Munich Cancer Registry

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ICD-10 C18: Colon cancer

Incidence and Mortality

Year of diagnosis	1998-2014
Patients	29,656
Diseases	30,220
Creation date	04/13/2016
Export date	12/23/2015
Population	4.64 m

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

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

http://www.tumorregister-muenchen.de/en/facts/base/bC18__E-ICD-10-C18-Colon-cancer-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
C18.-	Malignant neoplasm of colon
C18.0	Caecum
C18.1	Appendix
C18.2	Ascending colon
C18.3	Hepatic flexure
C18.4	Transverse colon
C18.5	Splenic flexure
C18.6	Descending colon
C18.7	Sigmoid colon
C18.8	Overlapping lesion of colon
C18.9	Colon, unspecified

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	1266	79	6.2	25.6	74.6	98.3
1999	1201	87	7.2	26.4	73.5	97.6
2000	1082	72	6.7	27.9	71.9	98.2
2001	1209	96	7.9	27.6	70.0	98.0
2002	2036	288	14.1	25.9	70.6	97.3 #
2003	2068	233	11.3	27.3	66.0	97.3
2004	2043	196	9.6	25.9	66.1	97.6
2005	1927	166	8.6	29.6	65.2	96.4
2006	1973	123	6.2	29.0	58.5	93.6
2007	2156	159	7.4	27.1	56.8	80.9 #
2008	2195	145	6.6	29.9	54.6	73.7
2009	2166	124	5.7	29.4	50.1	72.3
2010	1971	134	6.8	28.8	46.9	71.3
2011	1914	123	6.4	27.3	44.4	70.1
2012	1876	117	6.2	26.8	39.1	70.8
2013	1846	116	6.3	28.4	31.2	99.0
2014	1291	106	8.2	26.0	23.5	99.2 ##
1998-2014	30220	2364	7.8	27.7	56.0	87.6

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

Please be aware that data of recent annual patient cohorts may not yet be fully processed. The years under evaluation can be found in the respective headings.

Table 1a

All patients with invasive cancer
by year of diagnosis and gender
(incl. DCO)

Year of diagnosis	All n	Males n	Females n	Prop. males %
1998	1266	607	659	47.9
1999	1201	581	620	48.4
2000	1082	525	557	48.5
2001	1209	600	609	49.6
2002	2036	1026	1010	50.4
2003	2068	1059	1009	51.2
2004	2043	1050	993	51.4
2005	1927	979	948	50.8
2006	1973	1020	953	51.7
2007	2156	1131	1025	52.5
2008	2195	1167	1028	53.2
2009	2166	1157	1009	53.4
2010	1971	1041	930	52.8
2011	1914	986	928	51.5
2012	1876	986	890	52.6
2013	1846	1016	830	55.0
2014	1291	672	619	52.1
1998-2014	30220	15603	14617	51.6

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	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	607	659	54.8	56.0	32.6	23.4	49.7	35.6	66.3	47.1
1999	581	620	51.9	52.2	30.4	21.6	46.7	32.8	63.0	43.1
2000	525	557	46.1	46.4	26.6	18.8	40.9	28.8	54.4	38.1
2001	600	609	51.8	50.1	30.0	20.4	45.7	31.2	59.1	41.6
2002	1026	1010	55.1	51.6	30.0	20.1	46.2	30.7	62.4	40.8
2003	1059	1009	56.5	51.2	30.3	20.0	46.4	30.6	62.0	40.5
2004	1050	993	55.8	50.2	29.0	20.0	44.7	30.1	60.4	39.4
2005	979	948	51.7	47.6	26.6	17.9	40.7	27.4	54.4	36.6
2006	1020	953	53.3	47.4	27.3	18.7	41.7	28.3	55.4	37.4
2007	1131	1025	51.1	44.4	26.1	17.3	39.3	26.0	52.4	34.2
2008	1167	1028	52.4	44.3	25.5	16.9	39.3	25.7	52.5	33.6
2009	1157	1009	51.8	43.4	24.9	16.0	37.9	24.4	50.9	32.7
2010	1041	930	46.2	39.7	21.9	14.5	33.4	22.1	44.8	29.5
2011	986	928	43.2	39.3	20.3	14.7	30.9	22.3	41.2	29.2
2012	986	890	43.2	37.7	20.4	14.7	30.9	21.7	40.8	28.5
2013	1016	830	44.5	35.2	20.3	13.5	31.4	20.1	42.6	26.4
2014	672	619	29.4	26.2	13.7	10.1	21.0	15.2	28.2	19.9
1998-2014	15603	14617	48.7	43.7	24.5	16.9	37.4	25.6	50.0	33.8

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 patients)
(incl. DCO)

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	1266	70.8	12.3	13.2	98.1	54.7	62.0	72.2	79.6	86.3
1999	1201	71.3	12.4	24.9	101	55.5	63.2	72.5	79.8	86.6
2000	1082	71.3	11.9	24.7	103	56.3	62.7	72.6	79.4	86.8
2001	1209	71.1	12.4	30.8	103	55.7	62.7	71.7	80.5	87.2
2002	2036	72.2	12.2	17.7	101	56.6	63.7	73.5	81.2	87.5
2003	2068	72.2	11.7	8.4	99.4	57.2	64.3	72.9	80.8	87.1
2004	2043	71.9	12.3	13.8	101	56.4	64.3	73.1	81.0	86.8
2005	1927	72.6	12.3	15.1	99.9	57.2	65.2	73.7	81.9	87.1
2006	1973	71.7	11.9	17.9	102	55.7	64.2	72.4	80.7	85.8
2007	2156	71.6	12.7	15.8	103	54.7	64.5	72.6	81.1	86.3
2008	2195	72.4	12.4	18.9	105	56.4	65.4	73.2	81.6	87.2
2009	2166	72.4	12.2	12.4	99.1	56.4	65.3	73.3	81.4	86.9
2010	1971	72.6	12.5	14.9	101	55.9	65.3	74.0	81.8	86.9
2011	1914	72.6	12.5	15.5	101	55.5	64.9	74.0	81.9	87.4
2012	1876	72.2	13.0	9.7	101	56.0	65.0	73.8	81.7	87.0
2013	1846	72.4	13.0	15.7	105	54.6	65.4	74.1	81.8	87.2
2014	1291	72.3	13.4	20.3	103	53.8	64.7	74.4	81.8	87.3
1998-2014	30220	72.1	12.4	8.4	105	56.0	64.4	73.3	81.2	86.9

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	607	68.9	11.5	31.4	98.1	55.0	60.7	69.5	77.0	84.4
1999	581	69.5	11.4	24.9	95.5	56.2	62.4	70.2	77.7	83.7
2000	525	69.2	10.5	36.0	93.0	56.0	61.9	69.7	77.0	82.6
2001	600	69.2	11.7	31.3	102	54.6	61.7	69.1	77.0	85.5
2002	1026	70.4	11.0	20.9	98.5	56.8	63.1	71.5	78.2	83.2
2003	1059	70.3	11.1	8.4	99.4	56.7	63.3	71.0	78.1	83.4
2004	1050	70.8	11.1	27.8	101	56.8	63.9	71.5	78.6	84.5
2005	979	70.6	11.4	28.3	98.5	56.6	64.2	70.8	78.6	84.5
2006	1020	70.4	11.1	17.9	102	56.0	63.5	71.0	78.3	83.9
2007	1131	69.8	12.2	15.8	99.4	54.3	63.5	71.0	78.7	83.9
2008	1167	71.0	11.4	19.3	105	56.2	65.0	71.7	79.2	84.9
2009	1157	70.6	11.4	12.4	99.0	55.6	64.1	71.7	79.1	83.7
2010	1041	71.1	11.4	27.9	98.9	55.3	64.1	71.8	79.4	84.5
2011	986	71.3	11.8	15.5	97.3	55.3	64.7	72.6	79.8	85.1
2012	986	71.5	11.3	9.7	101	57.2	64.8	72.9	79.4	85.1
2013	1016	71.7	12.0	19.4	99.6	55.6	64.8	73.5	80.1	85.5
2014	672	71.5	12.7	20.3	102	54.9	64.3	73.7	80.7	85.7
1998-2014	15603	70.6	11.5	8.4	105	56.0	63.6	71.5	78.8	84.4

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	659	72.5	12.8	13.2	96.7	54.4	63.9	74.7	82.0	87.4
1999	620	73.0	13.0	26.9	101	54.8	64.3	75.0	82.7	88.4
2000	557	73.2	12.8	24.7	103	56.3	64.4	75.3	81.9	88.5
2001	609	73.0	12.7	30.8	103	55.9	64.0	75.4	81.7	89.0
2002	1010	74.1	13.0	17.7	101	56.4	64.9	76.5	83.0	89.4
2003	1009	74.1	11.9	23.5	98.9	57.9	65.4	75.9	82.9	88.9
2004	993	73.1	13.3	13.8	100	55.6	64.7	75.3	83.3	88.6
2005	948	74.7	12.8	15.1	99.9	57.9	66.9	76.6	83.9	90.2
2006	953	73.0	12.7	24.6	97.1	55.1	65.1	75.1	82.7	86.9
2007	1025	73.5	13.1	17.8	103	55.4	66.3	75.4	83.4	87.7
2008	1028	74.0	13.2	18.9	101	56.8	66.3	75.4	84.1	88.8
2009	1009	74.5	12.8	15.9	99.1	58.0	67.4	76.2	83.9	88.8
2010	930	74.3	13.3	14.9	101	56.1	67.4	76.4	83.9	89.1
2011	928	74.0	13.2	17.1	101	55.9	65.5	75.8	84.6	88.9
2012	890	73.1	14.7	13.7	100	54.4	65.4	75.6	83.8	89.4
2013	830	73.2	14.2	15.7	105	54.2	66.3	75.1	83.8	89.0
2014	619	73.1	14.0	23.2	103	52.4	65.1	75.5	82.8	89.1
1998-2014	14617	73.6	13.2	13.2	105	56.0	65.5	75.6	83.4	88.8

Table 4

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

Age at diagnosis Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
5-9	1	0.0	0.0	1	0.0	0.0			0.0
10-14	3	0.0	0.0	1	0.0	0.0	2	0.0	0.0
15-19	22	0.1	0.2	4	0.0	0.1	18	0.2	0.3
20-24	27	0.2	0.3	10	0.1	0.2	17	0.2	0.5
25-29	44	0.3	0.6	20	0.2	0.4	24	0.3	0.8
30-34	55	0.4	1.0	27	0.3	0.8	28	0.4	1.2
35-39	106	0.7	1.7	57	0.7	1.5	49	0.7	1.9
40-44	223	1.4	3.1	116	1.4	2.9	107	1.5	3.4
45-49	381	2.5	5.6	207	2.5	5.4	174	2.4	5.8
50-54	589	3.8	9.4	326	4.0	9.4	263	3.6	9.4
55-59	943	6.1	15.5	536	6.6	16.0	407	5.6	15.0
60-64	1419	9.2	24.7	860	10.5	26.5	559	7.7	22.7
65-69	2006	13.0	37.7	1219	14.9	41.5	787	10.8	33.5
70-74	2588	16.8	54.5	1526	18.7	60.2	1062	14.6	48.2
75-79	2399	15.6	70.1	1340	16.4	76.6	1059	14.6	62.8
80-84	2289	14.8	84.9	1126	13.8	90.4	1163	16.0	78.8
85+	2320	15.1	100.0	780	9.6	100.0	1540	21.2	100.0
All ages	15415	100.0		8156	100.0		7259	100.0	

Included in the statistics are 38.1% multiple primaries in males and 27.9% in females.

Table 5

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

Age at diagnosis Years	Males n	Females n	Males Age-spec. incid.	Females Age-spec. incid.	Males DCO rate n=406 %	Females DCO rate n=617 %	Males Prop.all cancers n=91183 %	Females Prop.all cancers n=89596 %
0- 4			0.0	0.0				
5- 9	1		0.1	0.0			1.0	
10-14	1	2	0.1	0.2			1.0	2.2
15-19	4	18	0.4	2.0			1.9	10.9
20-24	10	17	0.9	1.6	10.0		2.7	5.5
25-29	19	24	1.6	1.9			3.4	3.6
30-34	27	27	2.2	2.2			3.5	2.3
35-39	54	49	4.1	3.9		6.1	4.7	2.5
40-44	114	107	7.0	7.0			6.2	2.9
45-49	206	174	13.0	11.5	1.0		6.4	3.2
50-54	320	259	24.7	20.2	1.9	1.5	6.6	3.8
55-59	529	399	49.8	35.5	1.5	0.5	7.2	5.4
60-64	847	553	86.2	52.2	2.2	1.4	7.9	6.0
65-69	1200	781	124.7	74.8	1.5	2.3	7.7	6.8
70-74	1498	1048	164.6	100.2	3.3	2.5	8.8	8.8
75-79	1318	1047	239.3	146.8	4.2	4.7	10.6	10.4
80-84	1095	1147	313.5	204.6	8.7	8.3	12.8	13.0
85+	764	1524	330.0	263.7	19.9	27.0	12.5	14.9
All ages	8007	7176			5.1	8.6	8.8	8.0
Incidence								
Raw			44.3	38.3				
WS			21.2	14.5				
ES			32.2	21.9				
BRD-S			43.1	28.9				

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).

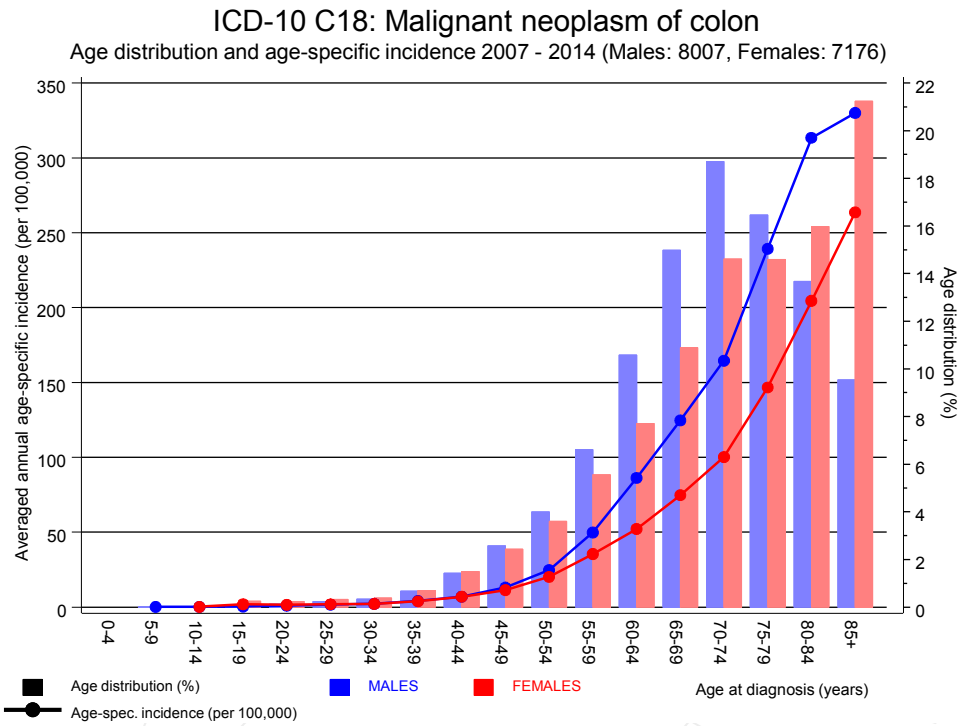


Figure 6. Age distribution and age-specific incidence

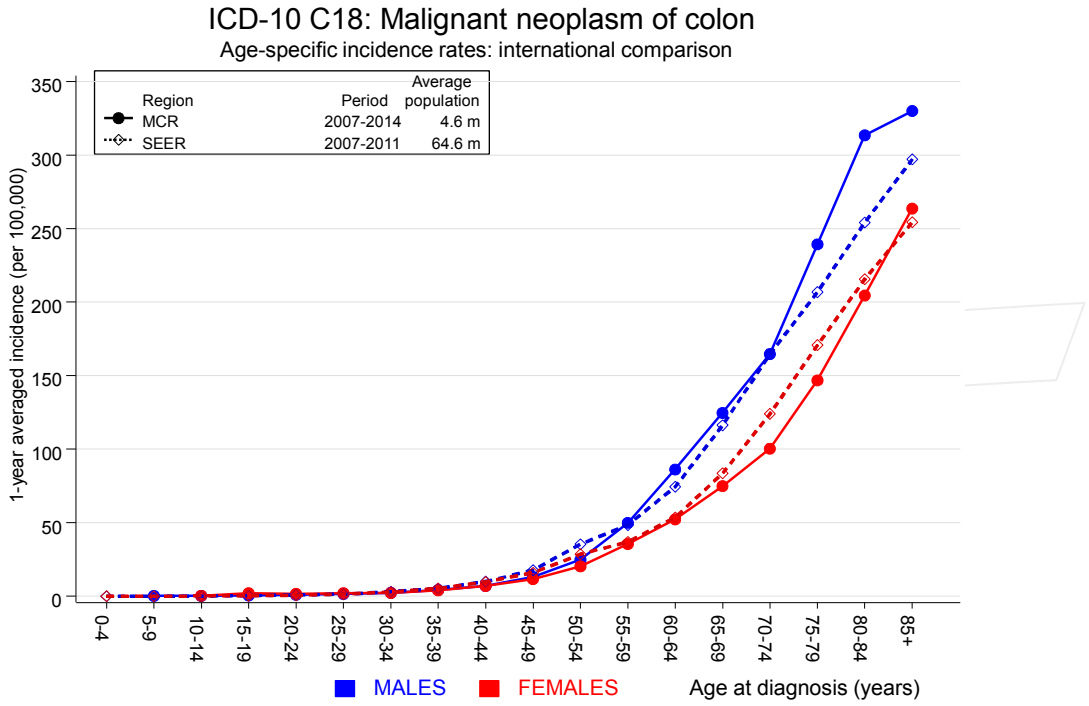


Figure 6a. Age-specific incidence in MCR registry areas compared to SEER (Surveillance, Epidemiology, and End Results, USA).

Reference:

Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Incidence - SEER 18 Regs Research Data, released April 2014, based on the November 2013 submission. http://www.seer.cancer.gov.

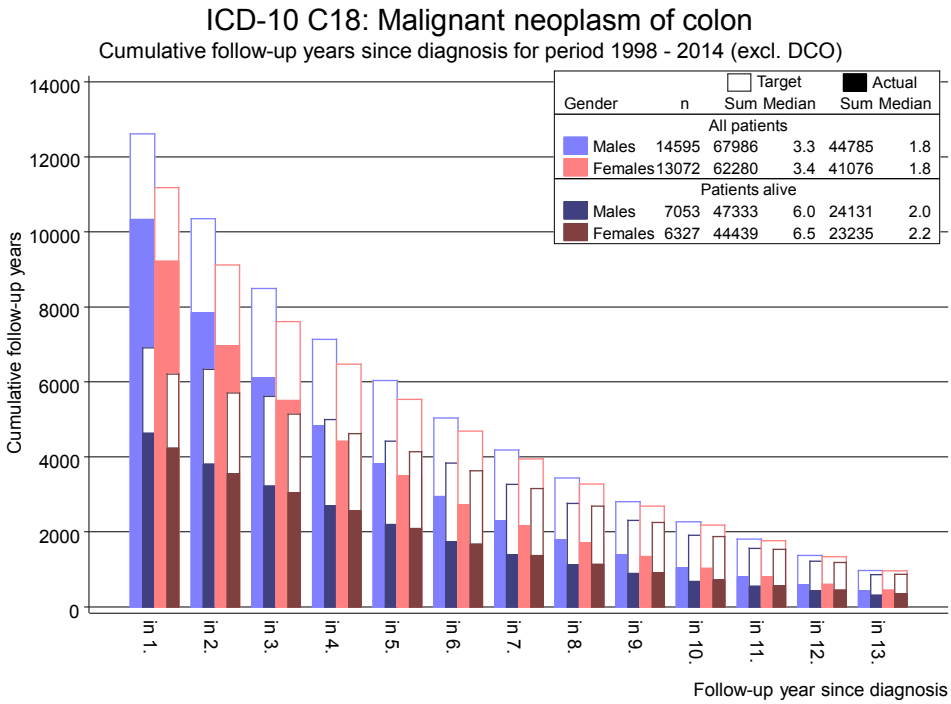


Figure 7. Cumulative follow-up years depending on time since diagnosis

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

Table 8a

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

Diagnosis		Observed n	Expected n	SIR	LCL 95%	UCL 95%		EAR	DCO %
C00	Lip	3	1.1	2.7	0.6	7.8		0.4	
C03-C06	Oral cavity	9	6.1	1.5	0.7	2.8		0.7	
C09-C10	Oropharynx	10	7.2	1.4	0.7	2.5		0.6	
C12-C13	Hypopharynx	6	3.9	1.5	0.6	3.3		0.5	16.7
C15	Oesophagus	48	14.4	3.3	2.5	4.4	#	7.7	16.7
C16	Stomach	119	38.6	3.1	2.6	3.7	#	18.3	6.7
C17	Small intestine	57	4.2	13.5	10.2	17.5	#	12.0	1.8
C18	Colon	342	91.3	3.7	3.4	4.2	#	57.1	0.9
C19-C20	Rectum	273	46.6	5.9	5.2	6.6	#	51.5	0.4
C21	Anus/canal	7	1.7	4.1	1.6	8.4	#	1.2	
C22	Liver	64	23.6	2.7	2.1	3.5	#	9.2	25.0
C23-C24	Bile	21	8.9	2.4	1.5	3.6	#	2.8	9.5
C25	Pancreas	78	32.6	2.4	1.9	3.0	#	10.3	28.2
C32	Larynx	16	8.0	2.0	1.1	3.3	#	1.8	12.5
C33-C34	Lung	208	101.6	2.0	1.8	2.3	#	24.2	15.9
C38,C45	Mesothelioma	7	5.7	1.2	0.5	2.5		0.3	
C40-C41	Bone	2	0.6	3.2	0.4	11.6		0.3	
C43	Malign. melanoma	70	34.1	2.1	1.6	2.6	#	8.2	2.9
C46,C49	Soft tissue	11	4.7	2.3	1.2	4.2	#	1.4	
C50	Breast	8	2.3	3.5	1.5	6.9	#	1.3	12.5
C60	Penis	4	2.0	2.0	0.5	5.0		0.4	
C61	Prostate	468	259.2	1.8	1.6	2.0	#	47.5	5.1
C62	Testis	4	1.5	2.8	0.7	7.0		0.6	25.0
C64	Kidney	97	29.3	3.3	2.7	4.0	#	15.4	5.2
C65	Renal pelvis	12	3.9	3.1	1.6	5.4	#	1.9	
C66	Ureter	7	2.2	3.2	1.3	6.6	#	1.1	
C67	Bladder	91	43.1	2.1	1.7	2.6	#	10.9	7.7
C68	Urinary org.	3	0.6	5.0	1.0	14.7	#	0.5	66.7
C69	Eye carcinoma	2	0.3	6.2	0.8	22.5		0.4	
C70-C72	CNS cancer	20	10.9	1.8	1.1	2.8	#	2.1	30.0
C73	Thyroid	8	4.7	1.7	0.7	3.4		0.8	12.5
C76-C79	CUP	26	15.5	1.7	1.1	2.5	#	2.4	3.8
C81	Hodgkin lymphoma	3	1.6	1.8	0.4	5.3		0.3	
C82-C85	NHL	81	36.0	2.3	1.8	2.8	#	10.2	4.9
C90	Mult. myeloma	24	11.6	2.1	1.3	3.1	#	2.8	25.0
C91-C96	Leukaemia	25	15.3	1.6	1.1	2.4	#	2.2	28.0
Other primaries		9	10.0	0.9	0.4	1.7		-0.2	11.1
Not observed		0	1.6	0.0	0.0	2.4		-0.4	
All mult. primaries		2243	886.3	2.5	2.4	2.6	#	308.8	7.4

Table 8a

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

Diagnosis	Observed n	Expected n	SIR	LCL 95%	UCL 95%	EAR	DCO %
Patients		14431					
Median age at second malignancy (years)		74.1					
Person-years		43928					
Mean observation time (years)		3.0					
Median observation time (years)		1.7					

The occurrence of second malignancy is statistically significant.

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

Table 8b

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

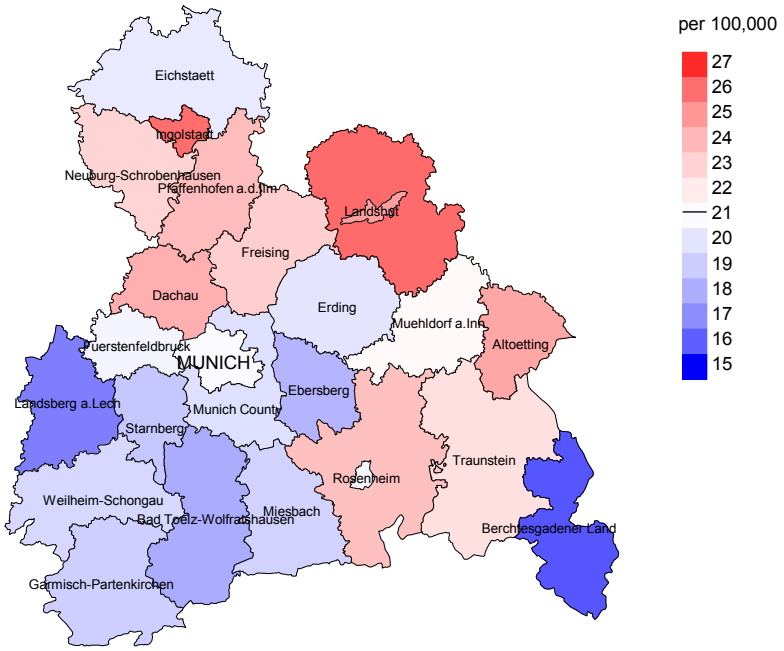
Diagnosis		Observed n	Expected n	SIR	LCL 95%	UCL 95%		EAR	DCO %
C03-C06	Oral cavity	7	3.0	2.3	0.9	4.8		1.0	
C09-C10	Oropharynx	5	1.7	2.9	0.9	6.7		0.8	
C15	Oesophagus	7	3.1	2.3	0.9	4.7		1.0	28.6
C16	Stomach	59	23.6	2.5	1.9	3.2	#	8.7	22.0
C17	Small intestine	30	2.4	12.5	8.4	17.8	#	6.8	3.3
C18	Colon	219	63.8	3.4	3.0	3.9	#	38.1	0.5
C19-C20	Rectum	126	25.4	5.0	4.1	5.9	#	24.7	0.8
C21	Anus/canal	6	2.8	2.1	0.8	4.6		0.8	
C22	Liver	25	7.0	3.6	2.3	5.3	#	4.4	40.0
C23-C24	Bile	17	9.3	1.8	1.1	2.9	#	1.9	17.6
C25	Pancreas	68	27.8	2.5	1.9	3.1	#	9.9	26.5
C26	GI cancer	3	1.4	2.1	0.4	6.1		0.4	33.3
C33-C34	Lung	105	36.8	2.9	2.3	3.5	#	16.7	16.2
C38,C45	Mesothelioma	3	1.0	2.9	0.6	8.4		0.5	
C43	Malign. melanoma	39	18.0	2.2	1.5	3.0	#	5.2	
C46,C49	Soft tissue	5	3.1	1.6	0.5	3.7		0.5	
C48	Peritoneal	6	1.8	3.3	1.2	7.1	#	1.0	33.3
C50	Breast	271	149.5	1.8	1.6	2.0	#	29.8	5.5
C51	Vulva	12	6.3	1.9	1.0	3.3		1.4	
C52	Vagina	3	1.2	2.5	0.5	7.4		0.4	
C53	Cervix uteri	14	6.3	2.2	1.2	3.7	#	1.9	7.1
C54	Corpus uteri	72	28.6	2.5	2.0	3.2	#	10.7	1.4
C56	Ovary	75	22.3	3.4	2.6	4.2	#	13.0	30.7
C64	Kidney	48	13.9	3.4	2.5	4.6	#	8.4	12.5
C65	Renal pelvis	5	1.8	2.7	0.9	6.4		0.8	
C66	Ureter	3	0.9	3.3	0.7	9.7		0.5	33.3
C67	Bladder	29	12.6	2.3	1.5	3.3	#	4.0	20.7
C70-C72	CNS cancer	11	7.4	1.5	0.7	2.7		0.9	63.6
C73	Thyroid	11	7.0	1.6	0.8	2.8		1.0	9.1
C74-C80	Cancer others	3	3.2	0.9	0.2	2.8		-0.0	66.7
C76-C79	CUP	8	11.9	0.7	0.3	1.3		-1.0	
C82-C85	NHL	44	22.5	2.0	1.4	2.6	#	5.3	20.5
C90	Mult. myeloma	12	7.3	1.7	0.9	2.9		1.2	16.7
C91-C96	Leukaemia	20	9.7	2.1	1.3	3.2	#	2.5	40.0
Other primaries		12	5.7	2.1	1.1	3.7	#	1.6	16.7
Not observed		0	3.3	0.0	0.0	1.1		-0.8	
All mult. primaries		1383	553.6	2.5	2.4	2.6	#	203.8	11.1

Patients	13146
Median age at second malignancy (years)	76.5
Person-years	40695
Mean observation time (years)	3.1
Median observation time (years)	1.7

The occurrence of second malignancy is statistically significant.

Observed second primaries with count 1 to 2 are pooled in category “Other primaries”

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



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

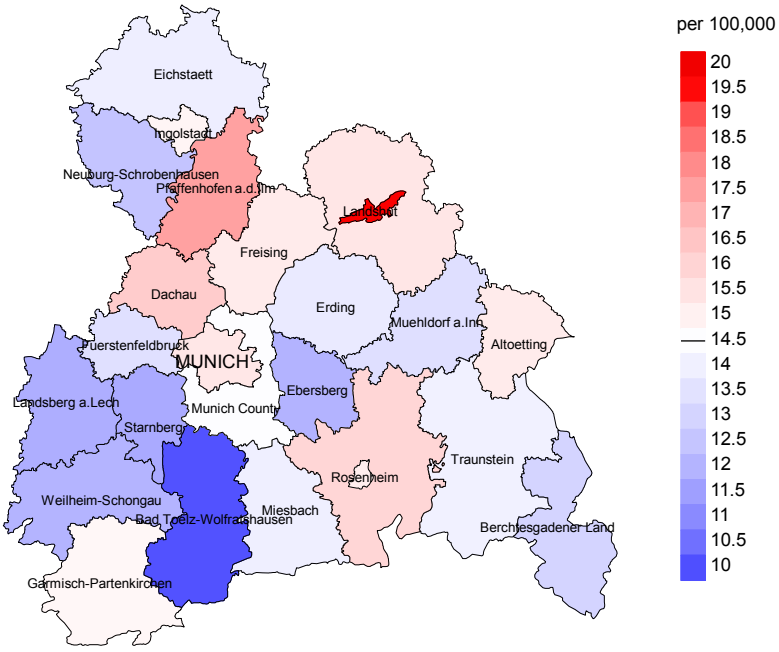
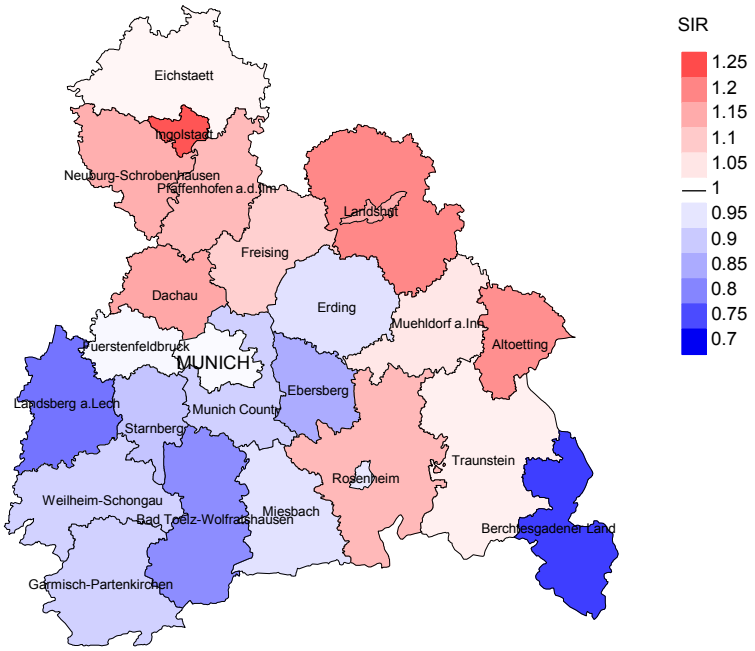


Figure 9a. Map of cancer incidence (world standard population, incl. DCO cases) by county averaged for period 2007 to 2014. According to their individual incidence rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 21.2/100,000 WS N=8,007, females 14.5/100,000 WS N=7,176).

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 150 women were identified with newly diagnosed colon cancer. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 12.0/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 9.4 and 15.3/100,000.

Standardized incidence ratio (SIR) 2007 - 2014: Males



Standardized incidence ratio (SIR) 2007 - 2014: Females

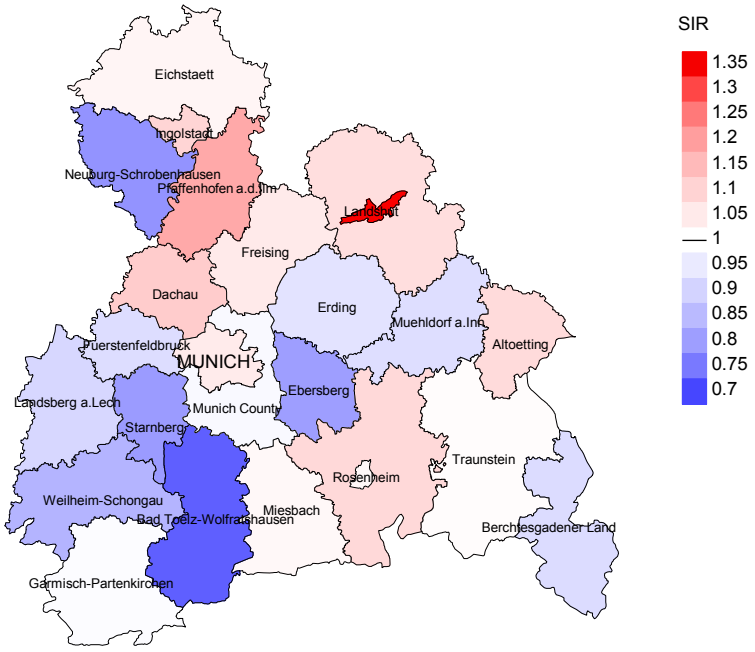


Figure 9b. Map of standardized incidence ratio (SIR, incl. DCO cases) by county averaged for period 2007 to 2014. According to their individual SIR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=8,007, females N=7,176).

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 150 women were identified with newly diagnosed colon cancer. Therefore, the mean standardized incidence ratio (SIR) for this cancer type in this area can be calculated at 0.80. Though, the value of this parameter may vary with an underlying probability of 99% between 0.64 and 0.98.

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	1266	98.3	6.2	944	74.6	93.9
1999	1201	97.6	7.2	883	73.5	95.1
2000	1082	98.2	6.7	778	71.9	96.7
2001	1209	98.0	7.9	846	70.0	97.0
2002	2036	97.3	14.1	1438	70.6	98.1
2003	2068	97.3	11.3	1365	66.0	98.1
2004	2043	97.6	9.6	1351	66.1	97.5
2005	1927	96.4	8.6	1256	65.2	98.1
2006	1973	93.6	6.2	1155	58.5	99.4
2007	2156	80.9	7.4	1224	56.8	98.5
2008	2195	73.7	6.6	1199	54.6	98.5
2009	2166	72.3	5.7	1085	50.1	99.0
2010	1971	71.3	6.8	925	46.9	98.2
2011	1914	70.1	6.4	850	44.4	97.6
2012	1876	70.8	6.2	733	39.1	98.1
2013	1846	99.0	6.3	576	31.2	96.9
2014	1291	99.2	8.2	303	23.5	95.4
1998-2014	30220	87.6	7.8	16911	56.0	97.6

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	1266	715	91.0	236	18.6
1999	1201	722	92.1	227	18.9
2000	1082	706	94.1	206	19.0
2001	1209	743	95.7	211	17.5
2002	2036	1049	98.2	501	24.6
2003	2068	1136	97.8	449	21.7
2004	2043	1139	98.4	430	21.0
2005	1927	1234	96.8	400	20.8
2006	1973	1206	97.5	345	17.5
2007	2156	1305	97.5	403	18.7
2008	2195	1344	98.4	447	20.4
2009	2166	1368	98.2	378	17.5
2010	1971	1413	98.4	350	17.8
2011	1914	1403	98.9	361	18.9
2012	1876	1432	98.3	364	19.4
2013	1846	1443	98.3	341	18.5
2014	1291	1318	98.7	271	21.0
1998-2014	30220	19676	97.4	5920	19.6

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	715	72.2	27.8	86.8
1999	722	71.5	28.5	84.8
2000	706	72.9	27.1	85.4
2001	743	69.0	31.0	84.2
2002	1049	74.0	26.0	86.8
2003	1136	72.2	27.8	85.4
2004	1139	76.5	23.5	85.9
2005	1234	70.6	29.4	80.0
2006	1206	68.5	31.5	81.5
2007	1305	70.6	29.4	82.6
2008	1344	70.4	29.6	81.3
2009	1368	67.8	32.2	77.1
2010	1413	65.0	35.0	77.4
2011	1403	64.8	35.2	75.9
2012	1432	64.6	35.4	77.3
2013	1443	62.0	38.0	72.2
2014	1318	61.2	38.8	73.6
1998-2014	19676	68.5	31.5	80.2

Table 11a

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

Year of death	Deaths n	Age at death (all causes) Years	Age at death (cancer-related) Years	Age at death (non-cancer-related) Years	Age at death (according to death certificate) Years
1998	336	74.5	72.3	80.1	73.7
1999	317	75.5	72.9	80.7	74.4
2000	356	76.9	73.9	82.4	75.4
2001	341	74.7	71.9	81.5	73.0
2002	513	75.4	73.1	81.0	74.3
2003	572	76.7	75.2	80.7	75.8
2004	559	76.4	75.2	81.6	75.8
2005	615	76.6	74.2	82.1	74.6
2006	629	77.5	76.0	81.0	76.2
2007	684	77.6	75.1	81.4	75.8
2008	733	77.5	75.8	82.6	76.4
2009	688	77.8	76.0	81.7	76.7
2010	735	78.2	75.4	82.2	76.8
2011	735	77.7	74.2	82.9	75.7
2012	747	78.5	76.3	83.1	77.0
2013	766	80.0	77.3	84.3	78.2
2014	695	80.0	77.2	83.9	78.8
1998-2014	10021	77.5	75.2	82.3	76.2

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

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

Year of death	Deaths n	Age at death (all causes) Years	Age at death (cancer-related) Years	Age at death (non-cancer-related) Years	Age at death (according to death certificate) Years
1998	379	78.2	76.5	84.0	78.1
1999	405	80.9	78.7	86.0	80.0
2000	350	81.1	78.8	86.8	80.3
2001	402	81.5	79.3	87.0	80.6
2002	536	81.7	79.7	87.0	80.9
2003	564	81.7	79.4	86.3	80.7
2004	580	81.5	79.3	85.3	80.3
2005	619	82.4	79.8	85.7	80.7
2006	577	82.8	80.3	86.5	81.4
2007	621	82.3	79.7	86.9	80.9
2008	611	83.1	80.4	86.5	81.8
2009	680	83.6	80.4	87.7	81.2
2010	678	83.7	80.8	87.8	82.6
2011	668	84.4	80.2	88.5	81.9
2012	685	84.1	79.7	88.4	81.4
2013	677	84.6	79.5	88.8	82.0
2014	623	84.7	79.2	88.2	81.3
1998-2014	9655	82.8	79.6	87.3	81.0

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 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	246	22.2	0.41	12.9	0.40	20.5	0.41	28.2	0.43
1999	221	19.7	0.38	11.3	0.37	18.1	0.39	25.6	0.41
2000	266	23.4	0.51	12.9	0.48	20.8	0.51	29.5	0.54
2001	247	21.3	0.41	11.9	0.40	18.9	0.41	25.6	0.43
2002	392	21.0	0.38	11.2	0.38	17.8	0.39	24.5	0.39
2003	424	22.6	0.40	11.4	0.38	18.6	0.40	26.8	0.43
2004	435	23.1	0.42	11.3	0.39	18.5	0.42	26.5	0.44
2005	443	23.4	0.46	11.3	0.43	18.1	0.45	25.7	0.48
2006	428	22.3	0.43	10.5	0.39	17.1	0.42	24.6	0.45
2007	493	22.3	0.44	10.2	0.40	16.5	0.43	23.6	0.46
2008	540	24.3	0.47	10.8	0.43	17.6	0.46	25.4	0.50
2009	465	20.8	0.41	9.2	0.37	14.9	0.40	21.3	0.42
2010	485	21.5	0.48	9.2	0.43	14.9	0.45	21.3	0.49
2011	496	21.7	0.51	9.6	0.48	15.1	0.50	20.8	0.51
2012	497	21.8	0.51	9.4	0.47	15.2	0.50	21.1	0.53
2013	496	21.7	0.50	9.0	0.45	14.8	0.48	21.2	0.51
2014	429	18.8	0.65	7.7	0.57	12.7	0.61	18.2	0.66
1998-2014	7003	21.9	0.45	10.2	0.42	16.5	0.45	23.3	0.47

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	270	23.0	0.41	8.6	0.37	13.6	0.38	19.0	0.40
1999	295	24.9	0.48	8.6	0.40	13.9	0.43	19.4	0.45
2000	249	20.7	0.45	7.3	0.39	11.7	0.41	16.0	0.42
2001	266	21.9	0.44	7.5	0.37	12.1	0.39	17.0	0.41
2002	384	19.6	0.38	6.6	0.33	10.6	0.35	14.7	0.36
2003	396	20.1	0.39	6.9	0.34	11.0	0.36	15.3	0.38
2004	436	22.1	0.44	7.2	0.36	11.7	0.39	16.5	0.42
2005	428	21.5	0.46	7.2	0.41	11.5	0.42	15.7	0.43
2006	398	19.8	0.42	6.2	0.33	10.2	0.36	14.3	0.39
2007	430	18.6	0.42	6.2	0.36	9.9	0.38	13.7	0.40
2008	408	17.6	0.40	5.4	0.32	8.8	0.35	12.5	0.38
2009	462	19.9	0.46	6.2	0.40	10.0	0.42	13.8	0.43
2010	434	18.5	0.47	5.8	0.41	9.2	0.42	12.6	0.43
2011	414	17.5	0.45	5.4	0.37	8.6	0.39	11.9	0.41
2012	428	18.1	0.49	5.7	0.39	9.2	0.43	12.7	0.45
2013	399	16.9	0.49	5.4	0.40	8.6	0.43	11.7	0.45
2014	377	16.0	0.61	5.0	0.50	8.0	0.53	11.0	0.56
1998-2014	6474	19.4	0.45	6.3	0.37	10.1	0.40	14.0	0.42

Table 13

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

Age at death Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
15-19	1	0.0	0.0	1	0.0	0.0			0.0
20-24	1	0.0	0.0	1	0.0	0.0			0.0
25-29	9	0.1	0.1	3	0.1	0.1	6	0.2	0.2
30-34	7	0.1	0.2	6	0.1	0.3	1	0.0	0.2
35-39	24	0.3	0.6	8	0.2	0.5	16	0.5	0.7
40-44	59	0.8	1.4	30	0.7	1.2	29	0.8	1.5
45-49	103	1.4	2.7	51	1.3	2.5	52	1.5	3.0
50-54	176	2.4	5.1	97	2.4	4.9	79	2.3	5.3
55-59	314	4.2	9.3	183	4.5	9.4	131	3.8	9.2
60-64	499	6.7	16.0	312	7.7	17.1	187	5.5	14.6
65-69	800	10.7	26.6	513	12.7	29.8	287	8.4	23.0
70-74	1094	14.6	41.3	664	16.4	46.2	430	12.5	35.5
75-79	1236	16.5	57.8	737	18.2	64.4	499	14.5	50.1
80-84	1387	18.5	76.3	767	18.9	83.3	620	18.1	68.1
85+	1769	23.7	100.0	676	16.7	100.0	1093	31.9	100.0
All ages	7479	100.0		4049	100.0		3430	100.0	

Included in the statistics are 38.1% multiple primaries in males and 27.9% in females.

Table 14

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

Age at death Years	Males n	Females n	Males Age-spec. mortal.	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	1		0.1	0.25	0.0		2.8	
20-24	1		0.1	0.10	0.0		2.1	
25-29	3	6	0.2	0.15	0.5	0.25	4.8	9.4
30-34	6	1	0.5	0.22	0.1	0.04	6.8	0.9
35-39	8	16	0.6	0.14	1.3	0.33	4.5	6.2
40-44	30	29	1.8	0.26	1.9	0.27	6.5	4.6
45-49	51	52	3.2	0.25	3.4	0.30	5.0	4.3
50-54	97	79	7.5	0.30	6.2	0.30	5.2	4.4
55-59	183	131	17.2	0.34	11.7	0.32	5.9	5.0
60-64	312	187	31.8	0.36	17.6	0.33	6.5	5.2
65-69	513	287	53.3	0.42	27.5	0.36	7.2	5.5
70-74	664	430	73.0	0.44	41.1	0.40	7.3	6.5
75-79	737	499	133.8	0.55	70.0	0.47	8.7	7.9
80-84	767	620	219.6	0.68	110.6	0.53	10.4	9.4
85+	676	1093	292.0	0.87	189.1	0.71	11.2	12.6
All ages	4049	3430					8.1	7.9
Mortality								
Raw			22.4	0.50	18.3	0.47		
WS			9.7	0.45	5.8	0.39		
ES			15.7	0.48	9.2	0.42		
BRD-S			22.3	0.51	12.8	0.44		
PYLL-70								
per 100,000			64.2		50.0			
ES			56.0		42.2			
AYLL-70			8.5		10.1			

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

Table 15a

Multiple primaries in deaths in period 1998–2014
MALES

Diagnosis		Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C15	Oesophagus	55	1.7	8	14.5	10	18.2	37	67.3
C16	Stomach	173	5.4	48	27.7	47	27.2	78	45.1
C17	Small intestine	37	1.2	5	13.5	16	43.2	16	43.2
C18	Colon	239	7.5			112	46.9	127	53.1
C19–C20	Rectum	285	9.0	82	28.8	139	48.8	64	22.5
C22	Liver	92	2.9	4	4.3	25	27.2	63	68.5
C25	Pancreas	111	3.5	9	8.1	17	15.3	85	76.6
C32	Larynx	49	1.5	32	65.3			17	34.7
C33–C34	Lung	323	10.2	58	18.0	48	14.9	217	67.2
C43	Malign. melanoma	102	3.2	55	53.9	3	2.9	44	43.1
C44	Skin others	161	5.1	83	51.6	14	8.7	64	39.8
C61	Prostate	657	20.7	381	58.0	47	7.2	229	34.9
C64	Kidney	118	3.7	56	47.5	24	20.3	38	32.2
C67	Bladder	237	7.5	118	49.8	20	8.4	99	41.8
C70–C72	CNS cancer	49	1.5	15	30.6	2	4.1	32	65.3
C76–C79	CUP	38	1.2	7	18.4	6	15.8	25	65.8
C82–C85	NHL	110	3.5	43	39.1	21	19.1	46	41.8
C90	Mult. myeloma	35	1.1	11	31.4	6	17.1	18	51.4
C91–C96	Leukaemia	68	2.1	17	25.0	5	7.4	46	67.6
Other primaries		241	7.6	98	40.7	19	7.9	124	51.5
All mult. primaries		3180	100.0	1130	35.5	581	18.3	1469	46.2

Multiple primaries with number of cases 1 to 26 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 15b

Multiple primaries in deaths in period 1998-2014
FEMALES

Diagnosis		Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C16	Stomach	132	5.4	39	29.5	30	22.7	63	47.7
C18	Colon	158	6.5			61	38.6	97	61.4
C19-C20	Rectum	168	6.9	53	31.5	70	41.7	45	26.8
C22	Liver	29	1.2	2	6.9	8	27.6	19	65.5
C23-C24	Bile	34	1.4	8	23.5	6	17.6	20	58.8
C25	Pancreas	101	4.2	7	6.9	15	14.9	79	78.2
C33-C34	Lung	149	6.1	26	17.4	15	10.1	108	72.5
C43	Malign. melanoma	59	2.4	40	67.8	5	8.5	14	23.7
C44	Skin others	73	3.0	43	58.9	6	8.2	24	32.9
C50	Breast	590	24.3	396	67.1	41	6.9	153	25.9
C53	Cervix uteri	64	2.6	45	70.3	8	12.5	11	17.2
C54	Corpus uteri	138	5.7	91	65.9	11	8.0	36	26.1
C56	Ovary	167	6.9	57	34.1	39	23.4	71	42.5
C64	Kidney	51	2.1	25	49.0	8	15.7	18	35.3
C67	Bladder	82	3.4	39	47.6	2	2.4	41	50.0
C70-C72	CNS cancer	42	1.7	21	50.0	3	7.1	18	42.9
C73	Thyroid	23	0.9	13	56.5	2	8.7	8	34.8
C76-C79	CUP	22	0.9	8	36.4	4	18.2	10	45.5
C82-C85	NHL	73	3.0	32	43.8	9	12.3	32	43.8
C90	Mult. myeloma	31	1.3	10	32.3	3	9.7	18	58.1
C91-C96	Leukaemia	51	2.1	10	19.6	7	13.7	34	66.7
Other primaries		189	7.8	78	41.3	28	14.8	83	43.9
All mult. primaries		2426	100.0	1043	43.0	381	15.7	1002	41.3

Multiple primaries with number of cases 1 to 20 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	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	1		0.1	0.25	0.0		3.0	
20-24	1		0.1	0.10	0.0		2.3	
25-29	3	6	0.2	0.18	0.5	0.26	5.5	10.2
30-34	6	1	0.5	0.22	0.1	0.04	7.0	1.1
35-39	7	12	0.5	0.15	1.0	0.27	4.2	5.3
40-44	27	26	1.7	0.25	1.7	0.27	6.4	4.7
45-49	48	44	3.0	0.26	2.9	0.28	5.2	4.3
50-54	77	68	5.9	0.29	5.3	0.29	4.8	4.6
55-59	152	110	14.3	0.33	9.8	0.32	5.8	5.1
60-64	252	146	25.7	0.36	13.8	0.33	6.4	5.1
65-69	390	236	40.5	0.42	22.6	0.37	6.9	5.8
70-74	503	331	55.3	0.45	31.7	0.41	7.2	6.5
75-79	529	375	96.1	0.56	52.6	0.46	8.5	7.7
80-84	527	463	150.9	0.73	82.6	0.50	9.9	9.2
85+	471	854	203.4	0.91	147.8	0.71	10.7	12.6
All ages	2994	2672					7.8	7.8
Mortality								
Raw			16.6	0.49	14.3	0.46		
WS			7.3	0.44	4.6	0.38		
ES			11.7	0.47	7.3	0.41		
BRD-S			16.4	0.51	10.0	0.42		
PYLL-70								
per 100,000			53.8		41.9			
ES			46.9		35.4			
AYLL-70			8.9		10.2			

* See corresponding tables with multiple primaries.

Table 17

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

Age at death Years	Males n	Females n	Males Age-spec. mortal.	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	1		0.1	0.25	0.0		3.0	
20-24	1		0.1	0.10	0.0		2.6	
25-29	3	6	0.2	0.19	0.5	0.26	5.9	10.7
30-34	6	1	0.5	0.22	0.1	0.04	7.1	1.2
35-39	7	11	0.5	0.15	0.9	0.25	4.4	5.4
40-44	27	26	1.7	0.26	1.7	0.27	6.8	5.1
45-49	46	43	2.9	0.26	2.8	0.28	5.3	4.7
50-54	70	66	5.4	0.28	5.2	0.30	4.9	5.0
55-59	135	99	12.7	0.31	8.8	0.31	5.8	5.3
60-64	220	130	22.4	0.33	12.3	0.31	6.5	5.4
65-69	325	203	33.8	0.38	19.4	0.35	6.8	6.0
70-74	389	272	42.8	0.38	26.0	0.36	6.9	6.6
75-79	403	310	73.2	0.48	43.5	0.40	8.3	7.8
80-84	376	385	107.6	0.57	68.7	0.44	9.3	9.4
85+	336	699	145.1	0.68	121.0	0.60	9.8	12.4
All ages	2345	2251					7.4	7.8
Mortality								
Raw			13.0	0.42	12.0	0.41		
WS			5.9	0.38	4.0	0.35		
ES			9.3	0.41	6.2	0.37		
BRD-S			12.8	0.43	8.5	0.38		
PYLL-70								
per 100,000			48.9		39.2			
ES			42.6		33.2			
AYLL-70			9.3		10.6			

* See corresponding tables with multiple primaries.

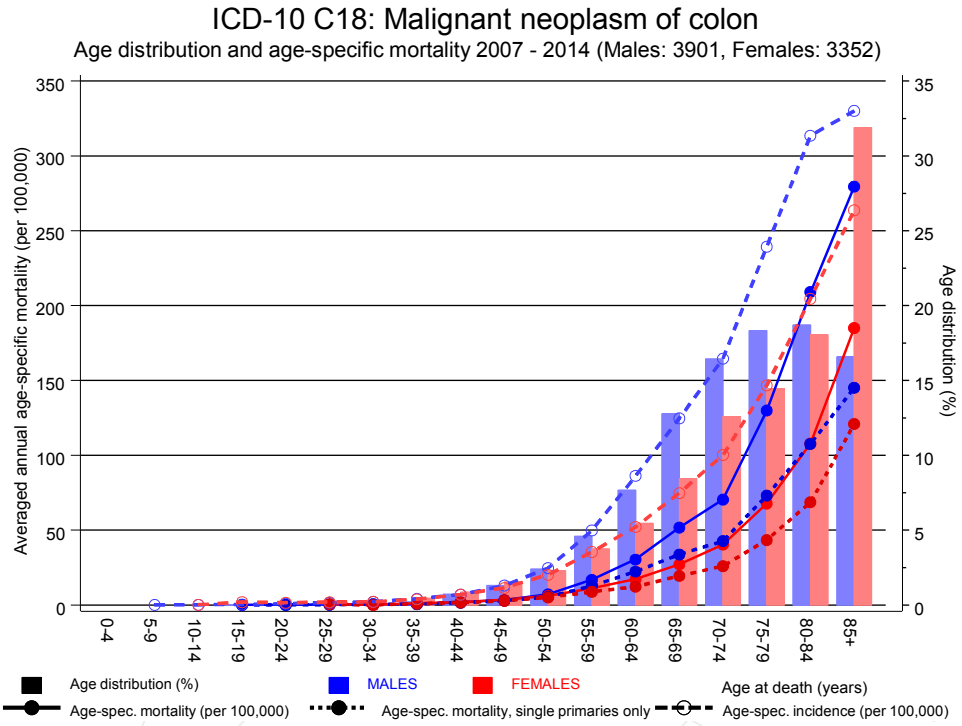
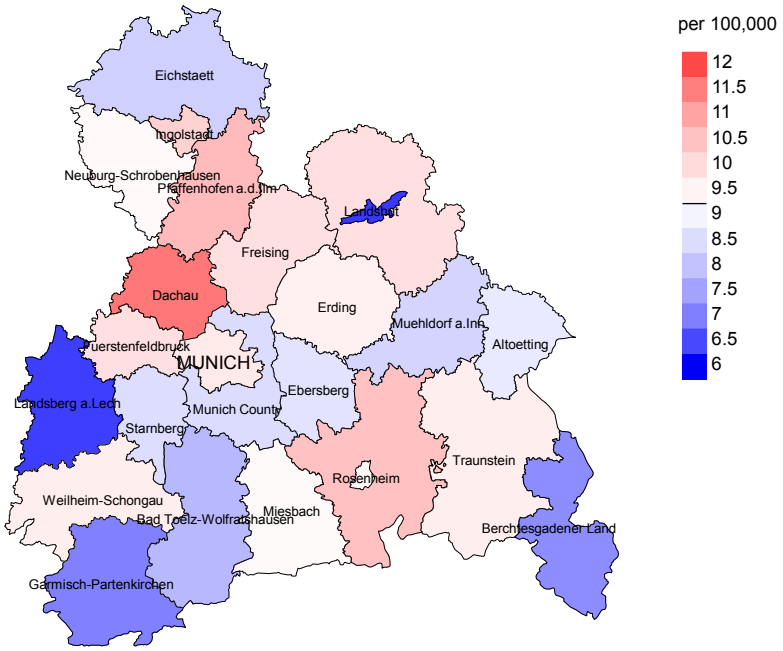


Figure 18. Distribution of age at death (bars) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

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

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



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

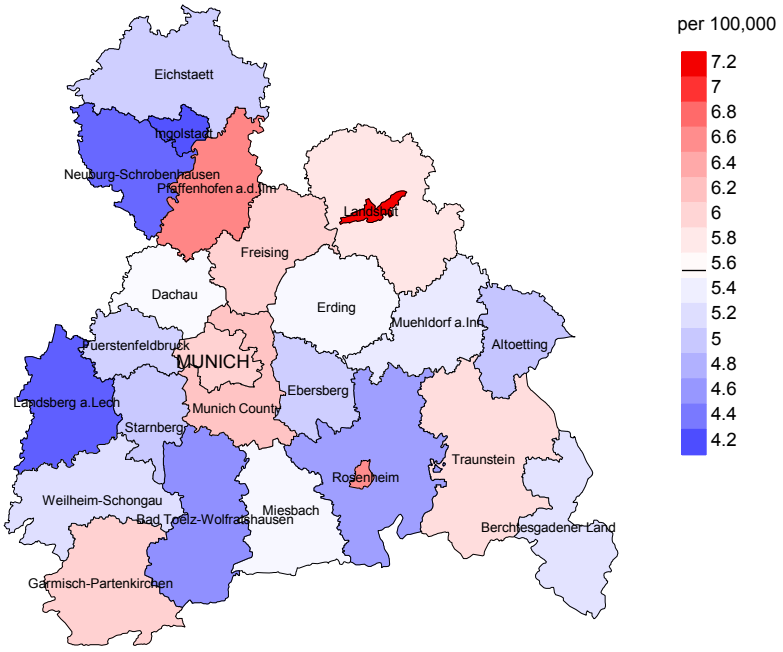
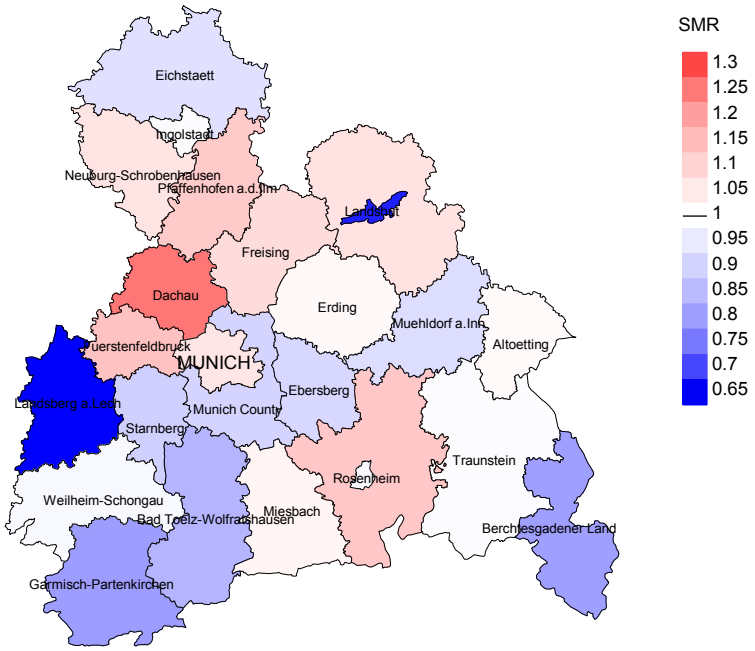


Figure 19a. Map of cancer mortality (world standard population) by county averaged for period 2007 to 2014. According to their individual mortality rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 9.2/100,000 WS N=3,866, females 5.6/100,000 WS N=3,315).

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 70 women died from colon cancer. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 5.0/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 3.4 and 7.5/100,000.

Standardized mortality ratio (SMR) 2007 - 2014: Males



Standardized mortality ratio (SMR) 2007 - 2014: Females

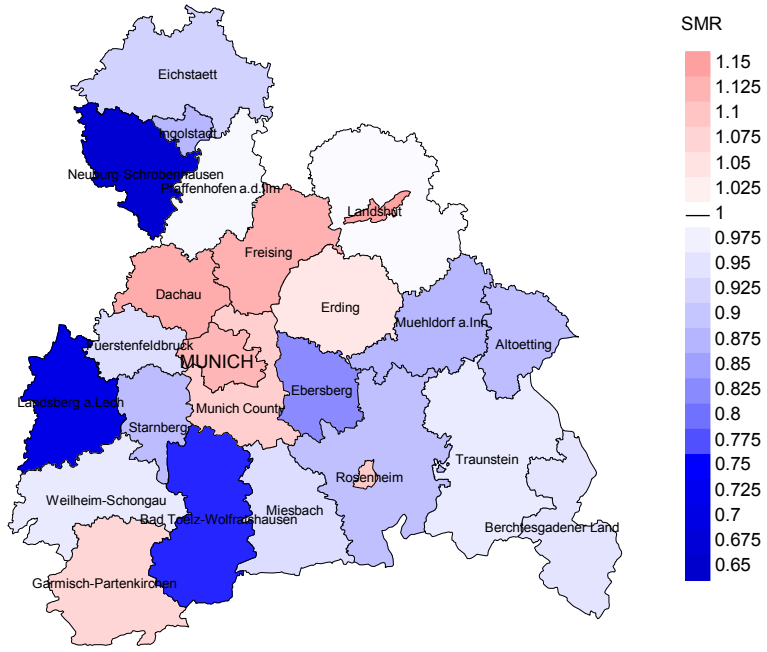


Figure 19b. Map of standardized mortality ratio (SMR, incl. DCO cases) by county averaged for period 2007 to 2014. According to their individual SMR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=3,866, females N=3,315).

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 70 women died from colon cancer. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 0.83. Though, the value of this parameter may vary with an underlying probability of 99% between 0.59 and 1.12, 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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