Munich Cancer Registry

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

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

Cancer statistics: Baseline statistics

C18: Colon cancer

Year of diagnosis	1998-2013
Patients	27,922
Diseases	28,439
Creation date	05/19/2015
Export date	12/30/2014
Population	4.64 m

http://www.tumorregister-muenchen.de/en/facts/base/base_C18__E.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. The time-delayed acquisition of data and the occasionally high DCO-rates indicate optimizing reserves, among others, because of current financial and legal conditions that hinder the analyses.

Clinics and physicians have access to essentially more detailed data, with which they can check, compare and in the best case optimize their own data and results.

We would be pleased to receive corrections, critique and useful suggestions. Just send an e-mail to tumor@ibe.med.uni-muenchen.de.

Munich Cancer Registry, May 2015

[#] Base data has been collected since 1998. An increase in new diseases is apparent, which is an effect of two extensions in the MCR catchment area (from a base population of 2.51 million to 3.96 in 2002, and to 4.52 million in 2007). Death certificates from 2014 are incorporated into these analyses.

[##] Due to the high frequency and good prognosis of non-malignant skin cancer (C44), no systematic ascertainment is performed for this diagnosis. C44 is not designated as a primary, but rather as a secondary tumor.

[###] DCO (death certificate only) identifies a cancer case that first becomes available to the MCR through the death certificate. A high proportion of DCO cases (≥5%) in particular cancer types indicate insufficient participation of specific cancer specializations.

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

Code	Description
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

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	1265	79	6.2	25.5	73.4	98.5	
1999	1199	87	7.3	26.0	72.4	97.8	
2000	1083	73	6.7	27.8	71.0	98.1	
2001	1207	96	8.0	27.3	68.8	98.1	
2002	2034	289	14.2	25.3	69.2	97.7	#
2003	2064	233	11.3	26.8	65.0	98.1	
2004	2042	195	9.5	25.6	64.8	97.8	
2005	1923	166	8.6	29.2	63.3	96.6	
2006	1970	122	6.2	28.5	57.0	94.8	
2007	2153	158	7.3	26.4	55.1	84.3	# ##
2008	2189	145	6.6	29.4	52.9	71.4	
2009	2153	123	5.7	29.0	48.1	69.5	
2010	1956	134	6.9	28.0	44.6	67.7	
2011	1883	123	6.5	26.9	40.6	66.6	
2012	1843	120	6.5	25.9	32.9	65.8	
2013	1475	110	7.5	26.4	24.0	98.8	###
1998-2013	28439	2253	7.9	27.2	55.5	86.2	

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

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

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

Table 1a

Patient cohorts by year of diagnosis and gender
including DCO cases

Year of diagnosis	All n	Males n	Females n	Prop. males %
1998	1265	606	659	47.9
1999	1199	580	619	48.4
2000	1083	524	559	48.4
2001	1207	599	608	49.6
2002	2034	1025	1009	50.4
2003	2064	1057	1007	51.2
2004	2042	1050	992	51.4
2005	1923	979	944	50.9
2006	1970	1019	951	51.7
2007	2153	1128	1025	52.4
2008	2189	1162	1027	53.1
2009	2153	1150	1003	53.4
2010	1956	1034	922	52.9
2011	1883	970	913	51.5
2012	1843	969	874	52.6
2013	1475	815	660	55.3
1998-2013	28439	14667	13772	51.6

Table 2

Incidence measures by year of diagnosis and gender including DCO cases
(with respect to registry area expansion from 2.51 to 3.96 m as of 2002,
and from 3.96 to 4.64 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	606	659	54.7	56.0	32.6	23.4	49.7	35.6	66.2	47.1
1999	580	619	51.8	52.2	30.3	21.5	46.6	32.7	63.0	43.1
2000	524	559	46.0	46.5	26.6	18.8	40.9	28.9	54.4	38.2
2001	599	608	51.7	50.0	30.0	20.4	45.6	31.2	59.0	41.5
2002	1025	1009	55.0	51.5	30.0	20.1	46.2	30.7	62.3	40.7
2003	1057	1007	56.4	51.1	30.3	19.9	46.3	30.6	61.9	40.4
2004	1050	992	55.8	50.2	29.0	20.0	44.7	30.1	60.4	39.3
2005	979	944	51.7	47.4	26.6	17.8	40.7	27.3	54.4	36.4
2006	1019	951	53.2	47.3	27.2	18.7	41.6	28.2	55.3	37.3
2007	1128	1025	50.9	44.4	26.0	17.3	39.2	26.0	52.3	34.2
2008	1162	1027	52.2	44.3	25.3	16.9	39.1	25.6	52.3	33.6
2009	1150	1003	51.5	43.1	24.8	15.9	37.7	24.3	50.6	32.5
2010	1034	922	45.9	39.4	21.8	14.4	33.2	21.9	44.5	29.3
2011	970	913	42.5	38.7	19.9	14.4	30.3	21.9	40.6	28.7
2012	969	874	42.4	37.0	20.0	14.6	30.4	21.5	40.1	28.1
2013	815	660	35.7	28.0	16.4	10.9	25.2	16.1	34.2	21.1
1998-2013	14667	13772	49.3	44.3	25.0	17.2	38.1	26.0	50.9	34.4

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	1265	70.8	12.3	13.2	98.1	54.7	62.1	72.2	79.6	86.3
1999	1199	71.3	12.4	24.9	101	55.5	63.2	72.6	79.8	86.6
2000	1083	71.3	11.9	24.7	103	56.3	62.7	72.7	79.5	86.8
2001	1207	71.1	12.4	30.8	103	55.7	62.7	71.7	80.5	87.2
2002	2034	72.2	12.2	17.7	101	56.6	63.7	73.5	81.2	87.5
2003	2064	72.2	11.7	8.4	99.4	57.2	64.3	72.9	80.8	87.1
2004	2042	71.9	12.3	13.8	101	56.4	64.3	73.1	81.0	86.8
2005	1923	72.6	12.3	15.1	99.9	57.2	65.2	73.7	81.9	87.1
2006	1970	71.7	11.9	17.9	102	55.7	64.2	72.4	80.7	85.8
2007	2153	71.6	12.7	15.8	103	54.8	64.5	72.6	81.1	86.3
2008	2189	72.4	12.3	18.9	105	56.4	65.5	73.2	81.6	87.2
2009	2153	72.4	12.2	12.4	99.1	56.3	65.3	73.3	81.4	86.9
2010	1956	72.6	12.5	14.9	101	55.9	65.3	74.0	81.8	86.9
2011	1883	72.7	12.4	17.1	101	56.2	65.0	74.0	81.9	87.4
2012	1843	72.1	13.0	9.7	101	56.0	65.0	73.7	81.6	86.9
2013	1475	72.1	13.1	15.7	105	54.2	65.0	74.0	81.6	87.1
1998-2013	28439	72.0	12.4	8.4	105	56.1	64.4	73.2	81.1	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	606	69.0	11.5	31.4	98.1	55.0	60.7	69.5	77.0	84.4
1999	580	69.6	11.4	24.9	95.5	56.1	62.4	70.2	77.7	83.7
2000	524	69.3	10.6	36.0	93.0	56.0	61.8	69.7	77.0	82.6
2001	599	69.2	11.7	31.3	102	54.5	61.7	69.1	77.0	85.6
2002	1025	70.4	11.0	20.9	98.5	56.8	63.1	71.5	78.2	83.2
2003	1057	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	1019	70.5	11.1	17.9	102	56.0	63.5	71.0	78.4	84.0
2007	1128	69.8	12.2	15.8	99.4	54.3	63.5	71.1	78.7	83.9
2008	1162	71.1	11.3	19.3	105	56.3	65.0	71.7	79.2	84.8
2009	1150	70.6	11.4	12.4	99.0	55.5	64.1	71.7	79.1	83.7
2010	1034	71.0	11.4	27.9	98.9	55.1	64.0	71.7	79.4	84.5
2011	970	71.4	11.6	31.2	97.3	56.2	64.8	72.7	79.9	85.1
2012	969	71.4	11.3	9.7	101	57.3	64.8	72.8	79.4	85.1
2013	815	71.5	12.0	19.4	99.6	55.5	64.4	73.4	80.0	85.2
1998-2013	14667	70.5	11.4	8.4	105	56.1	63.6	71.4	78.6	84.3

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	619	73.0	13.0	26.9	101	54.8	64.3	75.0	82.8	88.5
2000	559	73.2	12.8	24.7	103	56.3	64.4	75.3	82.0	88.5
2001	608	73.0	12.7	30.8	103	55.9	64.0	75.3	81.7	89.0
2002	1009	74.1	13.0	17.7	101	56.3	64.9	76.5	83.0	89.5
2003	1007	74.1	12.0	23.5	98.9	57.9	65.4	75.9	82.9	88.9
2004	992	73.1	13.3	13.8	100	55.6	64.7	75.3	83.3	88.6
2005	944	74.7	12.8	15.1	99.9	57.9	66.9	76.6	83.9	90.2
2006	951	73.0	12.7	24.6	97.1	55.2	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	1027	74.0	13.3	18.9	101	56.7	66.3	75.4	84.1	88.8
2009	1003	74.4	12.8	15.9	99.1	58.0	67.4	76.2	84.0	88.8
2010	922	74.3	13.3	14.9	101	56.4	67.4	76.5	83.9	89.1
2011	913	74.0	13.1	17.1	101	56.2	65.5	75.7	84.5	88.8
2012	874	72.9	14.7	13.7	100	54.3	65.1	75.5	83.5	89.3
2013	660	72.9	14.4	15.7	105	52.2	66.2	75.0	83.7	88.8
1998-2013	13772	73.6	13.1	13.2	105	56.1	65.5	75.6	83.4	88.7

Table 4

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

Age at diagnosis Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
5-9	2	0.0	0.0	2	0.0	0.0			0.0
10-14	5	0.0	0.0	1	0.0	0.0	4	0.0	0.0
15-19	25	0.1	0.1	4	0.0	0.0	21	0.2	0.2
20-24	25	0.1	0.2	7	0.0	0.1	18	0.1	0.3
25-29	59	0.2	0.4	27	0.2	0.3	32	0.2	0.5
30-34	104	0.4	0.8	52	0.4	0.6	52	0.4	0.9
35-39	179	0.6	1.4	90	0.6	1.2	89	0.6	1.6
40-44	355	1.2	2.7	183	1.2	2.5	172	1.2	2.8
45-49	662	2.3	5.0	342	2.3	4.8	320	2.3	5.1
50-54	1122	3.9	8.9	607	4.1	9.0	515	3.7	8.9
55-59	1954	6.9	15.8	1109	7.6	16.5	845	6.1	15.0
60-64	3038	10.7	26.5	1810	12.3	28.9	1228	8.9	23.9
65-69	3863	13.6	40.1	2361	16.1	45.0	1502	10.9	34.8
70-74	4497	15.8	55.9	2651	18.1	63.0	1846	13.4	48.2
75-79	4453	15.7	71.5	2340	16.0	79.0	2113	15.3	63.6
80-84	4077	14.3	85.9	1809	12.3	91.3	2268	16.5	80.1
85+	4019	14.1	100.0	1272	8.7	100.0	2747	19.9	100.0
All ages	28439	100.0		14667	100.0		13772	100.0	

Included in the statistics are 36.8% multiple primaries in males and 26.9% in females.

Table 5

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

Age at diagnosis Years	Males n	Females n	Males Age-spec. incid.	Females Age-spec. incid.	Males DCO rate n=866 %	Females DCO rate n=1386 %	Males Prop.all cancers n=158258 %	Females Prop.all cancers n=153136 %
0- 4			0.0	0.0				
5- 9	2		0.1	0.0			1.1	
10-14	1	4	0.1	0.3			0.6	2.4
15-19	4	21	0.3	1.4			1.1	7.2
20-24	7	18	0.4	1.0	14.3		1.1	3.4
25-29	26	32	1.3	1.6			2.7	2.9
30-34	52	51	2.3	2.3			3.5	2.5
35-39	87	89	3.5	3.8		2.2	3.9	2.4
40-44	181	172	6.9	6.9	1.1		5.7	2.8
45-49	341	318	14.4	13.8	1.2	1.9	6.4	3.6
50-54	600	509	29.7	24.8	2.3	1.4	7.0	4.6
55-59	1101	837	60.0	43.5	2.1	1.9	7.6	6.1
60-64	1789	1218	100.9	64.9	2.5	2.2	8.2	7.1
65-69	2334	1492	147.9	86.5	2.5	3.0	8.5	7.9
70-74	2612	1827	203.9	120.3	4.3	4.5	9.7	9.9
75-79	2311	2096	279.6	176.5	6.1	7.0	11.2	11.9
80-84	1774	2247	354.6	240.9	10.1	10.7	13.0	14.2
85+	1249	2726	366.3	305.0	22.7	29.8	12.6	15.9
All ages	14471	13657			6.0	10.1	9.1	8.9
Incidence								
Raw			48.7	44.0				
WS			24.6	17.0				
ES			37.6	25.8				
BRD-S			50.2	34.1				

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 1998-2013
MALES

Diagnosis		Observed n	Expected n	SIR	LCL 95%	UCL 95%		EAR	DCO %
C00	Lip	3	0.9	3.2	0.7	9.3		0.6	
C03-C06	Oral cavity	7	5.2	1.4	0.5	2.8		0.5	
C09-C10	Oropharynx	9	6.1	1.5	0.7	2.8		0.8	
C12-C13	Hypopharynx	4	3.4	1.2	0.3	3.0		0.2	25.0
C15	Oesophagus	29	11.8	2.5	1.6	3.5	#	4.7	13.8
C16	Stomach	85	33.1	2.6	2.0	3.2	#	14.2	8.2
C17	Small intestine	34	3.4	9.9	6.9	13.9	#	8.4	2.9
C18	Colon	209	77.7	2.7	2.3	3.1	#	35.9	1.0
C19-C20	Rectum	175	39.8	4.4	3.8	5.1	#	37.0	0.6
C21	Anus/canal	4	1.4	2.9	0.8	7.3		0.7	
C22	Liver	37	19.8	1.9	1.3	2.6	#	4.7	32.4
C23-C24	Bile	15	7.4	2.0	1.1	3.3	#	2.1	
C25	Pancreas	58	26.9	2.2	1.6	2.8	#	8.5	27.6
C32	Larynx	14	6.8	2.1	1.1	3.5	#	2.0	14.3
C33-C34	Lung	154	85.5	1.8	1.5	2.1	#	18.7	16.2
C38,C45	Mesothelioma	4	4.8	0.8	0.2	2.1		-0.2	
C43	Malign. melanoma	53	26.9	2.0	1.5	2.6	#	7.1	1.9
C46,C49	Soft tissue	10	3.9	2.6	1.2	4.7	#	1.7	
C50	Breast	5	1.9	2.6	0.9	6.2		0.8	20.0
C60	Penis	2	1.7	1.2	0.1	4.3		0.1	
C61	Prostate	356	221.2	1.6	1.4	1.8	#	36.9	4.8
C62	Testis	4	1.2	3.3	0.9	8.4		0.8	25.0
C64	Kidney	74	24.6	3.0	2.4	3.8	#	13.5	5.4
C65	Renal pelvis	10	3.2	3.1	1.5	5.8	#	1.9	
C66	Ureter	7	1.8	4.0	1.6	8.2	#	1.4	
C67	Bladder	64	35.9	1.8	1.4	2.3	#	7.7	7.8
C68	Urinary org.	3	0.5	6.3	1.3	18.3	#	0.7	66.7
C70-C72	CNS cancer	14	9.1	1.5	0.8	2.6		1.3	35.7
C73	Thyroid	6	3.9	1.5	0.6	3.4		0.6	16.7
C76-C79	CUP	19	13.1	1.5	0.9	2.3		1.6	5.3
C81	Hodgkin lymphoma	2	1.3	1.6	0.2	5.6		0.2	
C82-C85	NHL	57	30.1	1.9	1.4	2.5	#	7.4	5.3
C90	Mult. myeloma	18	9.8	1.8	1.1	2.9	#	2.3	22.2
C91-C96	Leukaemia	21	12.7	1.7	1.0	2.5	#	2.3	33.3
Other primaries		9	7.8	1.2	0.5	2.2		0.3	11.1
Not observed		0	2.6	0.0	0.0	1.4		-0.7	
All mult. primaries		1575	747.2	2.1	2.0	2.2	#	226.4	7.9

Patients	9690
Median age at second malignancy (years)	74.3
Person-years	36567
Mean observation time (years)	3.8
Median observation time (years)	2.7

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 1998-2013
FEMALES

Diagnosis		Observed n	Expected n	SIR	LCL 95%	UCL 95%		EAR	DCO %
C03-C06	Oral cavity	5	2.6	1.9	0.6	4.5		0.7	
C09-C10	Oropharynx	5	1.5	3.3	1.1	7.8	#	1.0	
C12-C13	Hypopharynx	2	0.4	5.0	0.6	18.0		0.5	50.0
C15	Oesophagus	4	2.5	1.6	0.4	4.1		0.4	25.0
C16	Stomach	49	20.7	2.4	1.7	3.1	#	8.1	22.4
C17	Small intestine	22	2.0	10.9	6.8	16.5	#	5.8	4.5
C18	Colon	144	55.1	2.6	2.2	3.1	#	25.6	0.7
C19-C20	Rectum	91	22.3	4.1	3.3	5.0	#	19.8	1.1
C21	Anus/canal	4	2.4	1.7	0.4	4.2		0.5	
C22	Liver	20	5.9	3.4	2.1	5.2	#	4.1	45.0
C23-C24	Bile	11	8.1	1.4	0.7	2.4		0.8	27.3
C25	Pancreas	52	23.4	2.2	1.7	2.9	#	8.3	21.2
C32	Larynx	2	0.7	2.7	0.3	9.7		0.4	
C33-C34	Lung	81	30.8	2.6	2.1	3.3	#	14.5	14.8
C38,C45	Mesothelioma	3	0.9	3.4	0.7	10.0		0.6	
C40-C41	Bone	2	0.3	5.7	0.7	20.8		0.5	
C43	Malign. melanoma	25	14.8	1.7	1.1	2.5	#	2.9	
C46,C49	Soft tissue	4	2.6	1.5	0.4	3.9		0.4	
C48	Peritoneal	4	1.5	2.7	0.7	6.9		0.7	25.0
C50	Breast	203	127.6	1.6	1.4	1.8	#	21.7	5.9
C51	Vulva	10	5.2	1.9	0.9	3.5		1.4	
C53	Cervix uteri	10	5.5	1.8	0.9	3.3		1.3	10.0
C54	Corpus uteri	55	24.5	2.2	1.7	2.9	#	8.8	1.8
C56	Ovary	56	19.3	2.9	2.2	3.8	#	10.6	30.4
C64	Kidney	39	12.0	3.2	2.3	4.4	#	7.8	12.8
C65	Renal pelvis	4	1.5	2.6	0.7	6.7		0.7	
C66	Ureter	2	0.8	2.7	0.3	9.6		0.4	
C67	Bladder	23	10.7	2.1	1.4	3.2	#	3.5	13.0
C70-C72	CNS cancer	9	6.3	1.4	0.7	2.7		0.8	55.6
C73	Thyroid	8	6.2	1.3	0.6	2.6		0.5	12.5
C74-C80	Cancer others	3	2.8	1.1	0.2	3.1		0.0	66.7
C76-C79	CUP	7	10.0	0.7	0.3	1.4		-0.9	
C82-C85	NHL	35	19.1	1.8	1.3	2.5	#	4.6	22.9
C90	Mult. myeloma	9	6.3	1.4	0.7	2.7		0.8	22.2
C91-C96	Leukaemia	17	8.2	2.1	1.2	3.3	#	2.5	41.2
Other primaries		6	5.4	1.1	0.4	2.4		0.2	16.7
Not observed		0	2.9	0.0	0.0	1.3		-0.8	
All mult. primaries		1026	473.2	2.2	2.0	2.3	#	159.3	11.4

Patients	9176
Median age at second malignancy (years)	76.5
Person-years	34697
Mean observation time (years)	3.8
Median observation time (years)	2.6

The occurrence of second malignancy is statistically significant.

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

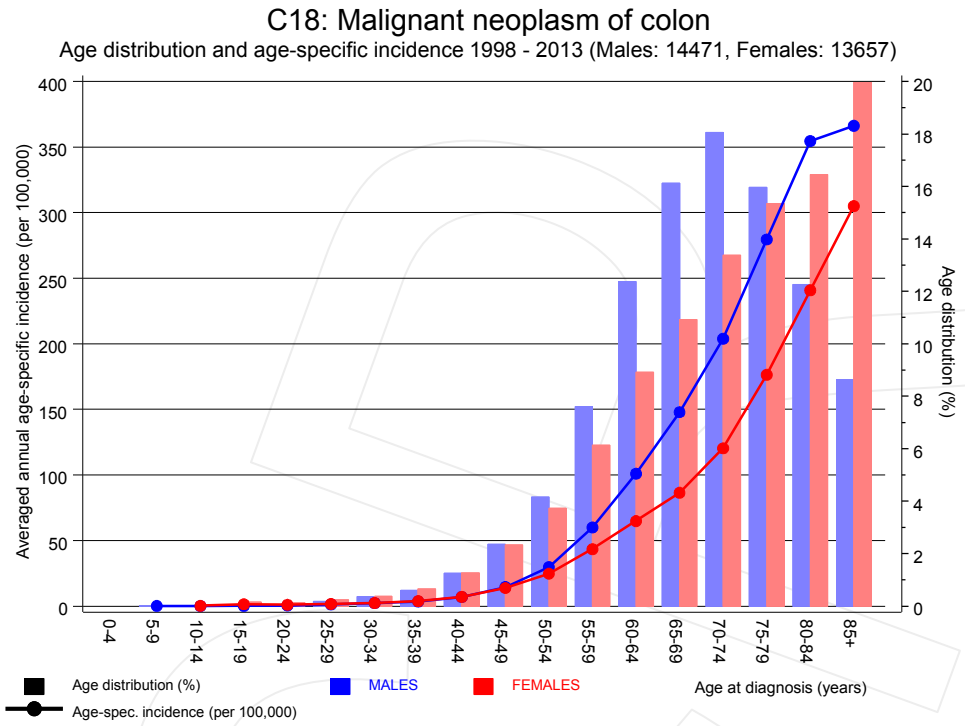


Figure 7. Age distribution and age-specific incidence

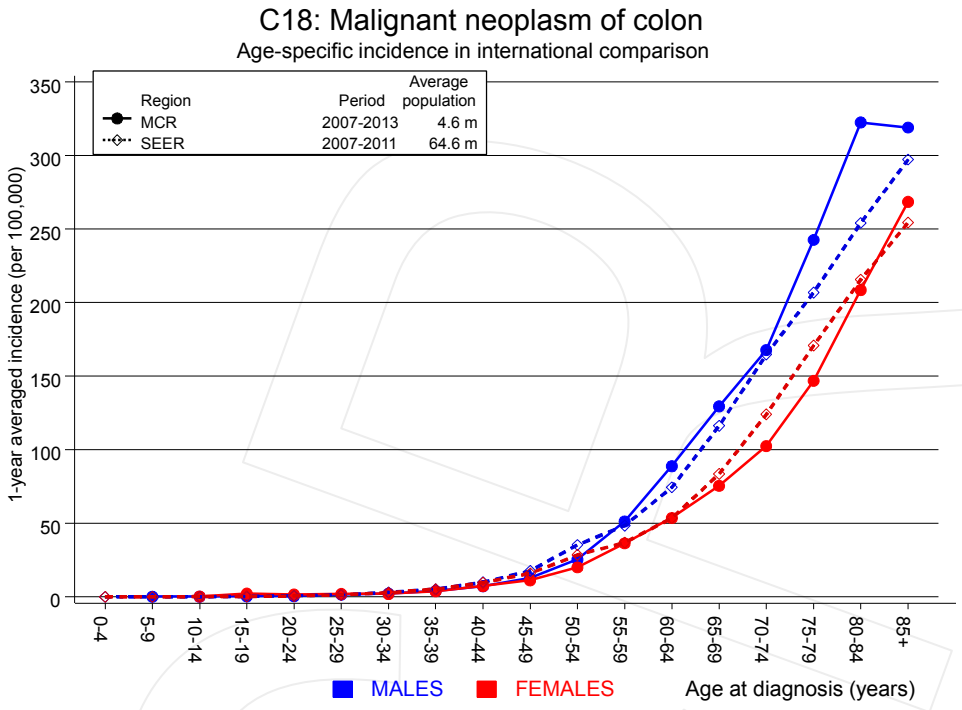


Figure 7a. Age-specific incidence in MCR registry areas compared to SEER (Surveillance, Epidemiology, and End Results, USA).

Reference:

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

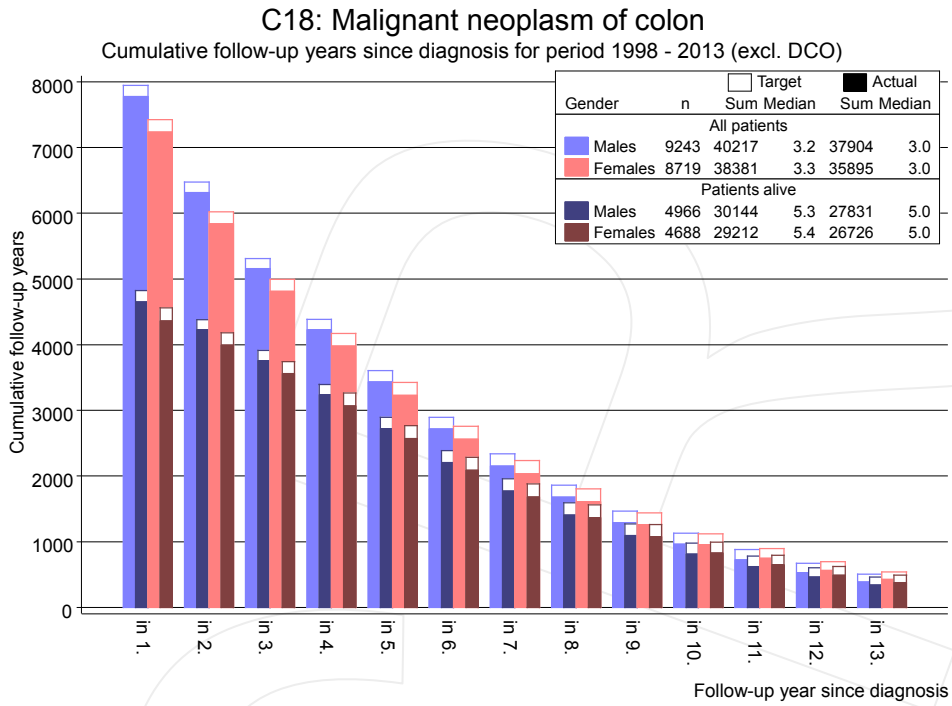
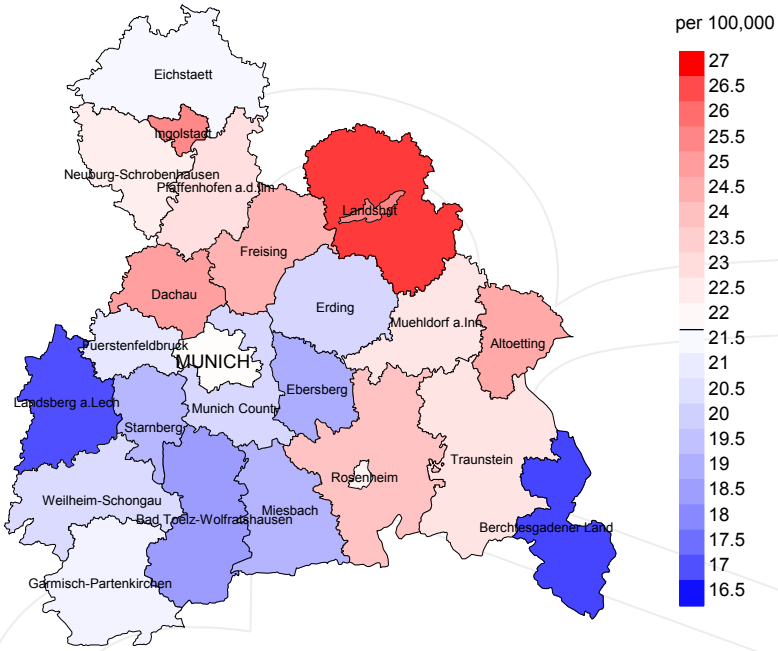


Figure 8. Cumulative follow-up years depending on time since diagnosis

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

Average incidence (world standard population) 2007 - 2013: Males



Average incidence (world standard population) 2007 - 2013: Females

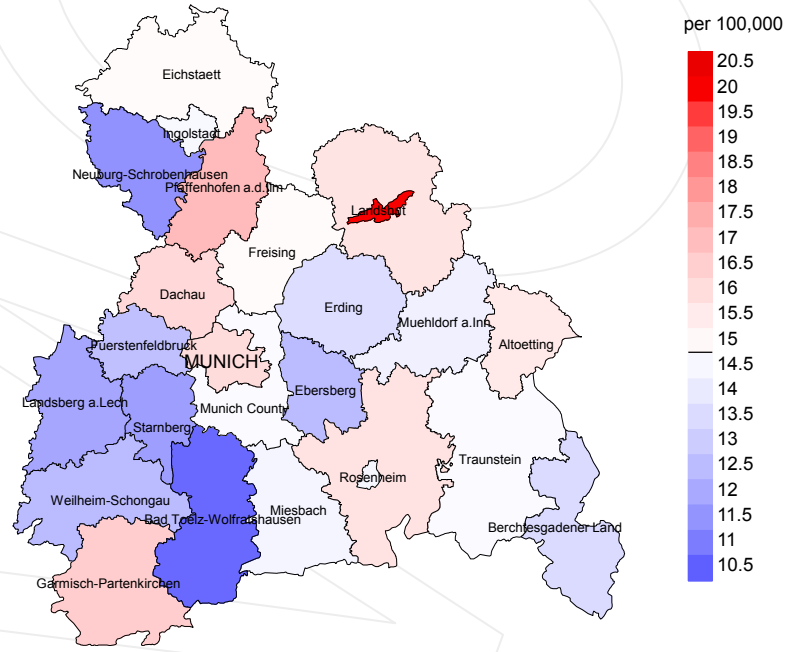
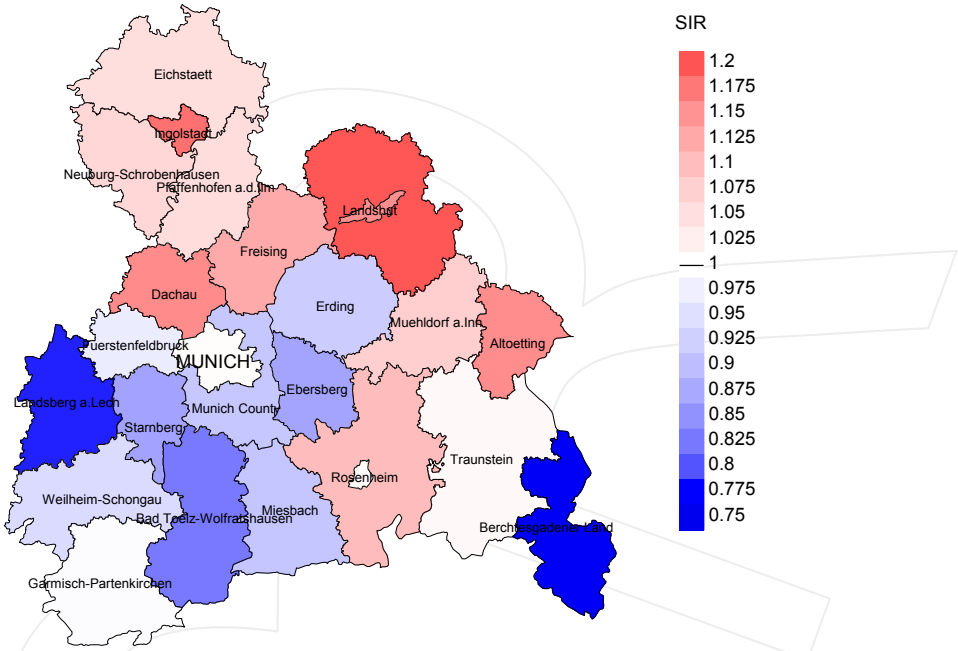


Figure 9a. Map of cancer incidence (world standard population, incl. DCO cases) by county averaged for period 2007 to 2013. According to their individual incidence rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 21.7/100,000 WS N=7,093, females 14.8/100,000 WS N=6,349).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 64,928 female residents (averaged) in the period from 2007 to 2013 a total of 134 women were identified with newly diagnosed colon cancer. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 12.5/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 9.6 and 16.1/100,000.

Standardized incidence ratio (SIR) 2007 - 2013: Males



Standardized incidence ratio (SIR) 2007 - 2013: Females

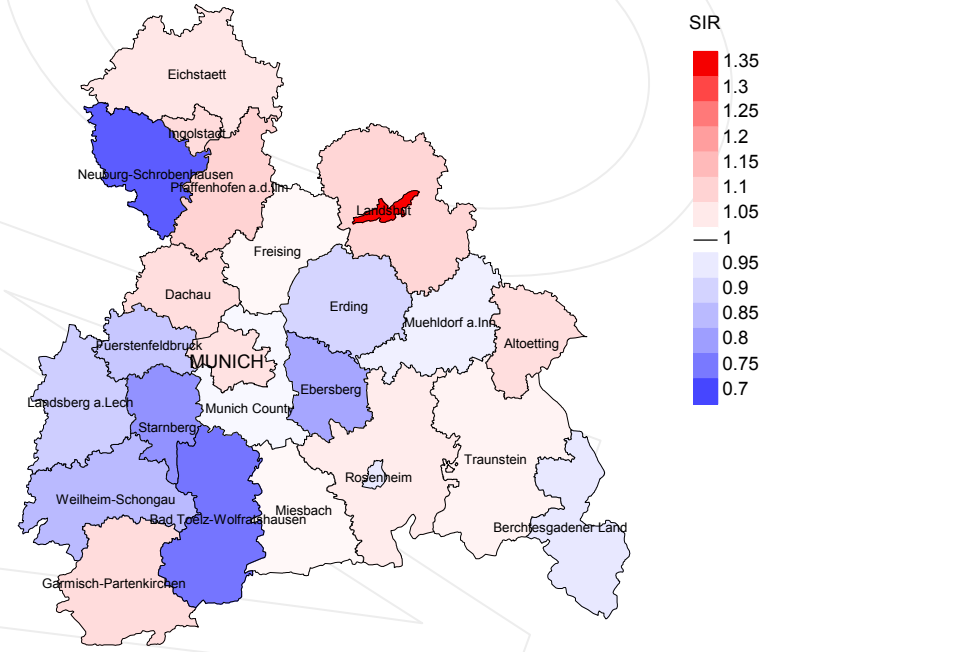


Figure 9b. Map of standardized incidence ratio (SIR, incl. DCO cases) by county averaged for period 2007 to 2013. According to their individual SIR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=7,093, females N=6,349).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 64,642 female residents (averaged) in the period from 2007 to 2013 a total of 134 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 0.81. Though, the value of this parameter may vary with an underlying probability of 99% between 0.64 and 1.01, 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	1265	98.5	6.2	929	73.4	93.8
1999	1199	97.8	7.3	868	72.4	94.5
2000	1083	98.1	6.7	769	71.0	95.8
2001	1207	98.1	8.0	831	68.8	96.6
2002	2034	97.7	14.2	1408	69.2	97.7
2003	2064	98.1	11.3	1341	65.0	97.8
2004	2042	97.8	9.5	1324	64.8	97.1
2005	1923	96.6	8.6	1217	63.3	97.5
2006	1970	94.8	6.2	1123	57.0	98.7
2007	2153	84.3	7.3	1186	55.1	97.9
2008	2189	71.4	6.6	1157	52.9	97.9
2009	2153	69.5	5.7	1035	48.1	97.9
2010	1956	67.7	6.9	872	44.6	97.6
2011	1883	66.6	6.5	765	40.6	97.3
2012	1843	65.8	6.5	607	32.9	96.9
2013	1475	98.8	7.5	354	24.0	91.0
1998-2013	28439	86.2	7.9	15786	55.5	97.0

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	1265	715	91.0	236	18.7
1999	1199	722	92.1	227	18.9
2000	1083	706	94.1	206	19.0
2001	1207	742	95.7	211	17.5
2002	2034	1048	98.3	501	24.6
2003	2064	1136	97.8	449	21.8
2004	2042	1139	98.4	430	21.1
2005	1923	1234	96.8	400	20.8
2006	1970	1206	97.5	345	17.5
2007	2153	1305	97.5	403	18.7
2008	2189	1344	98.4	447	20.4
2009	2153	1367	98.2	377	17.5
2010	1956	1413	98.3	350	17.9
2011	1883	1401	98.9	361	19.2
2012	1843	1422	98.6	361	19.6
2013	1475	1354	98.4	277	18.8
1998-2013	28439	18254	97.3	5581	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	742	69.0	31.0	84.2
2002	1048	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	70.4	29.6	82.5
2008	1344	70.4	29.6	81.3
2009	1367	67.7	32.3	77.0
2010	1413	64.8	35.2	77.4
2011	1401	64.8	35.2	75.9
2012	1422	64.6	35.4	77.2
2013	1354	60.9	39.1	71.1
1998-2013	18254	68.9	31.1	80.7

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	82.1	76.8
2011	733	77.7	74.2	82.8	75.7
2012	742	78.5	76.3	83.2	77.1
2013	715	80.2	77.3	84.2	78.2
1998-2013	9268	77.3	75.1	82.1	76.0

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	401	81.5	79.3	87.0	80.6
2002	535	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	82.4	79.7	86.9	80.9
2008	611	83.1	80.4	86.5	81.8
2009	679	83.6	80.4	87.7	81.2
2010	678	83.7	80.8	87.7	82.6
2011	668	84.4	80.2	88.5	81.9
2012	680	84.0	79.7	88.4	81.4
2013	639	84.7	79.7	88.9	81.9
1998-2013	8986	82.6	79.6	87.2	81.0

By 2010, life expectancy for a newborn male in Germany is 77.5 years compared with 82.6 years for his female counterpart.

Deaths of patients are considered to be cancer-related, in case that fact was recorded on the death certificate, or patients had suffered from metastasis or recurrence.

Table 12a

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

Year of death	Deaths n	Mort. raw	MI-Index raw	Mort. WS	MI-Index WS	Mort. ES	MI-Index ES	Mort. BRD-S	MI-Index BRD-S
1998	246	22.2	0.41	12.9	0.40	20.5	0.42	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	0.45	10.2	0.40	16.5	0.43	23.6	0.46
2008	540	24.3	0.48	10.8	0.44	17.6	0.46	25.4	0.50
2009	465	20.8	0.41	9.2	0.38	14.9	0.40	21.3	0.43
2010	484	21.5	0.48	9.2	0.43	14.8	0.46	21.3	0.49
2011	495	21.7	0.52	9.6	0.49	15.1	0.50	20.8	0.52
2012	493	21.6	0.52	9.3	0.48	15.1	0.51	21.0	0.53
2013	455	19.9	0.57	8.2	0.51	13.6	0.55	19.4	0.58
1998-2013	6527	22.0	0.45	10.3	0.42	16.7	0.44	23.6	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	265	21.8	0.44	7.4	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	0.40	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	0.43	15.7	0.44
2006	398	19.8	0.42	6.2	0.33	10.2	0.36	14.3	0.39
2007	428	18.5	0.42	6.2	0.36	9.8	0.38	13.6	0.40
2008	408	17.6	0.40	5.4	0.32	8.8	0.35	12.5	0.38
2009	460	19.8	0.47	6.2	0.40	10.0	0.42	13.8	0.43
2010	433	18.5	0.48	5.8	0.41	9.2	0.43	12.6	0.43
2011	414	17.5	0.46	5.4	0.38	8.6	0.40	11.9	0.42
2012	425	18.0	0.49	5.7	0.39	9.1	0.43	12.6	0.45
2013	371	15.7	0.57	5.0	0.47	8.0	0.50	10.8	0.52
1998-2013	6060	19.5	0.44	6.4	0.37	10.2	0.40	14.2	0.42

Table 13

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

Age at death Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
20-24	2	0.0	0.0	2	0.0	0.0			0.0
25-29	11	0.1	0.1	4	0.1	0.1	7	0.1	0.1
30-34	19	0.1	0.2	12	0.2	0.3	7	0.1	0.2
35-39	41	0.3	0.6	19	0.3	0.6	22	0.4	0.6
40-44	101	0.8	1.3	52	0.8	1.3	49	0.8	1.4
45-49	162	1.3	2.6	85	1.3	2.6	77	1.2	2.6
50-54	349	2.7	5.3	190	2.8	5.4	159	2.6	5.2
55-59	614	4.8	10.1	356	5.3	10.7	258	4.2	9.4
60-64	988	7.7	17.7	621	9.3	20.0	367	5.9	15.3
65-69	1423	11.0	28.8	911	13.6	33.6	512	8.3	23.6
70-74	1819	14.1	42.9	1078	16.1	49.6	741	12.0	35.6
75-79	2216	17.2	60.1	1238	18.5	68.1	978	15.8	51.4
80-84	2305	17.9	78.0	1143	17.0	85.1	1162	18.8	70.2
85+	2842	22.0	100.0	997	14.9	100.0	1845	29.8	100.0
All ages	12892	100.0		6708	100.0		6184	100.0	

Included in the statistics are 36.8% multiple primaries in males and 26.9% in females.

Table 14

Age-specific mortality (cancer-related) and proportion of all cancers
for period 1998-2013
(**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	2		0.1	0.29	0.0		2.2	
25-29	4	7	0.2	0.15	0.3	0.22	3.7	6.1
30-34	12	7	0.5	0.23	0.3	0.13	6.5	3.1
35-39	19	22	0.8	0.21	0.9	0.25	4.8	4.3
40-44	52	49	2.0	0.28	2.0	0.28	6.1	4.3
45-49	85	77	3.6	0.25	3.3	0.24	4.7	3.8
50-54	190	159	9.4	0.31	7.7	0.31	5.8	5.1
55-59	356	258	19.4	0.32	13.4	0.31	6.0	5.4
60-64	621	367	35.0	0.34	19.6	0.30	7.0	5.6
65-69	911	512	57.7	0.39	29.7	0.34	7.6	6.2
70-74	1078	741	84.2	0.41	48.8	0.40	7.9	7.5
75-79	1238	978	149.8	0.53	82.3	0.46	9.4	9.1
80-84	1143	1162	228.4	0.63	124.6	0.51	10.5	10.4
85+	997	1845	292.4	0.78	206.4	0.67	11.2	13.5
All ages	6708	6184					8.4	8.5
Mortality								
Raw			22.6	0.46	19.9	0.45		
WS			10.6	0.42	6.5	0.38		
ES			17.1	0.45	10.4	0.40		
BRD-S			24.2	0.48	14.4	0.42		
PYLL-70								
per 100,000			72.4		54.3			
ES			63.0		46.1			
AYLL-70			8.6		9.9			

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

Table 15a

Multiple primaries in deaths in period 1998-2013
MALES

Diagnosis		Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C03-C06	Oral cavity	23	0.8	16	69.6	2	8.7	5	21.7
C09-C10	Oropharynx	25	0.9	13	52.0	2	8.0	10	40.0
C15	Oesophagus	45	1.6	6	13.3	9	20.0	30	66.7
C16	Stomach	163	5.6	45	27.6	45	27.6	73	44.8
C17	Small intestine	31	1.1	4	12.9	14	45.2	13	41.9
C18	Colon	221	7.6			101	45.7	120	54.3
C19-C20	Rectum	258	8.9	73	28.3	125	48.4	60	23.3
C22	Liver	85	2.9	4	4.7	23	27.1	58	68.2
C23-C24	Bile	23	0.8	1	4.3	5	21.7	17	73.9
C25	Pancreas	104	3.6	8	7.7	17	16.3	79	76.0
C32	Larynx	46	1.6	30	65.2			16	34.8
C33-C34	Lung	298	10.3	52	17.4	44	14.8	202	67.8
C43	Malign. melanoma	90	3.1	50	55.6	3	3.3	37	41.1
C44	Skin others	128	4.4	70	54.7	12	9.4	46	35.9
C61	Prostate	600	20.8	350	58.3	43	7.2	207	34.5
C64	Kidney	111	3.8	52	46.8	22	19.8	37	33.3
C65	Renal pelvis	21	0.7	5	23.8	1	4.8	15	71.4
C67	Bladder	212	7.3	104	49.1	19	9.0	89	42.0
C70-C72	CNS cancer	45	1.6	14	31.1	2	4.4	29	64.4
C76-C79	CUP	35	1.2	7	20.0	6	17.1	22	62.9
C82-C85	NHL	104	3.6	39	37.5	20	19.2	45	43.3
C90	Mult. myeloma	31	1.1	10	32.3	6	19.4	15	48.4
C91-C96	Leukaemia	62	2.1	16	25.8	5	8.1	41	66.1
Other primaries		128	4.4	53	41.4	8	6.3	67	52.3
All mult. primaries		2889	100.0	1022	35.4	534	18.5	1333	46.1

Multiple primaries with number of cases 1 to 14 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 1998-2013
FEMALES

Diagnosis		Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C16	Stomach	120	5.4	33	27.5	29	24.2	58	48.3
C18	Colon	146	6.5			56	38.4	90	61.6
C19-C20	Rectum	155	6.9	47	30.3	66	42.6	42	27.1
C22	Liver	28	1.3	2	7.1	8	28.6	18	64.3
C23-C24	Bile	31	1.4	8	25.8	4	12.9	19	61.3
C25	Pancreas	92	4.1	7	7.6	15	16.3	70	76.1
C33-C34	Lung	141	6.3	26	18.4	14	9.9	101	71.6
C43	Malign. melanoma	53	2.4	37	69.8	4	7.5	12	22.6
C44	Skin others	59	2.6	32	54.2	5	8.5	22	37.3
C50	Breast	550	24.6	372	67.6	39	7.1	139	25.3
C53	Cervix uteri	59	2.6	41	69.5	8	13.6	10	16.9
C54	Corpus uteri	132	5.9	87	65.9	10	7.6	35	26.5
C56	Ovary	158	7.1	51	32.3	38	24.1	69	43.7
C64	Kidney	47	2.1	22	46.8	8	17.0	17	36.2
C67	Bladder	76	3.4	36	47.4	1	1.3	39	51.3
C70-C72	CNS cancer	39	1.7	18	46.2	3	7.7	18	46.2
C73	Thyroid	21	0.9	12	57.1	2	9.5	7	33.3
C82-C85	NHL	69	3.1	31	44.9	7	10.1	31	44.9
C90	Mult. myeloma	26	1.2	8	30.8	2	7.7	16	61.5
C91-C96	Leukaemia	47	2.1	9	19.1	5	10.6	33	70.2
Other primaries		186	8.3	76	40.9	28	15.1	82	44.1
All mult. primaries		2235	100.0	955	42.7	352	15.7	928	41.5

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 1998-2013
(**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	2		0.1	0.29	0.0		2.4	
25-29	4	7	0.2	0.17	0.3	0.23	4.0	6.4
30-34	11	7	0.5	0.22	0.3	0.15	6.1	3.5
35-39	17	16	0.7	0.22	0.7	0.20	4.5	3.4
40-44	48	45	1.8	0.28	1.8	0.28	6.1	4.5
45-49	80	67	3.4	0.26	2.9	0.23	4.9	3.9
50-54	160	133	7.9	0.31	6.5	0.29	5.6	5.1
55-59	311	225	17.0	0.32	11.7	0.31	6.1	5.6
60-64	524	296	29.6	0.34	15.8	0.28	7.0	5.6
65-69	734	425	46.5	0.39	24.6	0.34	7.6	6.3
70-74	846	586	66.0	0.42	38.6	0.40	7.9	7.5
75-79	916	753	110.8	0.53	63.4	0.45	9.2	8.8
80-84	825	885	164.9	0.66	94.9	0.49	10.2	10.0
85+	720	1478	211.1	0.79	165.4	0.66	10.7	13.4
All ages	5198	4923					8.1	8.4
Mortality								
Raw			17.5	0.45	15.9	0.43		
WS			8.4	0.42	5.2	0.36		
ES			13.3	0.44	8.4	0.39		
BRD-S			18.6	0.47	11.5	0.41		
PYLL-70								
per 100,000			62.7		46.2			
ES			54.6		39.3			
AYLL-70			8.9		10.0			

* See corresponding tables with multiple primaries.

Table 17

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

Age at death Years	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	2		0.1	0.29	0.0		2.5	
25-29	4	7	0.2	0.18	0.3	0.23	4.3	6.8
30-34	11	6	0.5	0.23	0.3	0.13	6.3	3.3
35-39	17	14	0.7	0.23	0.6	0.17	4.7	3.3
40-44	48	44	1.8	0.29	1.8	0.29	6.4	4.8
45-49	78	62	3.3	0.27	2.7	0.23	5.1	4.0
50-54	150	131	7.4	0.31	6.4	0.31	5.8	5.6
55-59	288	211	15.7	0.33	11.0	0.32	6.2	5.9
60-64	452	265	25.5	0.34	14.1	0.28	6.9	5.7
65-69	628	375	39.8	0.38	21.7	0.33	7.5	6.6
70-74	694	501	54.2	0.40	33.0	0.37	7.8	7.6
75-79	731	649	88.4	0.49	54.6	0.42	9.1	9.0
80-84	633	749	126.5	0.56	80.3	0.44	9.9	10.1
85+	539	1267	158.1	0.64	141.8	0.59	10.0	13.4
All ages	4275	4281					7.9	8.5
Mortality								
Raw			14.4	0.42	13.8	0.41		
WS			7.0	0.40	4.6	0.35		
ES			11.0	0.41	7.4	0.37		
BRD-S			15.2	0.43	10.0	0.38		
PYLL-70								
per 100,000			57.8		43.1			
ES			50.5		36.8			
AYLL-70			9.2		10.3			

* See corresponding tables with multiple primaries.

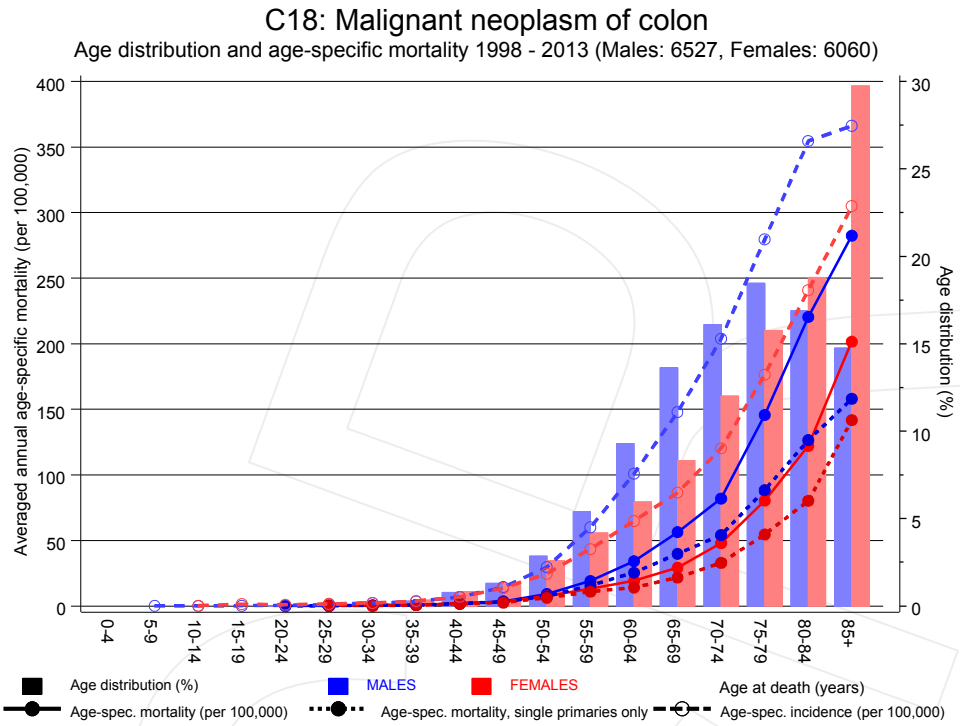
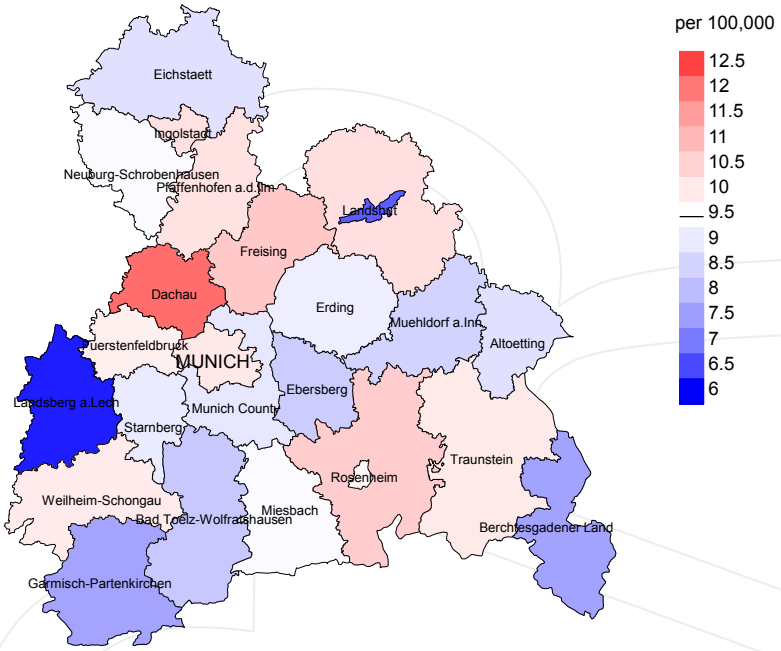


Figure 18. Distribution of age at death (bars) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

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

Average mortality (world standard population) 2007 - 2013: Males



Average mortality (world standard population) 2007 - 2013: Females

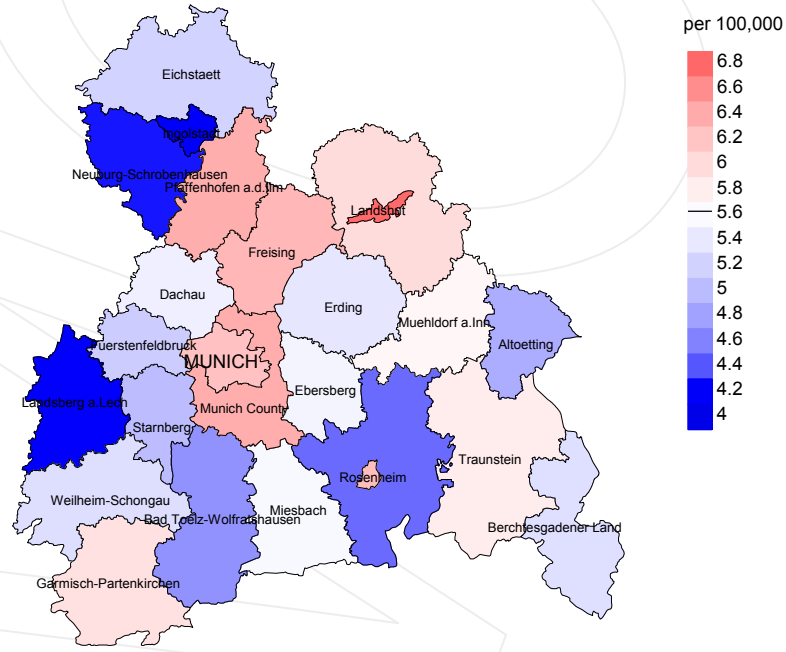
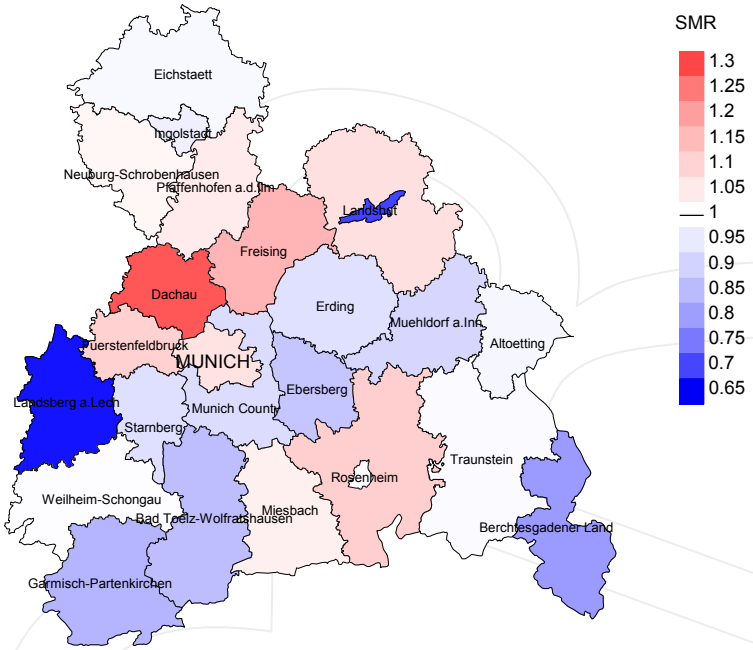


Figure 19a. Map of cancer mortality (world standard population) by county averaged for period 2007 to 2013. According to their individual mortality rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 9.5/100,000 WS N=3,393, females 5.6/100,000 WS N=2,909).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 64,928 female residents (averaged) in the period from 2007 to 2013 a total of 65 women died from colon cancer. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 5.5/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 3.7 and 8.4/100,000.

Standardized mortality ratio (SMR) 2007 - 2013: Males



Standardized mortality ratio (SMR) 2007 - 2013: Females

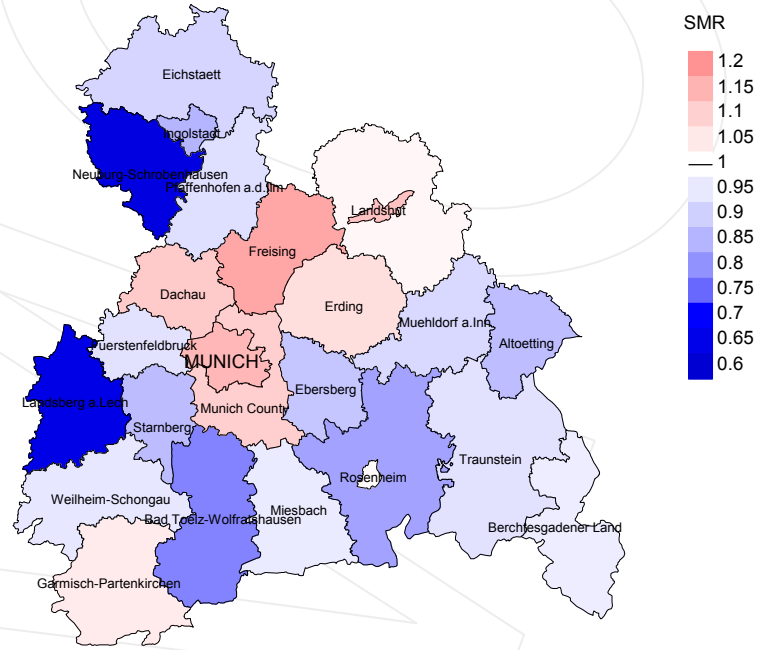


Figure 19b. Map of standardized mortality ratio (SMR, incl. DCO cases) by county averaged for period 2007 to 2013. According to their individual SMR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=3,393, females N=2,909).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 64,642 female residents (averaged) in the period from 2007 to 2013 a total of 65 women died from colon cancer. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 0.88. Though, the value of this parameter may vary with an underlying probability of 99% between 0.62 and 1.20, and is therefore not statistically striking.

Statistical Notes

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

1. **All multiple primaries included**

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

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

   The mortality statistic describes the cancer-related death for patients who have no therapeutic restrictions due to a previous or synchronous cancer. These statistics are comparable to studies that have exclusion criteria based on a second malignancy.

3. **Single primary** (no information about other prior, syn- or metachronous malignancy)

   The mortality statistic describes the tumor-specific death that occurs without any impact through secondary primaries, earlier, synchronous, later or induced. Precisely the difference between disease group 1 and 2 highlight the magnitude of the problem of secondary malignancies.

For this reason differences appear concerning official mono-causal mortality statistics. To judge the maximum deviation, 2 further tables are presented. In the first table the distribution of secondary malignancies before, at or after the described cancer are shown, that could be an alternative cause of death. In the second table, the age-specific mortality rates for all courses of disease, without designation of secondary malignancies are shown.

A previously minimally acknowledged statistic is the **age at death**, which allows for a good assessment of the quality of classification of the apparent tumor-specific death. For assumed tumor-independent deaths, the age of death should be estimated from the age of diagnosis and the normal life expectancy, whereas tumor-dependent deaths can be estimated from the age of diagnosis plus the average tumor-specific life expectancy. The comparison of different tumors demonstrates this association, if the causes of cancer and the competing cause of death are independent of each other (e.g. breast and colon versus head/neck and lung).

The index from mortality and incidence (Mortality-Incidence ratio, **MI-index**) is a statistic that allows for the evaluation of the quality of data. For diseases with poor prognoses, comparable values are obtained from all age groups, because to a large extent, the numerator and denominator contain the same cases. For tumors with a good prognosis, increasing and decreasing incidence and age-specific differences in prognosis can more strongly alter the MI- index. Additionally, attention should be paid to the confidence intervals where fewer cases are reported.

The complexity of problems identified here emphasizes the importance of relative survival data for the appropriate analysis of long term results.

As a measurement of the burden of disease, the number of potential life years loss due to premature deaths in a cohort can be calculated (**PYLL**, potential years of life lost, standardized per 100,000 persons or per European standard) as well as the average loss of life years per individual (**AYLL**, average years of life lost). Depending upon the analytic aim (health economy, prevention, health care research) different methods exist for the generation of these measurements. In the results presented here, the age for a premature death is considered to be before 70 years, according to the guidelines of the OECD and the WHO (as seen in the abbreviation PYLL-70 or AYLL-70).

Shortcuts

FRG	Federal Republic of Germany
GEKID	Association of Population-based Cancer Registries in Germany (Gesellschaft der epidemiologischen Krebsregister in Deutschland e.V.)
MCR	Munich Cancer Registry (Tumorregister München)
SEER	Surveillance, Epidemiology, and End Results (USA)
AYLL-70	Average years of life lost prior to age 70 given a person dies before that age
BRD-S	German standard population
DCO	Death certificate only
EAR	Excess absolute risk = excess cancer cases (O - E) per 10,000 person-years
ES	European standard population (old)
LCL	Lower confidence limit
MI-index	Ratio between mortality and incidence
PYLL-70	Potential years of life lost prior to age 70 given a person dies before that age
SIR	Standardized incidence ratio
SMR	Standardized mortality ratio
UCL	Upper confidence limit
WS	World standard population

Recommended Citation

Munich Cancer Registry. Baseline statistics C18: Colon cancer [Internet]. 2015 [updated 2015 May 19; cited 2015 Jul 1]. Available from: http://www.tumorregister-muenchen.de/en/facts/base/base_C18__E.pdf

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