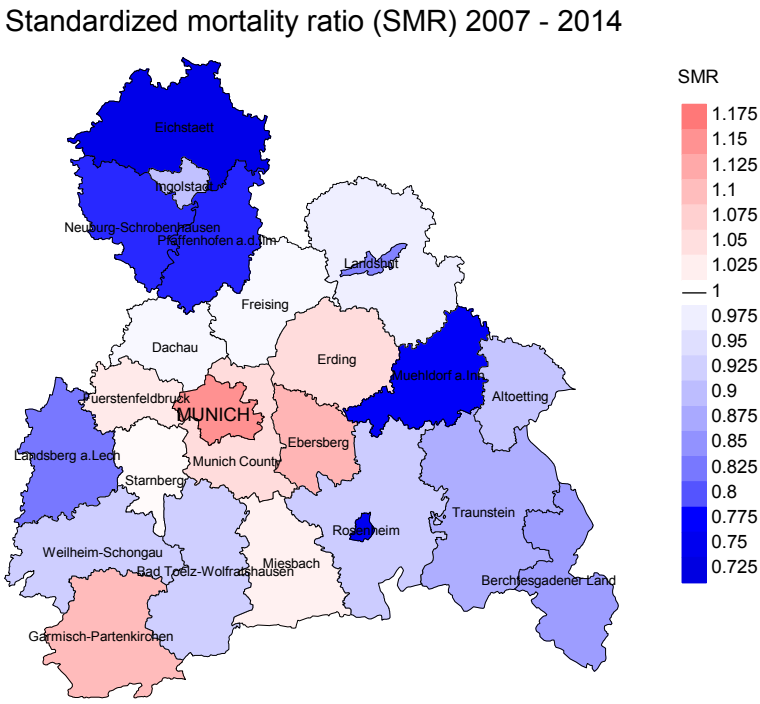

Figure 19b. Map of standardized mortality ratio (SMR, incl. DCO cases) by county averaged for period 2007 to 2014. According to their individual SMR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (N=9,277).

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 272 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 0.95 and 1.30, 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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