Munich Cancer Registry

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

Cancer statistics: Baseline statistics

C18.1: Appendix cancer

Year of diagnosis	1998-2012
Patients	494
Diseases	494
Creation date	03/20/2014
Export date	02/12/2014
Population	4.5 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 4.5 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-O-3 codes (topography) used for specifying cancer site

ICD-O-3	Description
C18.1	Appendix

INCIDENCE

Table 1

Patient cohorts by year of diagnosis including DCO cases
and multiple primaries, and with proportion of deaths and active follow-up

Year of diagnosis	Cases n	DCO cases n	Prop. DCO %	Prop. mult. primaries %	Prop. deaths %	Prop. actively followed %
1998	17			23.5	52.9	100.0
1999	15			26.7	33.3	93.3
2000	18			27.8	11.1	94.4
2001	14			21.4	57.1	100.0
2002	39			28.2	43.6	94.9 #
2003	24			29.2	50.0	95.8 #
2004	24			25.0	33.3	95.8 #
2005	31			35.5	61.3	93.5 #
2006	28			28.6	42.9	85.7 #
2007	42			21.4	33.3	76.2 # ##
2008	35			22.9	31.4	57.1
2009	44			31.8	40.9	63.6
2010	47			12.8	27.7	68.1
2011	55			16.4	20.0	67.3
2012	61			18.0	9.8	98.4 ###
1998–2012	494			23.5	33.4	82.4

\#   The increases of incident cases in 2002 and 2007 reflect the expansion to additional registry areas.

\##   Since 2007 the percentage of actively followed patients sharply declined compared to the previous years. This is a consequence of ambiguous data protection rules that currently forbid cancer registries in Bavaria to obtain the essential life status informations from competent registration offices.

\###   Please be aware that data of recent annual patient cohorts may not yet be fully processed. Therefore, the presented figures and tables are potentially related to different time periods as pointed out in the respective headlines or legends.

Table 1a

Patient cohorts by year of diagnosis and gender
including DCO cases

Year of diagnosis	All n	Males n	Females n	Prop. males %
1998	17	8	9	47.1
1999	15	8	7	53.3
2000	18	7	11	38.9
2001	14	9	5	64.3
2002	39	19	20	48.7
2003	24	11	13	45.8
2004	24	12	12	50.0
2005	31	12	19	38.7
2006	28	15	13	53.6
2007	42	26	16	61.9
2008	35	18	17	51.4
2009	44	21	23	47.7
2010	47	23	24	48.9
2011	55	28	27	50.9
2012	61	28	33	45.9
1998-2012	494	245	249	49.6

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	8	9	0.7	0.8	0.5	0.5	0.6	0.6	0.6	0.6
1999	8	7	0.7	0.6	0.6	0.5	0.6	0.6	0.9	0.6
2000	7	11	0.6	0.9	0.4	0.7	0.5	0.8	0.6	0.9
2001	9	5	0.8	0.4	0.5	0.2	0.7	0.3	0.7	0.3
2002	19	20	1.0	1.0	0.7	0.7	0.9	0.9	1.0	1.0
2003	11	13	0.6	0.7	0.4	0.4	0.5	0.5	0.6	0.6
2004	12	12	0.6	0.6	0.4	0.5	0.6	0.5	0.7	0.5
2005	12	19	0.6	1.0	0.4	0.6	0.5	0.8	0.6	0.9
2006	15	13	0.8	0.6	0.4	0.4	0.6	0.5	0.8	0.6
2007	26	16	1.2	0.7	0.8	0.5	1.0	0.6	1.3	0.7
2008	18	17	0.8	0.7	0.5	0.4	0.7	0.5	0.7	0.6
2009	21	23	0.9	1.0	0.6	0.6	0.8	0.8	0.9	0.9
2010	23	24	1.0	1.0	0.6	0.7	0.8	0.9	1.0	0.9
2011	28	27	1.2	1.1	0.7	0.8	1.0	0.9	1.1	1.1
2012	28	33	1.2	1.4	0.8	1.3	1.1	1.3	1.2	1.5
1998-2012	245	249	0.9	0.9	0.6	0.6	0.8	0.7	0.9	0.8

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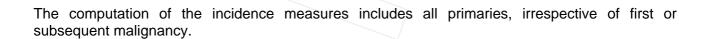
Table 3

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	17	57.3	20.9	13.2	87.9	32.1	46.7	56.0	64.1	87.6
1999	15	46.8	19.6	24.9	80.5	26.2	27.4	43.0	59.8	75.1
2000	18	50.2	13.5	24.7	81.6	32.7	41.6	49.3	60.1	64.1
2001	14	61.3	16.6	34.3	88.5	35.2	54.0	62.8	68.9	84.4
2002	39	56.8	18.4	17.7	90.9	29.9	45.4	61.3	71.7	78.6
2003	24	61.5	17.5	23.5	88.5	32.4	56.5	62.0	76.0	79.4
2004	24	56.1	21.8	13.8	83.3	27.8	35.0	61.6	74.8	81.0
2005	31	62.9	15.2	16.1	89.9	45.7	54.2	67.2	71.8	76.7
2006	28	64.0	13.4	40.8	91.1	44.8	52.9	64.7	74.0	81.2
2007	42	57.9	21.1	15.8	86.8	24.8	41.0	63.8	74.4	83.0
2008	35	58.2	19.6	18.9	91.4	33.7	44.5	59.2	73.2	84.3
2009	44	60.3	20.6	12.4	91.8	26.4	51.0	60.1	76.5	86.7
2010	47	59.4	19.4	14.9	94.1	31.8	43.5	64.6	70.8	81.9
2011	55	60.1	19.6	17.1	88.8	32.0	46.3	64.1	76.9	84.7
2012	61	51.1	21.1	13.7	87.3	20.3	27.9	53.6	67.9	75.5
1998-2012	494	57.8	19.4	12.4	94.1	27.4	45.3	60.7	72.2	81.4

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	8	53.9	11.9	32.1	64.1	32.1	46.7	57.6	63.4	64.1
1999	8	45.5	22.5	24.9	80.5	24.9	26.8	36.1	66.3	80.5
2000	7	50.1	9.9	37.4	64.0	37.4	39.0	49.5	59.2	64.0
2001	9	60.1	15.9	34.3	88.5	34.3	54.0	63.0	67.0	88.5
2002	19	57.6	13.8	27.1	79.8	35.0	53.4	60.3	65.9	74.9
2003	11	60.7	13.4	32.4	78.0	48.8	56.3	58.8	75.0	77.1
2004	12	58.8	19.9	27.8	81.0	31.0	39.4	61.6	75.9	79.4
2005	12	64.8	11.9	34.1	77.0	53.3	59.5	69.5	71.5	74.8
2006	15	67.4	13.7	44.8	91.1	49.4	56.2	65.4	78.3	84.1
2007	26	61.3	21.8	15.8	86.8	24.8	45.3	66.8	79.7	83.3
2008	18	55.9	15.7	19.3	80.6	37.2	43.6	58.8	67.7	74.0
2009	21	60.4	17.0	12.4	84.7	42.6	52.4	58.6	70.9	80.8
2010	23	62.3	15.7	27.9	86.5	39.2	55.1	64.6	76.1	81.4
2011	28	60.9	15.7	32.0	86.2	40.5	47.0	64.2	72.0	82.6
2012	28	57.1	15.4	25.8	77.3	27.9	48.7	60.7	68.4	75.3
1998-2012	245	59.4	16.4	12.4	91.1	34.3	49.0	61.4	70.9	79.4

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	9	60.4	27.0	13.2	87.9	13.2	46.7	55.5	86.0	87.9
1999	7	48.4	17.2	26.9	75.0	26.9	28.4	52.7	59.8	75.0
2000	11	50.3	15.8	24.7	81.6	32.7	41.6	49.1	60.8	64.1
2001	5	63.5	19.4	35.2	84.4	35.2	56.7	62.6	78.5	84.4
2002	20	56.1	22.2	17.7	90.9	26.3	35.0	62.6	74.0	83.3
2003	13	62.3	21.0	23.5	88.5	30.6	59.3	65.8	78.9	84.0
2004	12	53.3	24.2	13.8	83.3	17.0	35.0	61.9	71.9	81.0
2005	19	61.7	17.1	16.1	89.9	39.0	52.8	63.8	72.2	83.1
2006	13	60.0	12.5	40.8	81.2	43.1	49.2	60.9	69.3	72.3
2007	16	52.4	19.3	17.8	76.0	19.1	41.0	55.0	70.1	74.4
2008	17	60.5	23.3	18.9	91.4	22.8	44.8	72.1	79.9	86.2
2009	23	60.1	23.8	15.9	91.8	26.3	41.4	61.0	81.6	87.7
2010	24	56.6	22.4	14.9	94.1	26.0	36.1	64.2	70.3	85.4
2011	27	59.2	23.3	17.1	88.8	22.7	45.3	59.6	81.9	87.0
2012	33	45.9	23.9	13.7	87.3	16.8	21.9	47.4	63.4	78.1
1998-2012	249	56.2	21.8	13.2	94.1	22.7	40.8	59.8	73.2	84.4

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.%
10-14	5	1.0	1.0	1	0.4	0.4	4	1.6	1.6
15-19	18	3.6	4.7	2	0.8	1.2	16	6.4	8.0
20-24	12	2.4	7.1	3	1.2	2.4	9	3.6	11.6
25-29	22	4.5	11.5	10	4.1	6.5	12	4.8	16.5
30-34	21	4.3	15.8	11	4.5	11.0	10	4.0	20.5
35-39	17	3.4	19.2	9	3.7	14.7	8	3.2	23.7
40-44	28	5.7	24.9	13	5.3	20.0	15	6.0	29.7
45-49	37	7.5	32.4	17	6.9	26.9	20	8.0	37.8
50-54	30	6.1	38.5	16	6.5	33.5	14	5.6	43.4
55-59	50	10.1	48.6	32	13.1	46.5	18	7.2	50.6
60-64	54	10.9	59.5	29	11.8	58.4	25	10.0	60.6
65-69	57	11.5	71.1	36	14.7	73.1	21	8.4	69.1
70-74	44	8.9	80.0	20	8.2	81.2	24	9.6	78.7
75-79	39	7.9	87.9	24	9.8	91.0	15	6.0	84.7
80-84	31	6.3	94.1	16	6.5	97.6	15	6.0	90.8
85+	29	5.9	100.0	6	2.4	100.0	23	9.2	100.0
All ages	494	100.0		245	100.0		249	100.0	

Included in the statistics are 34.7% multiple primaries in males and 26.1% 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	1	4	0.1	0.3			0.7	2.5
15-19	2	16	0.1	1.2			0.6	6.0
20-24	3	9	0.2	0.5			0.5	1.9
25-29	10	12	0.5	0.6			1.1	1.2
30-34	11	10	0.5	0.5			0.8	0.5
35-39	9	8	0.4	0.4			0.4	0.2
40-44	13	15	0.5	0.7			0.4	0.3
45-49	17	20	0.8	0.9			0.3	0.3
50-54	16	14	0.9	0.7			0.2	0.1
55-59	32	18	1.9	1.0			0.2	0.1
60-64	29	25	1.8	1.4			0.1	0.2
65-69	36	21	2.5	1.3			0.1	0.1
70-74	20	24	1.7	1.7			0.1	0.1
75-79	24	15	3.2	1.4			0.1	0.1
80-84	16	15	3.5	1.7			0.1	0.1
85+	6	23	1.9	2.8			0.1	0.1
All ages	245	249			0.0	0.0	0.2	0.2
Incidence								
Raw			0.9	0.9				
WS			0.6	0.6				
ES			0.8	0.7				
BRD-S			0.9	0.8				
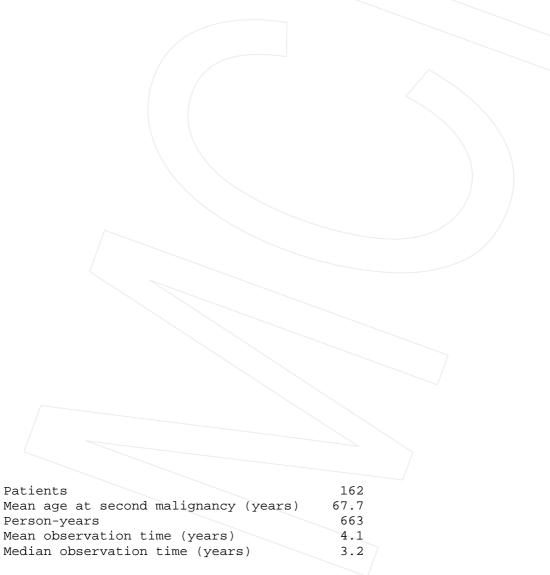
The age-specific incidence characterizes the disease risk in a particular age group. The age distribution depends on the patient population frequency in each age group and reflects the tangible clinical picture of everyday patients care (see following chart).

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 %
C18 Colon	3	0.8	4.0	0.8	11.6		33.9	
C19-C20 Rectum	5	0.5	11.1	3.6	25.8	#	68.6	
C61 Prostate	6	2.3	2.6	1.0	5.7		55.6	
C82-C85 NHL	2	0.3	6.4	0.8	23.1		25.4	
Other primaries	5	0.8	6.7	2.2	15.6	#	64.1	
Not observed	0	3.4	0.0	0.0	1.1		-51.6	
All mult. primaries	21	8.0	2.6	1.6	4.0	#	196.0	

Patients	162
Mean age at second malignancy (years)	67.7
Person-years	663
Mean observation time (years)	4.1
Median observation time (years)	3.2

The occurrence of second malignancy is statistically significant.
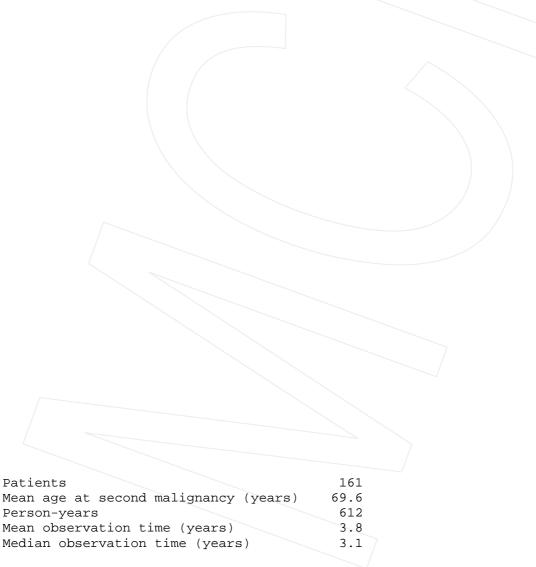
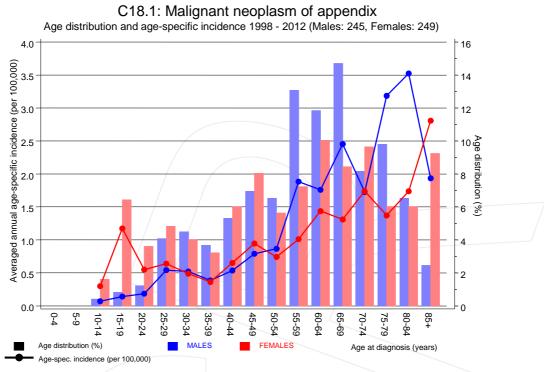Observed second primaries with count 1 are pooled in category "Other primaries".

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 %
C16	Stomach	2	0.2	10.3	1.2	37.2	#	29.5	50.0
C18	Colon	4	0.5	7.6	2.1	19.4	#	56.7	
C19-C20	Rectum	3	0.2	13.2	2.7	38.6	#	45.3	
C50	Breast	2	1.6	1.2	0.2	4.5		6.5	
Other primaries		7	1.3	5.4	2.2	11.2	#	93.3	
Not observed		0	1.4	0.0	0.0	2.6		-22.9	
All mult. primaries		18	5.2	3.4	2.0	5.4	#	208.4	5.6

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Patients                                161
Mean age at second malignancy (years)   69.6
Person-years                            612
Mean observation time (years)           3.8
Median observation time (years)         3.1
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The occurrence of second malignancy is statistically significant.

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

C18.1: Malignant neoplasm of appendix
Age distribution and age-specific incidence 1998 - 2012 (Males: 245, Females: 249)

Figure 7. Age distribution and age-specific incidence

C18.1: Malignant neoplasm of appendix
Age-specific incidence in international comparison

	Region	Period	Average population
● MCR	2002-2011	4.2 m
◇ SEER	2004-2009	64.3 m

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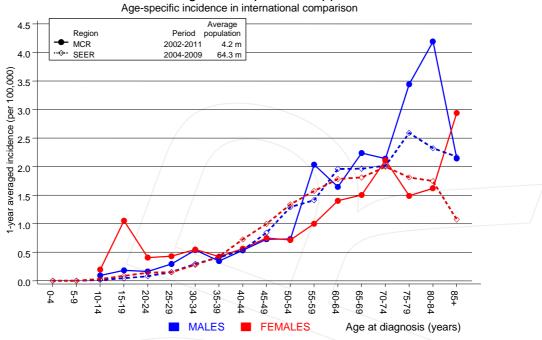
Figure 7a. Age-specific incidence in MCR registry areas compared to SEER (Surveillance, Epidemiology, and End Results, USA).

C18.1: Malignant neoplasm of appendix
Cumulative follow-up years since diagnosis for period 1998 - 2012 (excl. DCO)

Gender	n	Target Sum	Target Median	Actual Sum	Actual Median
All patients					
Males	158	752	3.6	694	3.4
Females	162	714	3.5	641	3.2
Patients alive					
Males	114	643	5.0	584	4.6
Females	121	626	4.4	553	3.7
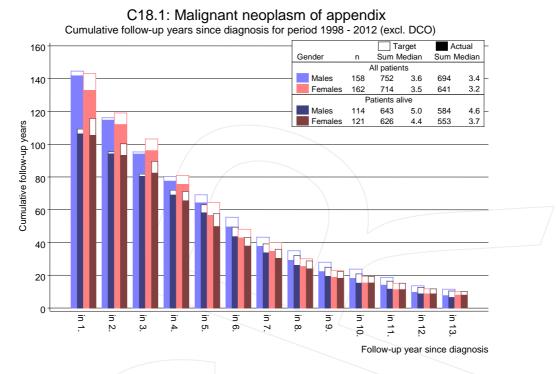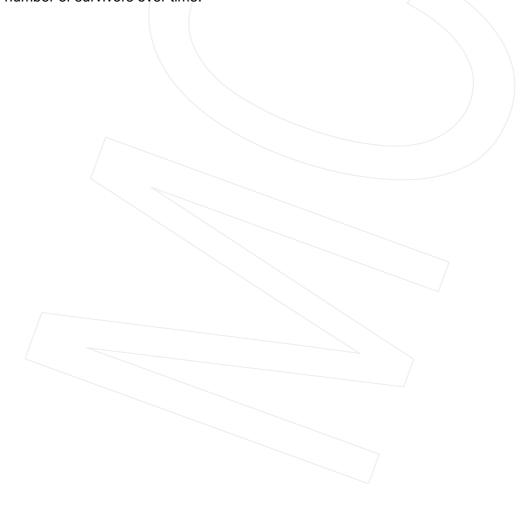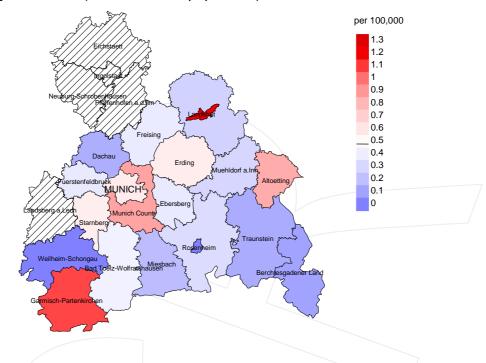
Figure 8. Cumulative follow-up years depending on time since diagnosis

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
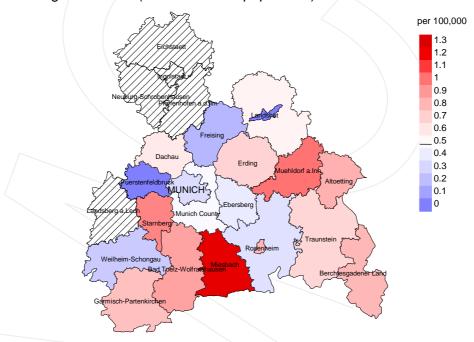
Figure 9a. Map of cancer incidence (world standard population, incl. DCO cases) by county averaged for period 2003 to 2008. According to their individual incidence rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 0.5/100,000 WS N=90, females 0.5/100,000 WS N=88). 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 2 women were identified with newly diagnosed appendix cancer. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 0.4/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.0 and 1.9/100,000.

Standardized incidence ratio (SIR) 2003 - 2008: Males

Standardized incidence ratio (SIR) 2003 - 2008: Females
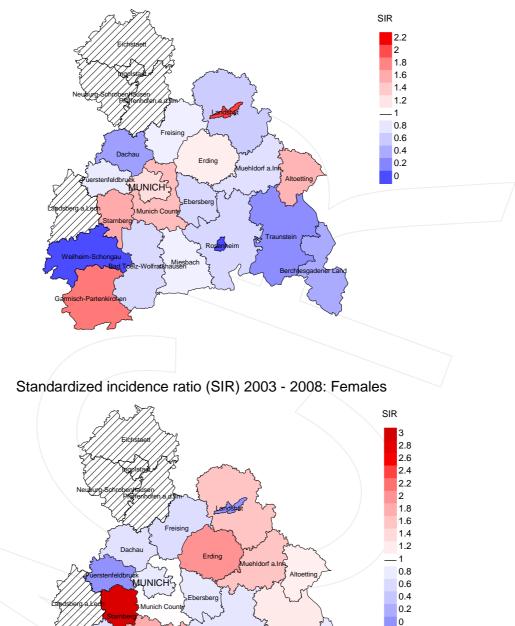

Figure 9b. Map of standardized incidence ratio (SIR, incl. DCO cases) by county averaged for period 2003 to 2008. According to their individual SIR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=90, females N=88). 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 2 women were identified with newly diagnosed appendix cancer. Therefore, the mean standardized incidence ratio (SIR) for this cancer type in this area can be calculated at 0.74. Though, the value of this parameter may vary with an underlying probability of 99% between 0.04 and 3.44, 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	17	100.0		9	52.9	100.0
1999	15	93.3		5	33.3	80.0
2000	18	94.4		2	11.1	100.0
2001	14	100.0		8	57.1	100.0
2002	39	94.9		17	43.6	100.0
2003	24	95.8		12	50.0	100.0
2004	24	95.8		8	33.3	100.0
2005	31	93.5		19	61.3	94.7
2006	28	85.7		12	42.9	100.0
2007	42	76.2		14	33.3	92.9
2008	35	57.1		11	31.4	100.0
2009	44	63.6		18	40.9	100.0
2010	47	68.1		13	27.7	100.0
2011	55	67.3		11	20.0	100.0
2012	61	98.4		6	9.8	100.0
1998-2012	494	82.4		165	33.4	98.2

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	17	5	100.0	2	11.8
1999	15	6	83.3	2	13.3
2000	18				
2001	14	5	100.0	2	14.3
2002	39	9	100.0	4	10.3
2003	24	10	100.0	2	8.3
2004	24	7	100.0		
2005	31	14	92.9	5	16.1
2006	28	11	90.9	1	3.6
2007	42	7	100.0	1	2.4
2008	35	20	95.0	1	2.9
2009	44	17	100.0	5	11.4
2010	47	28	100.0	4	8.5
2011	55	21	100.0	4	7.3
2012	61	22	100.0	3	4.9
1998-2012	494	182	97.8	36	7.3

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	80.0	20.0	80.0
1999	6	100.0		100.0
2000				
2001	5	100.0		100.0
2002	9	77.8	22.2	77.8
2003	10	70.0	30.0	90.0
2004	7	85.7	14.3	85.7
2005	14	78.6	21.4	84.6
2006	11	81.8	18.2	90.0
2007	7	85.7	14.3	85.7
2008	20	85.0	15.0	84.2
2009	17	76.5	23.5	100.0
2010	28	71.4	28.6	82.1
2011	21	85.7	14.3	90.5
2012	22	72.7	27.3	77.3
1998-2012	182	79.7	20.3	86.5

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	1	56.4	56.4		56.4
1999	3	68.9	68.9		68.9
2000					
2001	4	63.8	63.8		63.8
2002	4	67.4	67.4		63.6
2003	2	60.1	60.1		60.1
2004	4	65.0	65.0		76.8
2005	7	70.8	69.3	79.9	69.3
2006	5	68.9	63.7	76.8	63.7
2007	2	87.2	87.2		87.2
2008	14	71.3	69.7	81.2	70.0
2009	6	77.6	77.6		77.6
2010	11	73.0	71.6	79.7	72.5
2011	9	69.9	67.9	86.4	70.2
2012	11	70.7	68.8	79.2	68.8
1998-2012	83	70.6	69.3	80.0	70.2

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	4	85.9	85.2	88.1	85.2
1999	3	68.9	68.9		76.9
2000					
2001	1	49.6	49.6		49.6
2002	5	83.0	87.0	76.9	81.0
2003	8	77.9	79.3	75.6	78.4
2004	3	79.8	79.9	79.7	79.8
2005	7	73.8	75.1	70.7	75.1
2006	6	61.7	61.7		61.7
2007	5	73.1	70.4	83.6	70.4
2008	6	71.0	67.1	90.4	71.8
2009	11	78.1	77.2	79.7	78.1
2010	17	80.4	76.2	88.1	78.2
2011	12	70.4	67.2	86.4	69.4
2012	11	75.4	70.2	84.6	71.9
1998-2012	99	75.3	72.7	82.3	74.4

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	1	0.1	0.13	0.0	0.10	0.1	0.11	0.1	0.11
1999	3	0.3	0.38	0.2	0.27	0.2	0.35	0.3	0.40
2000									
2001	4	0.3	0.44	0.2	0.45	0.3	0.45	0.3	0.46
2002	4	0.2	0.21	0.1	0.17	0.2	0.18	0.2	0.21
2003	2	0.1	0.18	0.1	0.16	0.1	0.16	0.1	0.19
2004	4	0.2	0.33	0.1	0.36	0.2	0.36	0.3	0.37
2005	6	0.3	0.50	0.2	0.44	0.2	0.46	0.3	0.57
2006	3	0.2	0.20	0.1	0.23	0.1	0.24	0.2	0.21
2007	2	0.1	0.08	0.0	0.04	0.1	0.07	0.1	0.09
2008	12	0.5	0.67	0.3	0.54	0.4	0.59	0.5	0.71
2009	6	0.3	0.29	0.1	0.16	0.2	0.22	0.3	0.32
2010	9	0.4	0.39	0.2	0.30	0.3	0.33	0.4	0.36
2011	8	0.4	0.29	0.2	0.26	0.3	0.27	0.3	0.28
2012	9	0.4	0.32	0.2	0.23	0.3	0.28	0.4	0.34
1998-2012	73	0.3	0.30	0.1	0.25	0.2	0.28	0.3	0.31

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	3	0.3	0.33	0.0	0.10	0.1	0.17	0.2	0.26
1999	3	0.3	0.43	0.1	0.26	0.2	0.33	0.2	0.42
2000									
2001	1	0.1	0.20	0.1	0.40	0.1	0.33	0.1	0.29
2002	3	0.2	0.15	0.0	0.06	0.1	0.09	0.1	0.10
2003	5	0.3	0.38	0.1	0.24	0.1	0.30	0.2	0.32
2004	2	0.1	0.17	0.0	0.08	0.1	0.11	0.1	0.11
2005	5	0.3	0.26	0.1	0.15	0.1	0.18	0.2	0.19
2006	6	0.3	0.46	0.2	0.45	0.2	0.44	0.2	0.44
2007	4	0.2	0.25	0.1	0.16	0.1	0.19	0.2	0.23
2008	5	0.2	0.29	0.1	0.21	0.1	0.25	0.2	0.26
2009	7	0.3	0.30	0.1	0.14	0.2	0.20	0.2	0.28
2010	11	0.5	0.46	0.1	0.20	0.2	0.27	0.3	0.35
2011	10	0.4	0.37	0.2	0.28	0.3	0.34	0.4	0.33
2012	7	0.3	0.21	0.1	0.09	0.2	0.14	0.2	0.16
1998-2012	72	0.3	0.29	0.1	0.16	0.1	0.21	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.%
25-29	2	1.4	1.4	2	2.7	2.7			0.0
30-34	1	0.7	2.1	1	1.4	4.1			0.0
35-39	3	2.1	4.1			4.1	3	4.2	4.2
40-44	1	0.7	4.8	1	1.4	5.5			4.2
45-49	4	2.8	7.6	2	2.7	8.2	2	2.8	6.9
50-54	8	5.5	13.1	4	5.5	13.7	4	5.6	12.5
55-59	7	4.8	17.9	4	5.5	19.2	3	4.2	16.7
60-64	17	11.7	29.7	11	15.1	34.2	6	8.3	25.0
65-69	19	13.1	42.8	9	12.3	46.6	10	13.9	38.9
70-74	22	15.2	57.9	12	16.4	63.0	10	13.9	52.8
75-79	16	11.0	69.0	10	13.7	76.7	6	8.3	61.1
80-84	23	15.9	84.8	11	15.1	91.8	12	16.7	77.8
85+	22	15.2	100.0	6	8.2	100.0	16	22.2	100.0
All ages	145	100.0		73	100.0		72	100.0	

Included in the statistics are 34.7% multiple primaries in males and 26.1% in females.

Table 14

Age-specific mortality (cancer-related) and proportion of all cancers
for period 1998-2012
(**incl. multiple primaries**)

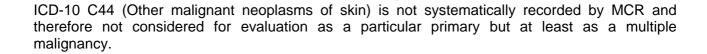| Age at death Years	Males n	Females n	Males Age-spec. mortal.	MI-index	Females Age-spec. mortal.	MI-index	Males Prop.all cancers %	Females Prop.all cancers %
0- 4			0.0		0.0			
5- 9			0.0		0.0			
10-14			0.0		0.0			
15-19			0.0		0.0			
20-24			0.0		0.0			
25-29	2		0.1	0.20	0.0		2.1	
30-34	1		0.0	0.09	0.0		0.6	
35-39		3	0.0		0.1	0.38		0.6
40-44	1		0.0	0.08	0.0		0.1	
45-49	2	2	0.1	0.12	0.1	0.10	0.1	0.1
50-54	4	4	0.2	0.25	0.2	0.29	0.1	0.1
55-59	4	3	0.2	0.13	0.2	0.17	0.1	0.1
60-64	11	6	0.7	0.38	0.3	0.24	0.1	0.1
65-69	9	10	0.6	0.25	0.6	0.48	0.1	0.1
70-74	12	10	1.0	0.60	0.7	0.42	0.1	0.1
75-79	10	6	1.3	0.42	0.5	0.40	0.1	0.1
80-84	11	12	2.4	0.69	1.4	0.80	0.1	0.1
85+	6	16	1.9	1.00	2.0	0.70	0.1	0.1
All ages	73	72					0.1	0.1
Mortality								
Raw			0.3	0.30	0.3	0.29		
WS			0.1	0.25	0.1	0.16		
ES			0.2	0.28	0.1	0.21		
BRD-S			0.3	0.31	0.2	0.24		
PYLL-70								
per 100,000			1.7		1.3			
ES			1.5		1.1			
AYLL-70			12.4		11.4			

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 ←%
C12-C13	Hypopharynx	1	2.9					1	100.0
C16	Stomach	1	2.9					1	100.0
C17	Small intestine	1	2.9			1	100.0		
C18	Colon	5	14.7			3	60.0	2	40.0
C19-C20	Rectum	3	8.8			2	66.7	1	33.3
C22	Liver	1	2.9			1	100.0		
C25	Pancreas	1	2.9					1	100.0
C33-C34	Lung	2	5.9					2	100.0
C44	Skin others	3	8.8	2	66.7	1	33.3		
C61	Prostate	7	20.6	3	42.9	1	14.3	3	42.9
C65	Renal pelvis	3	8.8					3	100.0
C67	Bladder	3	8.8	2	66.7			1	33.3
C73	Thyroid	1	2.9	1	100.0				
C76-C79	CUP	1	2.9					1	100.0
C82-C85	NHL	1	2.9			1	100.0		
All mult. primaries		34	100.0	8	23.5	10	29.4	16	47.1
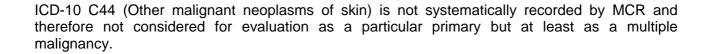
ICD-10 C44 (Other malignant neoplasms of skin) is not systematically recorded by MCR and therefore not considered for evaluation as a particular primary but at least as a multiple malignancy.

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 ←%
C03-C06	Oral cavity	1	2.9					1	100.0
C16	Stomach	1	2.9					1	100.0
C18	Colon	5	14.7			3	60.0	2	40.0
C19-C20	Rectum	3	8.8	1	33.3	1	33.3	1	33.3
C25	Pancreas	1	2.9					1	100.0
C33-C34	Lung	4	11.8	2	50.0			2	50.0
C43	Malign. melanoma	1	2.9	1	100.0				
C46,C49	Soft tissue	1	2.9	1	100.0				
C48	Peritoneal	1	2.9	1	100.0				
C50	Breast	2	5.9	1	50.0			1	50.0
C51	Vulva	1	2.9	1	100.0				
C53	Cervix uteri	1	2.9			1	100.0		
C54	Corpus uteri	2	5.9	1	50.0	1	50.0		
C55,C57	Fem. genitals un	1	2.9	1	100.0				
C56	Ovary	6	17.6	1	16.7	5	83.3		
C64	Kidney	1	2.9	1	100.0				
C67	Bladder	2	5.9	1	50.0			1	50.0
All mult. primaries		34	100.0	13	38.2	11	32.4	10	29.4

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	2		0.1	0.20	0.0		2.2	
30-34	1		0.0	0.10	0.0		0.6	
35-39		1	0.0		0.0	0.17		0.2
40-44	1		0.0	0.08	0.0		0.1	
45-49	2	2	0.1	0.12	0.1	0.11	0.1	0.1
50-54	4	3	0.2	0.31	0.2	0.30	0.1	0.1
55-59	3	1	0.2	0.11	0.1	0.07	0.1	0.0
60-64	10	5	0.6	0.45	0.3	0.26	0.1	0.1
65-69	6	6	0.4	0.22	0.4	0.35	0.1	0.1
70-74	10	6	0.9	0.71	0.4	0.32	0.1	0.1
75-79	9	5	1.2	0.56	0.5	0.56	0.1	0.1
80-84	7	7	1.5	0.70	0.8	0.64	0.1	0.1
85+	4	12	1.3	1.33	1.5	0.60	0.1	0.1
All ages	59	48					0.1	0.1
Mortality								
Raw			0.2	0.30	0.2	0.23		
WS			0.1	0.25	0.1	0.12		
ES			0.2	0.28	0.1	0.16		
BRD-S			0.2	0.32	0.1	0.19		
PYLL-70								
per 100,000			1.6		0.8			
ES			1.4		0.7			
AYLL-70			13.5		10.8			

* 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	2		0.1	0.20	0.0		2.4	
30-34	1		0.0	0.10	0.0		0.6	
35-39		1	0.0		0.0	0.17		0.2
40-44	1		0.0	0.08	0.0		0.1	
45-49	2	2	0.1	0.12	0.1	0.12	0.1	0.1
50-54	4	3	0.2	0.33	0.2	0.33	0.2	0.1
55-59	3	1	0.2	0.14	0.1	0.07	0.1	0.0
60-64	8	3	0.5	0.40	0.2	0.19	0.1	0.1
65-69	5	6	0.3	0.19	0.4	0.38	0.1	0.1
70-74	9	5	0.8	0.64	0.4	0.31	0.1	0.1
75-79	7	4	0.9	0.47	0.4	0.67	0.1	0.1
80-84	6	6	1.3	0.60	0.7	0.55	0.1	0.1
85+	4	11	1.3	1.33	1.3	0.58	0.1	0.1
All ages	52	42					0.1	0.1
Mortality								
Raw			0.2	0.28	0.1	0.22		
WS			0.1	0.23	0.1	0.11		
ES			0.2	0.26	0.1	0.15		
BRD-S			0.2	0.30	0.1	0.17		
PYLL-70								
per 100,000			1.5		0.7			
ES			1.4		0.6			
AYLL-70			14.4		11.3			

* See corresponding tables with multiple primaries.

C18.1: Malignant neoplasm of appendix
Age distribution and age-specific mortality 1998 - 2012 (Males: 73, Females: 72)
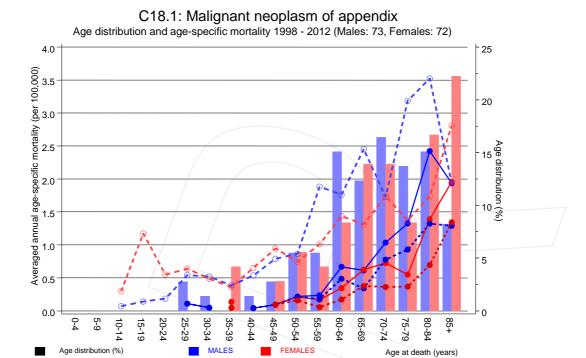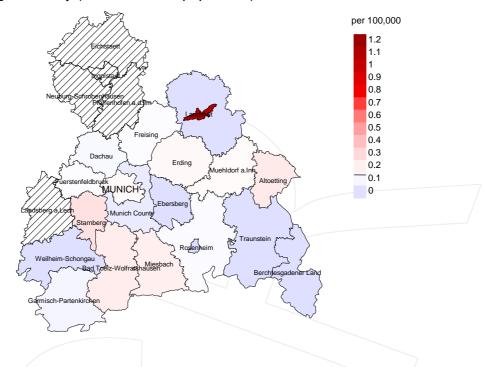
Figure 18. Distribution of age at death (bars) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

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

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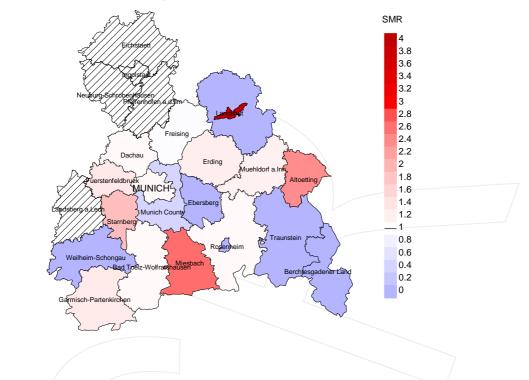
Average mortality (world standard population) 2003 - 2008: Females

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 0.1/100,000 WS N=29, females 0.1/100,000 WS N=25). 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 appendix cancer. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 0.1/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.0 and 0.9/100,000.

Standardized mortality ratio (SMR) 2003 - 2008: Males

Standardized mortality ratio (SMR) 2003 - 2008: Females
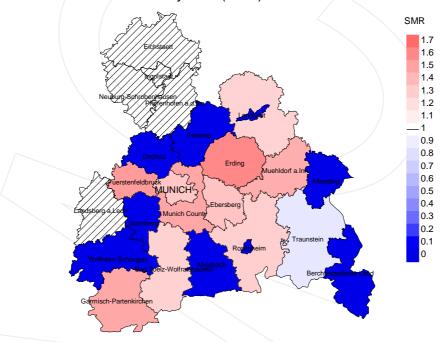
Figure 19b. Map of standardized mortality ratio (SMR, incl. DCO cases) by county averaged for period 2003 to 2008. According to their individual SMR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=29, females N=25). 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 appendix cancer. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 1.35. Though, the value of this parameter may vary with an underlying probability of 99% between 0.01 and 10.04, and is therefore not statistically striking.

Statistical Notes

In all tables and figures the respective reference values should be carefully considered. The incidence rates include diagnoses (with multiple primary), and death certificate only (DCO) cases. For mortality statistics patients, diagnoses and progressive course of disease are presented. In the calculations, all courses of disease are considered whereby progressions occurred and/or death certificate identified progressive cancers were ascertained. Additionally there are three groups of disease course to consider:

1. **All multiple primaries included**

   The mortality statistic describes the tumor-specific death, independent of any malignancy. The patient perspective, induced secondary malignancies, and the problem of multiple malignancies from the same primary tumor all have reasons for their inclusion.

2. **First singular primary** (no information about other prior or synchronous malignancy)

   The mortality statistic describes the 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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Index of figures and tables