Munich Cancer Registry

Munich Cancer Registry at Munich Cancer Center
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Munich, 81377
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http://www.tumorregister-muenchen.de/en

Cancer statistics: Baseline statistics

C18: Colon cancer

Year of diagnosis	1998-2012
Patients	26,138
Diseases	26,610
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-10 codes used for specifying cancer site

ICD-10	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	1263	79	6.3	25.2	72.3	98.5
1999	1198	87	7.3	25.5	71.0	97.7
2000	1081	73	6.8	27.6	69.2	98.0
2001	1206	96	8.0	26.8	67.4	98.0
2002	2031	288	14.2	25.0	67.6	97.7 #
2003	2062	234	11.3	26.4	63.5	98.0 #
2004	2039	195	9.6	25.0	63.7	97.8 #
2005	1918	166	8.7	28.7	61.3	96.4 #
2006	1964	121	6.2	27.8	54.9	94.5 #
2007	2149	158	7.4	25.6	52.5	83.6 # ##
2008	2183	145	6.6	28.5	50.0	70.1
2009	2140	123	5.7	28.3	44.4	68.3
2010	1943	132	6.8	27.4	40.9	67.1
2011	1848	122	6.6	26.1	35.2	67.7
2012	1585	120	7.6	26.8	26.9	97.0 ###
1998-2012	26610	2139	8.0	26.8	54.9	87.3

\#   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	1263	605	658	47.9
1999	1198	580	618	48.4
2000	1081	523	558	48.4
2001	1206	599	607	49.7
2002	2031	1023	1008	50.4
2003	2062	1056	1006	51.2
2004	2039	1047	992	51.3
2005	1918	976	942	50.9
2006	1964	1016	948	51.7
2007	2149	1127	1022	52.4
2008	2183	1158	1025	53.0
2009	2140	1145	995	53.5
2010	1943	1026	917	52.8
2011	1848	951	897	51.5
2012	1585	833	752	52.6
1998-2012	26610	13665	12945	51.4

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	605	658	54.6	55.9	32.5	23.3	49.6	35.5	66.1	47.0
1999	580	618	51.8	52.1	30.3	21.5	46.6	32.7	63.0	43.0
2000	523	558	45.9	46.5	26.6	18.8	40.8	28.9	54.2	38.1
2001	599	607	51.7	49.9	30.0	20.3	45.6	31.1	59.0	41.5
2002	1023	1008	54.9	51.5	29.9	20.0	46.1	30.6	62.2	40.6
2003	1056	1006	56.3	51.1	30.2	19.9	46.2	30.6	61.9	40.4
2004	1047	992	55.6	50.2	28.9	20.0	44.6	30.1	60.2	39.3
2005	976	942	51.5	47.3	26.6	17.8	40.6	27.3	54.2	36.3
2006	1016	948	53.1	47.2	27.2	18.6	41.5	28.1	55.2	37.2
2007	1127	1022	50.9	44.3	26.0	17.2	39.1	25.9	52.3	34.0
2008	1158	1025	52.0	44.2	25.3	16.9	39.0	25.6	52.1	33.6
2009	1145	995	51.3	42.8	24.7	15.7	37.5	24.0	50.3	32.2
2010	1026	917	45.5	39.2	21.6	14.3	32.9	21.8	44.2	29.2
2011	951	897	41.6	38.0	19.4	14.1	29.7	21.5	39.8	28.2
2012	833	752	36.5	31.9	17.1	12.5	25.9	18.4	34.5	24.0
1998-2012	13665	12945	49.8	45.1	25.3	17.5	38.7	26.5	51.7	35.0

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	1263	70.8	12.3	13.2	98.1	54.7	62.0	72.2	79.6	86.3
1999	1198	71.4	12.4	24.9	101	55.5	63.2	72.6	79.8	86.6
2000	1081	71.3	11.9	24.7	103	56.3	62.7	72.6	79.4	86.8
2001	1206	71.1	12.4	30.8	103	55.7	62.7	71.7	80.5	87.2
2002	2031	72.2	12.2	17.7	101	56.7	63.8	73.6	81.2	87.5
2003	2062	72.2	11.6	23.5	99.4	57.3	64.3	72.9	80.8	87.1
2004	2039	71.9	12.3	13.8	101	56.4	64.3	73.1	81.0	86.8
2005	1918	72.6	12.3	15.1	99.9	57.1	65.2	73.7	81.9	87.1
2006	1964	71.7	11.9	17.9	102	55.7	64.2	72.4	80.7	85.8
2007	2149	71.6	12.7	15.8	103	54.8	64.6	72.6	81.1	86.3
2008	2183	72.4	12.3	18.9	105	56.4	65.4	73.3	81.6	87.2
2009	2140	72.5	12.2	12.4	99.1	56.5	65.4	73.3	81.4	87.0
2010	1943	72.6	12.5	14.9	101	55.8	65.3	73.9	81.8	86.9
2011	1848	72.8	12.4	17.1	101	56.2	65.3	74.1	82.1	87.5
2012	1585	72.3	12.8	13.7	101	56.5	65.3	73.6	81.4	86.9
1998-2012	26610	72.0	12.3	12.4	105	56.2	64.4	73.1	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	605	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	523	69.2	10.5	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	1023	70.4	11.0	20.9	98.5	56.8	63.1	71.6	78.2	83.2
2003	1056	70.4	11.0	25.7	99.4	56.7	63.3	71.0	78.1	83.4
2004	1047	70.8	11.1	27.8	101	56.8	63.9	71.5	78.6	84.5
2005	976	70.6	11.5	28.3	98.5	56.6	64.1	70.8	78.6	84.5
2006	1016	70.4	11.1	17.9	102	56.0	63.5	71.0	78.3	84.0
2007	1127	69.9	12.1	15.8	99.4	54.4	63.6	71.1	78.7	83.9
2008	1158	71.1	11.3	19.3	105	56.3	65.0	71.7	79.2	84.8
2009	1145	70.7	11.4	12.4	99.0	55.6	64.2	71.7	79.1	83.7
2010	1026	71.0	11.5	27.9	98.9	55.1	64.0	71.7	79.4	84.5
2011	951	71.5	11.6	31.2	97.3	56.5	64.9	72.8	80.0	85.1
2012	833	71.5	11.1	25.8	101	57.8	65.3	72.9	79.2	84.4
1998-2012	13665	70.5	11.4	12.4	105	56.1	63.6	71.2	78.5	84.2

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	658	72.5	12.9	13.2	96.7	54.4	63.9	74.8	82.0	87.4
1999	618	73.0	13.0	26.9	101	54.8	64.3	75.0	82.8	88.5
2000	558	73.2	12.8	24.7	103	56.3	64.4	75.3	82.0	88.5
2001	607	73.0	12.7	30.8	103	55.9	64.0	75.4	81.7	89.0
2002	1008	74.1	13.0	17.7	101	56.4	65.0	76.5	83.0	89.5
2003	1006	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	942	74.7	12.8	15.1	99.9	57.9	66.9	76.6	84.0	90.2
2006	948	73.0	12.7	24.6	97.1	55.1	65.1	75.1	82.7	86.9
2007	1022	73.6	13.0	17.8	103	55.5	66.4	75.4	83.4	87.7
2008	1025	74.0	13.2	18.9	101	56.8	66.3	75.4	84.1	88.7
2009	995	74.5	12.7	15.9	99.1	58.1	67.4	76.2	84.0	88.9
2010	917	74.3	13.3	14.9	101	56.1	67.4	76.4	83.9	89.1
2011	897	74.2	13.1	17.1	101	56.2	65.7	75.8	84.6	88.9
2012	752	73.1	14.4	13.7	100	55.3	65.2	75.3	83.5	89.5
1998-2012	12945	73.7	13.0	13.2	103	56.3	65.5	75.6	83.4	88.7

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	0.0	0.0	1	0.0	0.0	4	0.0	0.0
15-19	20	0.1	0.1	3	0.0	0.0	17	0.1	0.2
20-24	19	0.1	0.2	6	0.0	0.1	13	0.1	0.3
25-29	54	0.2	0.4	24	0.2	0.2	30	0.2	0.5
30-34	98	0.4	0.7	51	0.4	0.6	47	0.4	0.9
35-39	167	0.6	1.4	86	0.6	1.3	81	0.6	1.5
40-44	322	1.2	2.6	168	1.2	2.5	154	1.2	2.7
45-49	597	2.2	4.8	310	2.3	4.7	287	2.2	4.9
50-54	1050	3.9	8.8	567	4.1	8.9	483	3.7	8.6
55-59	1835	6.9	15.7	1035	7.6	16.5	800	6.2	14.8
60-64	2885	10.8	26.5	1712	12.5	29.0	1173	9.1	23.9
65-69	3653	13.7	40.2	2236	16.4	45.4	1417	10.9	34.8
70-74	4197	15.8	56.0	2468	18.1	63.4	1729	13.4	48.2
75-79	4137	15.5	71.5	2162	15.8	79.2	1975	15.3	63.4
80-84	3827	14.4	85.9	1672	12.2	91.5	2155	16.6	80.1
85+	3744	14.1	100.0	1164	8.5	100.0	2580	19.9	100.0
All ages	26610	100.0		13665	100.0		12945	100.0	

Included in the statistics are 35.8% multiple primaries in males and 26.6% 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=825 %	Females DCO rate n=1313 %	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	3	17	0.2	1.2			0.9	6.4
20-24	6	13	0.4	0.8	16.7		1.1	2.7
25-29	23	30	1.2	1.6			2.6	2.9
30-34	51	46	2.4	2.2			3.6	2.4
35-39	83	81	3.6	3.7		2.5	3.9	2.3
40-44	167	154	6.9	6.7	1.2		5.6	2.7
45-49	309	285	14.3	13.5	1.3	2.1	6.3	3.6
50-54	560	477	30.3	25.3	2.3	1.5	7.0	4.7
55-59	1027	794	60.4	44.6	1.9	2.0	7.6	6.2
60-64	1691	1164	102.6	66.9	2.6	2.2	8.3	7.2
65-69	2209	1408	150.6	87.8	2.6	3.1	8.6	7.9
70-74	2436	1710	210.2	124.0	4.4	4.9	9.9	10.1
75-79	2139	1959	283.9	179.1	6.5	7.1	11.3	12.1
80-84	1640	2134	361.1	247.1	10.2	10.9	13.1	14.4
85+	1143	2560	368.6	312.6	23.6	29.6	12.4	16.0
All ages	13488	12836			6.1	10.2	9.2	9.0
Incidence								
Raw			49.1	44.7				
WS			25.0	17.3				
ES			38.2	26.3				
BRD-S			51.0	34.7				

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 %
C00	Lip	3	0.8	3.7	0.8	10.8		0.6	
C03-C06	Oral cavity	6	4.8	1.3	0.5	2.7		0.4	
C09-C10	Oropharynx	8	5.7	1.4	0.6	2.8		0.7	
C12-C13	Hypopharynx	4	3.2	1.3	0.3	3.2		0.2	25.0
C15	Oesophagus	27	10.9	2.5	1.6	3.6	#	4.8	14.8
C16	Stomach	75	31.0	2.4	1.9	3.0	#	13.0	8.0
C17	Small intestine	30	3.1	9.8	6.6	14.0	#	8.0	3.3
C18	Colon	193	72.0	2.7	2.3	3.1	#	35.8	0.5
C19-C20	Rectum	159	37.2	4.3	3.6	5.0	#	36.0	0.6
C21	Anus/canal	3	1.3	2.4	0.5	6.9		0.5	
C22	Liver	35	18.3	1.9	1.3	2.7	#	4.9	34.3
C23-C24	Bile	13	6.8	1.9	1.0	3.3	#	1.8	
C25	Pancreas	55	24.6	2.2	1.7	2.9	#	9.0	27.3
C32	Larynx	13	6.3	2.1	1.1	3.5	#	2.0	7.7
C33-C34	Lung	144	79.4	1.8	1.5	2.1	#	19.1	15.3
C38,C45	Mesothelioma	4	4.4	0.9	0.2	2.3		-0.1	
C43	Malign. melanoma	48	24.1	2.0	1.5	2.6	#	7.1	2.1
C46,C49	Soft tissue	9	3.6	2.5	1.2	4.8	#	1.6	
C50	Breast	4	1.7	2.3	0.6	6.0		0.7	25.0
C60	Penis	2	1.6	1.3	0.2	4.6		0.1	
C61	Prostate	326	204.8	1.6	1.4	1.8	#	35.8	5.2
C62	Testis	4	1.2	3.4	0.9	8.8		0.8	25.0
C64	Kidney	67	22.7	2.9	2.3	3.7	#	13.1	6.0
C65	Renal pelvis	9	2.9	3.1	1.4	5.9	#	1.8	
C66	Ureter	6	1.6	3.8	1.4	8.2	#	1.3	
C67	Bladder	61	32.8	1.9	1.4	2.4	#	8.3	8.2
C68	Urinary org.	3	0.4	7.4	1.5	21.6	#	0.8	66.7
C70-C72	CNS cancer	14	8.5	1.6	0.9	2.8		1.6	35.7
C73	Thyroid	5	3.6	1.4	0.4	3.2		0.4	20.0
C76-C79	CUP	18	12.1	1.5	0.9	2.3		1.7	5.6
C82-C85	NHL	55	27.4	2.0	1.5	2.6	#	8.2	5.5
C90	Mult. myeloma	18	8.9	2.0	1.2	3.2	#	2.7	22.2
C91-C96	Leukaemia	19	11.6	1.6	1.0	2.6		2.2	36.8
Other primaries		9	7.3	1.2	0.6	2.4		0.5	11.1
Not observed		0	3.4	0.0	0.0	1.1		-1.0	
All mult. primaries		1449	690.0	2.1	2.0	2.2	#	224.5	8.1

Patients	9359
Mean age at second malignancy (years)	73.6
Person-years	33804
Mean observation time (years)	3.6
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".

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 %
C03-C06 Oral cavity	2	2.4	0.8	0.1	3.0		-0.1	
C09-C10 Oropharynx	5	1.4	3.5	1.2	8.3	#	1.1	
C12-C13 Hypopharynx	2	0.4	5.3	0.6	19.1		0.5	50.0
C15 Oesophagus	3	2.3	1.3	0.3	3.8		0.2	
C16 Stomach	46	19.5	2.4	1.7	3.2	#	8.3	23.9
C17 Small intestine	21	1.8	11.5	7.1	17.6	#	6.0	4.8
C18 Colon	138	51.6	2.7	2.2	3.2	#	26.9	0.7
C19-C20 Rectum	88	21.0	4.2	3.4	5.2	#	20.8	1.1
C21 Anus/canal	3	2.2	1.3	0.3	3.9		0.2	
C22 Liver	18	5.4	3.3	2.0	5.2	#	3.9	44.4
C23-C24 Bile	8	7.6	1.1	0.5	2.1		0.1	37.5
C25 Pancreas	49	21.5	2.3	1.7	3.0	#	8.6	20.4
C32 Larynx	2	0.7	2.9	0.4	10.5		0.4	
C33-C34 Lung	73	28.5	2.6	2.0	3.2	#	13.8	12.3
C38,C45 Mesothelioma	3	0.8	3.7	0.8	10.7		0.7	
C40-C41 Bone	2	0.3	6.2	0.8	22.5		0.5	
C43 Malign. melanoma	23	13.6	1.7	1.1	2.5	#	2.9	
C46,C49 Soft tissue	4	2.4	1.7	0.5	4.3		0.5	
C48 Peritoneal	3	1.3	2.3	0.5	6.8		0.5	33.3
C50 Breast	191	118.4	1.6	1.4	1.9	#	22.6	5.8
C51 Vulva	10	4.8	2.1	1.0	3.8		1.6	
C53 Cervix uteri	9	5.2	1.7	0.8	3.3		1.2	11.1
C54 Corpus uteri	54	22.7	2.4	1.8	3.1	#	9.8	
C56 Ovary	56	18.1	3.1	2.3	4.0	#	11.8	30.4
C64 Kidney	36	11.1	3.2	2.3	4.5	#	7.7	13.9
C65 Renal pelvis	4	1.4	2.8	0.8	7.3		0.8	
C66 Ureter	2	0.7	3.0	0.4	10.9		0.4	
C67 Bladder	22	9.9	2.2	1.4	3.4	#	3.8	13.6
C70-C72 CNS cancer	8	6.0	1.3	0.6	2.6		0.6	62.5
C73 Thyroid	9	5.8	1.6	0.7	3.0		1.0	11.1
C74-C80 Cancer others	3	2.7	1.1	0.2	3.3		0.1	66.7
C76-C79 CUP	4	9.3	0.4	0.1	1.1		-1.6	
C82-C85 NHL	35	17.7	2.0	1.4	2.7	#	5.4	22.9
C90 Mult. myeloma	8	5.8	1.4	0.6	2.7		0.7	12.5
C91-C96 Leukaemia	17	7.5	2.3	1.3	3.6	#	3.0	41.2
Other primaries	6	5.1	1.2	0.4	2.6		0.3	16.7
Not observed	0	2.7	0.0	0.0	1.3		-0.9	
All mult. primaries	967	439.6	2.2	2.1	2.3	#	164.1	11.2

Patients	8889
Mean age at second malignancy (years)	75.3
Person-years	32143
Mean observation time (years)	3.6
Median observation time (years)	2.6

The occurrence of second malignancy is statistically significant.

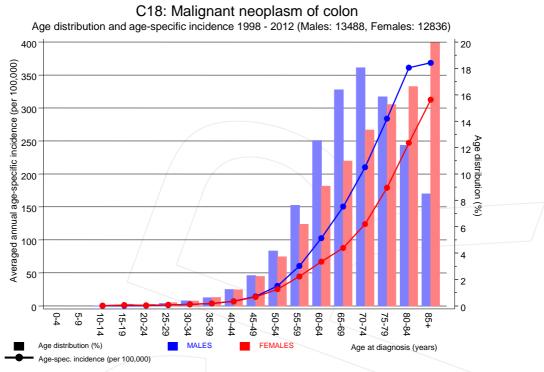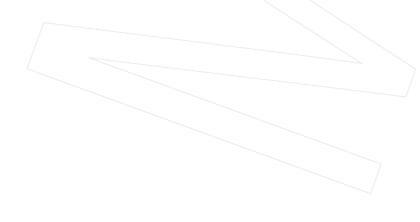Observed second malignancies with count 1 are pooled in category "Other primaries".

C18: Malignant neoplasm of colon
Age distribution and age-specific incidence 1998 - 2012 (Males: 13488, Females: 12836)

Figure 7. Age distribution and age-specific incidence

C18: Malignant neoplasm of colon
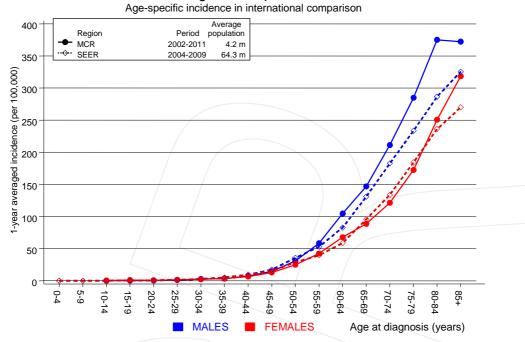### Age-specific incidence in international comparison

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 2012, based on the November 2011 submission. http://www.seer.cancer.gov.

C18: Malignant neoplasm of colon
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	8976	37111	3.1	35042	2.9
Females	8496	35441	3.2	33239	2.9
Patients alive					
Males	4907	28072	5.0	26002	4.7
Females	4635	27131	5.1	24929	4.7
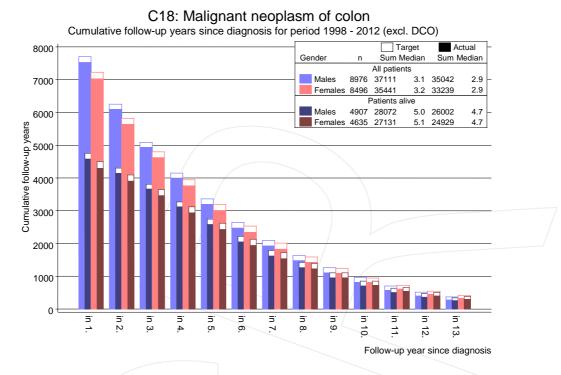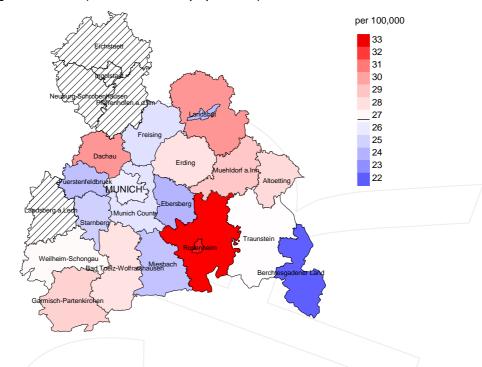
Figure 8. Cumulative follow-up years depending on time since diagnosis

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
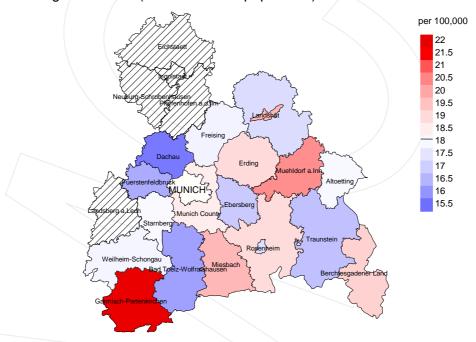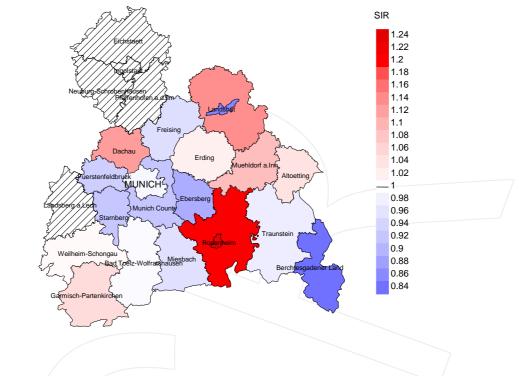
Figure 9a. Map of cancer incidence (world standard population, incl. DCO cases) by county averaged for period 2003 to 2008. According to their individual incidence rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 26.8/100,000 WS N=6,003, females 18.1/100,000 WS N=5,629). 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 146 women were identified with newly diagnosed colon cancer. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 16.9/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 13.2 and 21.9/100,000.

Standardized incidence ratio (SIR) 2003 - 2008: Males

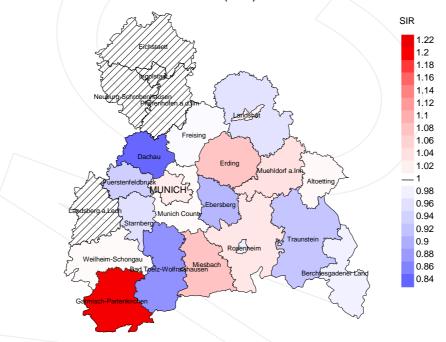## Standardized incidence ratio (SIR) 2003 - 2008: Females

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=6,003, females N=5,629). 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 146 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 0.91. Though, the value of this parameter may vary with an underlying probability of 99% between 0.73 and 1.12, 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	1263	98.5	6.3	913	72.3	93.8
1999	1198	97.7	7.3	850	71.0	94.6
2000	1081	98.0	6.8	748	69.2	96.1
2001	1206	98.0	8.0	813	67.4	96.8
2002	2031	97.7	14.2	1372	67.6	97.9
2003	2062	98.0	11.3	1309	63.5	98.1
2004	2039	97.8	9.6	1298	63.7	97.2
2005	1918	96.4	8.7	1175	61.3	98.3
2006	1964	94.5	6.2	1079	54.9	99.4
2007	2149	83.6	7.4	1129	52.5	98.4
2008	2183	70.1	6.6	1091	50.0	98.4
2009	2140	68.3	5.7	951	44.4	98.6
2010	1943	67.1	6.8	795	40.9	98.1
2011	1848	67.7	6.6	650	35.2	97.5
2012	1585	97.0	7.6	427	26.9	95.8
1998–2012	26610	87.3	8.0	14600	54.9	97.5

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	1263	715	91.0	236	18.7
1999	1198	721	92.2	227	18.9
2000	1081	706	94.1	206	19.1
2001	1206	742	95.7	211	17.5
2002	2031	1048	98.3	501	24.7
2003	2062	1136	97.8	449	21.8
2004	2039	1139	98.4	430	21.1
2005	1918	1234	96.8	400	20.9
2006	1964	1205	97.6	345	17.6
2007	2149	1304	97.5	403	18.8
2008	2183	1344	98.4	447	20.5
2009	2140	1367	98.1	378	17.7
2010	1943	1411	98.4	349	18.0
2011	1848	1399	99.1	359	19.4
2012	1585	1373	99.1	322	20.3
1998-2012	26610	16844	97.3	5263	19.8

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	715	72.2	27.8	86.8
1999	721	71.6	28.4	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	1205	68.5	31.5	81.5
2007	1304	70.5	29.5	82.5
2008	1344	70.4	29.6	81.3
2009	1367	67.5	32.5	77.0
2010	1411	64.9	35.1	77.4
2011	1399	64.9	35.1	75.9
2012	1373	63.9	36.1	76.7
1998-2012	16844	69.5	30.5	81.4

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	336	73.8	72.1	78.5	73.4
1999	316	74.4	72.3	79.2	73.3
2000	356	75.0	72.7	81.6	74.1
2001	341	73.9	71.7	79.8	72.7
2002	513	74.2	72.2	80.6	73.2
2003	572	75.3	73.5	80.3	74.5
2004	559	75.8	74.2	81.5	75.2
2005	615	75.3	73.0	81.1	73.6
2006	629	76.1	73.9	80.7	74.7
2007	684	76.3	74.5	81.0	75.2
2008	733	76.2	74.4	81.4	75.1
2009	688	76.3	74.6	79.7	75.2
2010	734	76.7	74.4	81.1	75.5
2011	732	76.3	73.7	81.8	74.9
2012	719	77.2	74.8	81.8	75.9
1998-2012	8527	75.8	73.7	80.8	74.6

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.
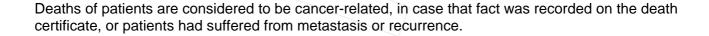
Table 11b

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	379	77.4	75.3	82.6	77.4
1999	405	78.9	76.8	84.5	78.8
2000	350	79.0	76.7	84.7	78.2
2001	401	80.0	77.2	85.6	78.8
2002	535	79.7	77.5	85.3	79.0
2003	564	79.4	77.0	85.1	78.2
2004	580	79.2	77.2	85.2	78.0
2005	619	79.8	77.4	85.4	78.5
2006	576	80.6	78.1	86.2	79.2
2007	620	79.8	77.1	85.9	78.1
2008	611	80.9	78.1	86.5	79.4
2009	679	80.7	78.0	86.3	78.9
2010	677	80.7	77.5	86.3	78.9
2011	667	81.9	78.2	87.8	79.5
2012	654	81.3	77.6	87.5	79.1
1998-2012	8317	80.1	77.4	85.9	78.7

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	0.55
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	0.41	26.8	0.44
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	0.44	18.1	0.46	25.7	0.49
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	464	20.8	0.41	9.2	0.38	14.9	0.40	21.2	0.43
2010	484	21.5	0.48	9.2	0.43	14.8	0.46	21.3	0.49
2011	496	21.7	0.53	9.6	0.50	15.1	0.52	20.8	0.53
2012	471	20.6	0.58	8.9	0.54	14.4	0.57	20.1	0.59
1998-2012	6050	22.0	0.45	10.5	0.42	16.9	0.44	23.8	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	0.41
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	0.35	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	0.34	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	0.33	8.8	0.35	12.5	0.38
2009	459	19.7	0.47	6.2	0.40	9.9	0.42	13.7	0.43
2010	433	18.5	0.48	5.8	0.41	9.2	0.43	12.6	0.44
2011	413	17.5	0.47	5.3	0.38	8.5	0.40	11.8	0.43
2012	407	17.2	0.55	5.4	0.44	8.7	0.48	12.0	0.51
1998-2012	5669	19.8	0.44	6.4	0.37	10.4	0.39	14.4	0.41

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.%
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	0.2	0.3	12	0.2	0.3	7	0.1	0.2
35-39	40	0.3	0.6	18	0.3	0.6	22	0.4	0.6
40-44	97	0.8	1.4	49	0.8	1.4	48	0.8	1.5
45-49	146	1.2	2.6	74	1.2	2.6	72	1.2	2.7
50-54	328	2.7	5.4	180	2.9	5.5	148	2.6	5.3
55-59	574	4.8	10.1	332	5.3	10.8	242	4.2	9.4
60-64	921	7.7	17.8	593	9.5	20.3	328	5.7	15.1
65-69	1345	11.2	29.0	863	13.9	34.2	482	8.3	23.4
70-74	1694	14.1	43.2	999	16.1	50.3	695	12.0	35.5
75-79	2057	17.1	60.3	1142	18.4	68.7	915	15.8	51.3
80-84	2154	18.0	78.3	1053	16.9	85.6	1101	19.0	70.3
85+	2609	21.7	100.0	892	14.4	100.0	1717	29.7	100.0
All ages	11997	100.0		6213	100.0		5784	100.0	

Included in the statistics are 35.8% multiple primaries in males and 26.6% 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	2		0.1	0.33	0.0		2.4	
25-29	4	7	0.2	0.17	0.4	0.23	4.2	6.4
30-34	12	7	0.6	0.24	0.3	0.15	6.8	3.3
35-39	18	22	0.8	0.21	1.0	0.27	4.7	4.4
40-44	49	48	2.0	0.29	2.1	0.31	6.0	4.5
45-49	74	72	3.4	0.24	3.4	0.25	4.4	3.8
50-54	180	148	9.7	0.32	7.8	0.31	5.9	5.1
55-59	332	242	19.5	0.32	13.6	0.30	6.0	5.4
60-64	593	328	36.0	0.35	18.8	0.28	7.1	5.4
65-69	863	482	58.8	0.39	30.1	0.34	7.7	6.3
70-74	999	695	86.2	0.40	50.4	0.40	8.1	7.7
75-79	1142	915	151.6	0.53	83.6	0.46	9.4	9.3
80-84	1053	1101	231.9	0.63	127.5	0.51	10.6	10.5
85+	892	1717	287.6	0.77	209.6	0.67	11.1	13.6
All ages	6213	5784					8.4	8.6

Mortality						
Raw	22.6	0.45	20.2	0.45
WS	10.7	0.42	6.6	0.38
ES	17.3	0.45	10.6	0.40
BRD-S	24.5	0.47	14.7	0.42

PYLL-70		
per 100,000	73.5	55.0
ES	64.0	46.8
AYLL-70	8.6	10.0

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 ←%
C03-C06 Oral cavity	22	0.8	15	68.2	2	9.1	5	22.7
C09-C10 Oropharynx	23	0.9	11	47.8	2	8.7	10	43.5
C15 Oesophagus	40	1.5	5	12.5	9	22.5	26	65.0
C16 Stomach	147	5.6	41	27.9	42	28.6	64	43.5
C17 Small intestine	26	1.0	3	11.5	12	46.2	11	42.3
C18 Colon	201	7.7			88	43.8	113	56.2
C19-C20 Rectum	229	8.8	68	29.7	108	47.2	53	23.1
C22 Liver	78	3.0	3	3.8	23	29.5	52	66.7
C25 Pancreas	97	3.7	8	8.2	16	16.5	73	75.3
C32 Larynx	42	1.6	29	69.0			13	31.0
C33-C34 Lung	274	10.5	48	17.5	39	14.2	187	68.2
C43 Malign. melanoma	80	3.1	43	53.8	3	3.8	34	42.5
C44 Skin others	109	4.2	61	56.0	11	10.1	37	33.9
C61 Prostate	538	20.6	306	56.9	41	7.6	191	35.5
C64 Kidney	104	4.0	50	48.1	20	19.2	34	32.7
C67 Bladder	189	7.2	92	48.7	16	8.5	81	42.9
C70-C72 CNS cancer	42	1.6	12	28.6	2	4.8	28	66.7
C76-C79 CUP	32	1.2	7	21.9	5	15.6	20	62.5
C82-C85 NHL	99	3.8	37	37.4	18	18.2	44	44.4
C90 Mult. myeloma	25	1.0	6	24.0	5	20.0	14	56.0
C91-C96 Leukaemia	57	2.2	15	26.3	4	7.0	38	66.7
Other primaries	154	5.9	54	35.1	11	7.1	89	57.8
All mult. primaries	2608	100.0	914	35.0	477	18.3	1217	46.7

Multiple primaries with number of cases n<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 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 ←%
C16	Stomach	116	5.6	31	26.7	28	24.1	57	49.1
C18	Colon	134	6.5			47	35.1	87	64.9
C19-C20	Rectum	139	6.7	40	28.8	60	43.2	39	28.1
C22	Liver	26	1.3	2	7.7	7	26.9	17	65.4
C23-C24	Bile	28	1.4	8	28.6	3	10.7	17	60.7
C25	Pancreas	85	4.1	6	7.1	14	16.5	65	76.5
C33-C34	Lung	128	6.2	25	19.5	12	9.4	91	71.1
C43	Malign. melanoma	48	2.3	33	68.8	4	8.3	11	22.9
C44	Skin others	52	2.5	28	53.8	5	9.6	19	36.5
C50	Breast	512	24.8	344	67.2	37	7.2	131	25.6
C53	Cervix uteri	54	2.6	38	70.4	8	14.8	8	14.8
C54	Corpus uteri	119	5.8	78	65.5	10	8.4	31	26.1
C56	Ovary	150	7.3	49	32.7	38	25.3	63	42.0
C64	Kidney	44	2.1	21	47.7	7	15.9	16	36.4
C67	Bladder	70	3.4	33	47.1	1	1.4	36	51.4
C70-C72	CNS cancer	37	1.8	18	48.6	3	8.1	16	43.2
C73	Thyroid	20	1.0	11	55.0	2	10.0	7	35.0
C82-C85	NHL	64	3.1	26	40.6	7	10.9	31	48.4
C90	Mult. myeloma	22	1.1	5	22.7	2	9.1	15	68.2
C91-C96	Leukaemia	43	2.1	6	14.0	5	11.6	32	74.4
Other primaries		170	8.2	70	41.2	27	15.9	73	42.9
All mult. primaries		2061	100.0	872	42.3	327	15.9	862	41.8

Multiple primaries with number of cases n<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 1998-2012
(**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	2		0.1	0.33	0.0		2.6	
25-29	4	7	0.2	0.19	0.4	0.24	4.4	6.8
30-34	11	7	0.5	0.23	0.3	0.16	6.4	3.7
35-39	16	16	0.7	0.22	0.7	0.22	4.5	3.6
40-44	45	44	1.9	0.28	1.9	0.31	6.0	4.7
45-49	69	64	3.2	0.25	3.0	0.25	4.5	3.9
50-54	152	124	8.2	0.31	6.6	0.29	5.7	5.1
55-59	291	212	17.1	0.32	11.9	0.31	6.1	5.6
60-64	501	267	30.4	0.35	15.3	0.27	7.1	5.4
65-69	696	402	47.4	0.39	25.1	0.34	7.6	6.4
70-74	791	553	68.3	0.42	40.1	0.40	8.1	7.7
75-79	857	705	113.7	0.53	64.4	0.45	9.3	8.9
80-84	760	839	167.4	0.65	97.1	0.48	10.2	10.1
85+	652	1385	210.2	0.78	169.1	0.65	10.6	13.6
All ages	4847	4625					8.2	8.5
Mortality								
Raw			17.7	0.45	16.1	0.43		
WS			8.5	0.42	5.3	0.36		
ES			13.6	0.44	8.5	0.39		
BRD-S			18.9	0.47	11.7	0.40		
PYLL-70								
per 100,000			63.7		47.1			
ES			55.5		40.1			
AYLL-70			8.8		10.1			

* 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	2		0.1	0.33	0.0		2.7	
25-29	4	7	0.2	0.20	0.4	0.24	4.8	7.2
30-34	11	6	0.5	0.24	0.3	0.15	6.6	3.6
35-39	16	14	0.7	0.23	0.6	0.19	4.7	3.4
40-44	45	43	1.9	0.29	1.9	0.32	6.3	5.0
45-49	67	59	3.1	0.25	2.8	0.24	4.7	4.0
50-54	142	122	7.7	0.31	6.5	0.31	5.8	5.6
55-59	270	199	15.9	0.33	11.2	0.31	6.2	5.9
60-64	433	240	26.3	0.34	13.8	0.27	7.0	5.6
65-69	594	354	40.5	0.38	22.1	0.33	7.5	6.7
70-74	653	477	56.4	0.40	34.6	0.37	7.9	7.9
75-79	683	607	90.6	0.49	55.5	0.42	9.2	9.1
80-84	588	712	129.5	0.56	82.4	0.44	10.0	10.2
85+	488	1185	157.4	0.62	144.7	0.58	9.9	13.5
All ages	3996	4025					7.9	8.6
Mortality								
Raw			14.6	0.42	14.0	0.41		
WS			7.2	0.39	4.7	0.35		
ES			11.3	0.41	7.5	0.37		
BRD-S			15.5	0.43	10.3	0.38		
PYLL-70								
per 100,000			58.7		44.0			
ES			51.3		37.6			
AYLL-70			9.2		10.3			

* See corresponding tables with multiple primaries.

C18: Malignant neoplasm of colon
Age distribution and age-specific mortality 1998 - 2012 (Males: 6050, Females: 5669)
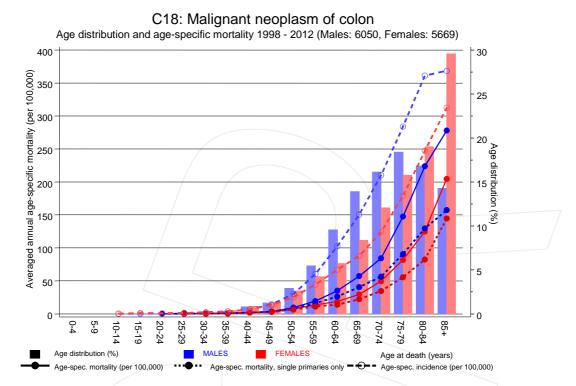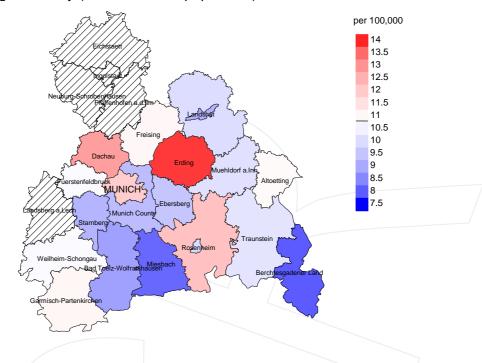
Figure 18. Distribution of age at death (bars) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

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) 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 10.8/100,000 WS N=2,632, females 6.5/100,000 WS N=2,396). 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 80 women died from colon cancer. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 7.9/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 5.5 and 11.4/100,000.

Standardized mortality ratio (SMR) 2003 - 2008: Males

Standardized mortality ratio (SMR) 2003 - 2008: Females
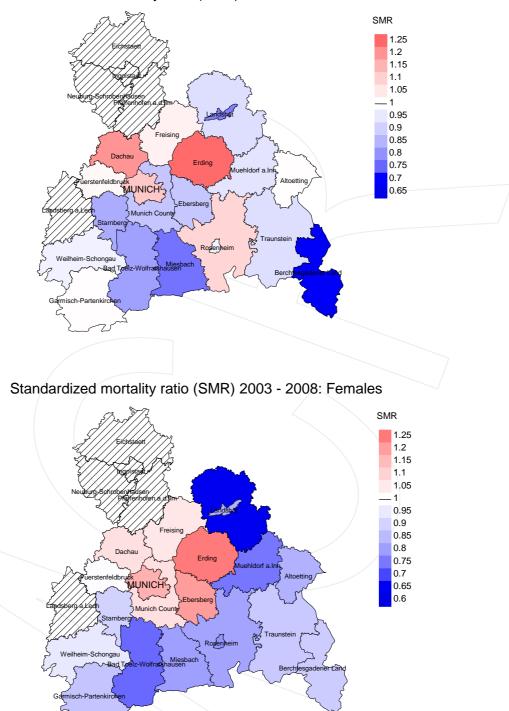
Figure 19b. Map of standardized mortality ratio (SMR, incl. DCO cases) by county averaged for period 2003 to 2008. According to their individual SMR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=2,632, females N=2,396). 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 80 women died from colon cancer. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 1.20. Though, the value of this parameter may vary with an underlying probability of 99% between 0.88 and 1.59, 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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