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

C61: Prostate cancer

Year of diagnosis	1998-2012
Patients	40,451
Diseases	40,453
Creation date	03/20/2014
Export date	02/12/2014
Population (males)	2.2 m

http://www.tumorregister-muenchen.de/en/facts/base/base_C61__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 4.5 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.

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	1549	144	9.3	26.1	63.2	98.1	
1999	1506	109	7.2	25.1	58.3	98.5	
2000	1687	138	8.2	23.6	54.5	98.4	
2001	1756	109	6.2	24.4	47.7	97.6	
2002	3333	307	9.2	24.3	47.2	97.0	#
2003	3262	227	7.0	24.6	41.9	96.5	#
2004	3201	218	6.8	23.1	37.6	96.7	#
2005	3114	195	6.3	21.4	34.6	94.7	#
2006	3022	180	6.0	22.7	32.5	90.5	#
2007	3536	239	6.8	21.2	29.6	74.4	# ##
2008	3215	196	6.1	21.5	26.8	56.5	
2009	2919	169	5.8	22.4	24.8	56.5	
2010	2826	188	6.7	20.0	20.9	56.4	
2011	3037	189	6.2	18.3	16.0	60.0	
2012	2490	158	6.3	18.8	10.9	97.6	###
1998-2012	40453	2766	6.8	22.3	34.1	82.8	

\# 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 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	Cases n	Incidence raw	Incidence WS	Incidence ES	Incidence BRD-S
1998	1549	139.8	83.0	127.8	173.3
1999	1506	134.6	78.6	119.8	157.8
2000	1687	148.1	85.1	130.3	172.8
2001	1756	151.5	86.3	131.9	173.7
2002	3333	178.9	97.8	149.2	195.0
2003	3262	174.0	94.2	142.2	184.1
2004	3201	170.1	90.2	135.2	174.2
2005	3114	164.4	85.3	128.0	165.3
2006	3022	157.8	80.6	120.8	155.9
2007	3536	159.6	81.9	122.2	155.8
2008	3215	144.4	71.4	107.0	138.2
2009	2919	130.8	64.7	96.1	122.2
2010	2826	125.4	61.6	91.8	116.8
2011	3037	132.9	63.9	95.3	122.6
2012	2490	109.0	52.7	78.6	100.7
1998-2012	40453	147.4	76.2	114.4	147.5

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

Table 3

Age distribution parameters by year of diagnosis
(incl. DCO)

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	1549	70.7	9.7	47.0	99.8	58.2	63.3	70.2	77.7	84.2
1999	1506	70.1	9.5	43.0	99.5	58.2	62.8	69.9	76.3	83.7
2000	1687	70.3	9.3	40.6	97.8	58.8	63.4	69.8	76.6	83.2
2001	1756	70.0	9.2	43.6	100	58.6	63.1	69.8	76.4	82.0
2002	3333	70.6	9.5	42.6	102	59.1	63.7	69.9	76.7	83.4
2003	3262	70.0	9.2	35.2	101	58.8	63.7	69.2	75.8	82.2
2004	3201	70.0	9.2	40.0	100	59.1	63.8	69.0	76.0	82.2
2005	3114	70.1	9.1	38.4	101	58.9	64.1	69.3	76.0	82.4
2006	3022	70.4	8.9	41.6	98.6	59.5	64.7	69.4	76.1	82.8
2007	3536	70.2	9.2	37.6	99.9	59.0	64.4	69.4	75.9	82.5
2008	3215	70.6	9.0	25.1	101	59.5	65.4	70.2	76.0	82.5
2009	2919	70.3	9.0	44.4	105	59.2	65.1	70.0	75.5	82.3
2010	2826	70.7	9.2	38.4	102	59.3	64.9	70.6	76.1	83.0
2011	3037	71.0	9.3	40.0	109	59.3	65.7	71.1	76.4	82.9
2012	2490	71.0	9.0	2.7	100	59.4	65.4	71.2	76.1	82.6
1998-2012	40453	70.4	9.2	2.7	109	59.1	64.3	69.9	76.2	82.7

Table 4

Age distribution by 5-year age group for period 1998-2012
(incl. DCO)

Age at diagnosis Years	Cases n	%	Cum.%
0-4	1	0.0	0.0
5-9	0	0.0	0.0
10-14	0	0.0	0.0
15-19	0	0.0	0.0
20-24	0	0.0	0.0
25-29	1	0.0	0.0
30-34	0	0.0	0.0
35-39	12	0.0	0.0
40-44	66	0.2	0.2
45-49	377	0.9	1.1
50-54	1199	3.0	4.1
55-59	3254	8.0	12.1
60-64	6312	15.6	27.7
65-69	9127	22.6	50.3
70-74	8436	20.9	71.2
75-79	5593	13.8	85.0
80-84	3309	8.2	93.2
85+	2766	6.8	100.0
All ages	40453	100.0	

Included in the statistics are 27.6% multiple primaries.

Table 5

Age-specific incidence, DCO rate and proportion of all cancers
for period 1998-2012

Age at diagnosis Years	Cases n	Age-spec. incidence	DCO rate n=2764 %	Prop. all cancers n=146755 %
0- 4	1	0.1	100.0	0.3
5- 9		0.0		
10-14		0.0		
15-19		0.0		
20-24		0.0		
25-29	1	0.1		0.1
30-34		0.0		
35-39	12	0.5		0.6
40-44	66	2.7		2.2
45-49	377	17.5	0.3	7.7
50-54	1199	64.9	0.1	14.9
55-59	3254	191.5	0.2	24.0
60-64	6312	383.0	0.6	30.8
65-69	9127	622.0	1.2	35.5
70-74	8436	728.0	2.1	34.4
75-79	5593	742.3	6.7	29.6
80-84	3309	728.7	19.0	26.4
85+	2764	891.2	51.7	30.1
All ages	40451		6.8	27.6
Incidence				
Raw		147.4		
WS		76.2		
ES		114.4		
BRD-S		147.5		

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 6

Standardized incidence ratio (SIR, with 95% confidence limits), excess absolute risk (EAR) and DCO rate of second primaries for period 1998-2012

Diagnosis		Observed n	Expected n	SIR	LCL 95%	UCL 95%		EAR	DCO %
C03-C06	Oral cavity	17	19.3	0.9	0.5	1.4		-0.2	
C07-C08	Salivary gland	12	6.0	2.0	1.0	3.5	#	0.5	25.0
C09-C10	Oropharynx	26	23.4	1.1	0.7	1.6		0.2	
C12-C13	Hypopharynx	16	13.3	1.2	0.7	1.9		0.2	6.3
C15	Oesophagus	72	45.2	1.6	1.2	2.0	#	2.0	11.1
C16	Stomach	177	118.8	1.5	1.3	1.7	#	4.4	7.9
C17	Small intestine	36	12.5	2.9	2.0	4.0	#	1.8	2.8
C18	Colon	457	281.5	1.6	1.5	1.8	#	13.2	3.9
C19-C20	Rectum	244	151.7	1.6	1.4	1.8	#	6.9	4.5
C21	Anus/canal	8	5.1	1.6	0.7	3.1		0.2	
C22	Liver	81	75.3	1.1	0.9	1.3		0.4	16.0
C23-C24	Bile	33	26.6	1.2	0.9	1.7		0.5	15.2
C25	Pancreas	193	97.3	2.0	1.7	2.3	#	7.2	24.4
C32	Larynx	39	26.1	1.5	1.1	2.0	#	1.0	5.1
C33-C34	Lung	450	322.4	1.4	1.3	1.5	#	9.6	8.4
C38,C45	Mesothelioma	31	18.4	1.7	1.1	2.4	#	0.9	3.2
C40-C41	Bone	8	1.9	4.3	1.8	8.4	#	0.5	
C43	Malign. melanoma	229	99.3	2.3	2.0	2.6	#	9.7	1.3
C46,C49	Soft tissue	23	13.8	1.7	1.1	2.5	#	0.7	
C48	Peritoneal	7	1.9	3.8	1.5	7.8	#	0.4	
C50	Breast	11	6.9	1.6	0.8	2.9		0.3	9.1
C60	Penis	12	6.2	1.9	1.0	3.4	#	0.4	
C62	Testis	9	3.8	2.3	1.1	4.5	#	0.4	11.1
C64	Kidney	228	93.5	2.4	2.1	2.8	#	10.1	4.8
C65	Renal pelvis	31	11.4	2.7	1.9	3.9	#	1.5	
C66	Ureter	16	6.4	2.5	1.4	4.1	#	0.7	
C67	Bladder	359	125.4	2.9	2.6	3.2	#	17.5	3.3
C68	Urethra	10	1.4	7.0	3.4	12.9	#	0.6	
C69	Eye melanoma	10	2.9	3.4	1.6	6.3	#	0.5	
C70-C72	CNS cancer	67	34.3	2.0	1.5	2.5	#	2.5	4.5
C73	Thyroid	33	14.8	2.2	1.5	3.1	#	1.4	
C76-C79	CUP	74	46.7	1.6	1.2	2.0	#	2.0	2.7
C81	Hodgkin lymphoma	8	4.8	1.7	0.7	3.3		0.2	
C82-C85	NHL	191	108.1	1.8	1.5	2.0	#	6.2	5.2
C90	Mult. myeloma	74	35.4	2.1	1.6	2.6	#	2.9	10.8
C91-C96	Leukaemia	88	44.6	2.0	1.6	2.4	#	3.3	35.2
Other primaries		40	25.7	1.6	1.1	2.1	#	1.1	20.0
Not observed		0	838.6	0.0	0.0	0.0	#	-62.9	
All mult. primaries		3420	2770.6	1.2	1.2	1.3	#	48.7	7.4

Patients	27734
Mean age at second malignancy (years)	74.4
Person-years	133266
Mean observation time (years)	4.8
Median observation time (years)	4.3

The occurrence of second malignancy is statistically significant.

Observed second primaries with count 1 to 6 are pooled in category "Other primaries".

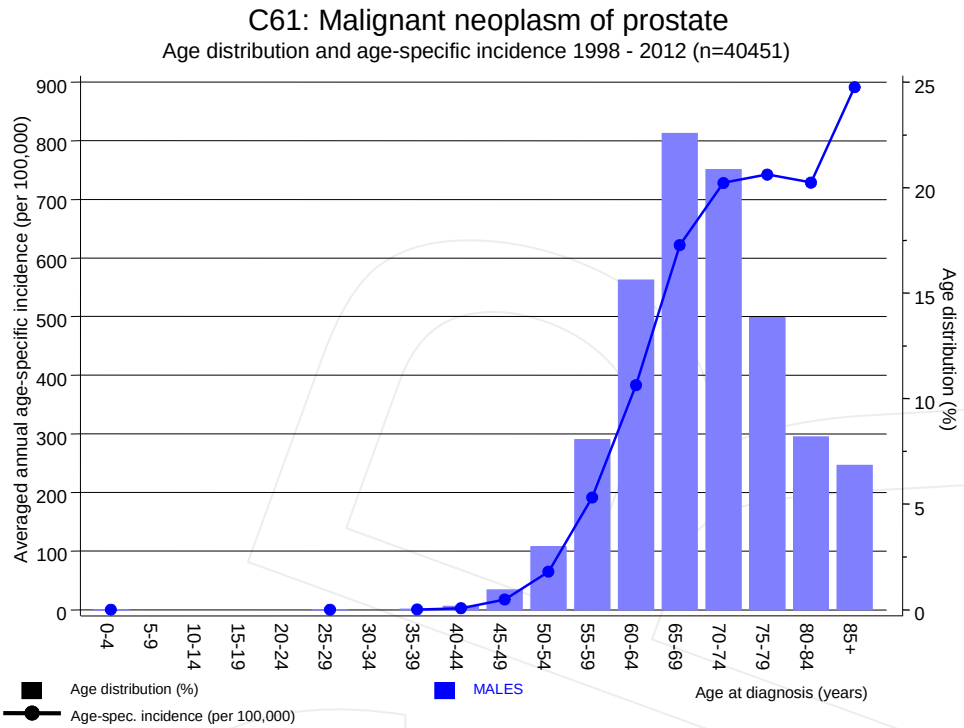

Figure 7. Age distribution and age-specific incidence

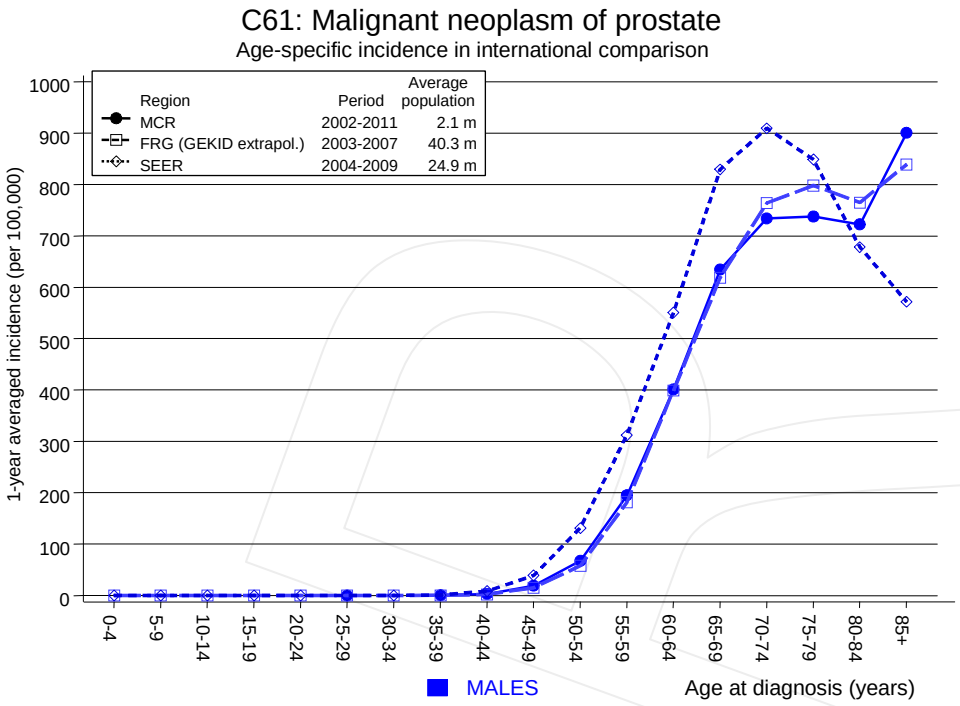

Figure 7a. Age-specific incidence in MCR registry areas compared to Germany (FRG, GEKID extrapolation) and SEER (Surveillance, Epidemiology, and End Results, USA).

Reference:

Extrapolated age-specific patient population of Germany, data status middle of 2010. Association of Population-based Cancer Registries in Germany (GEKID e.V.). Berlin, 2011. http://www.gekid.de. Last access: 05/12/2011

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.

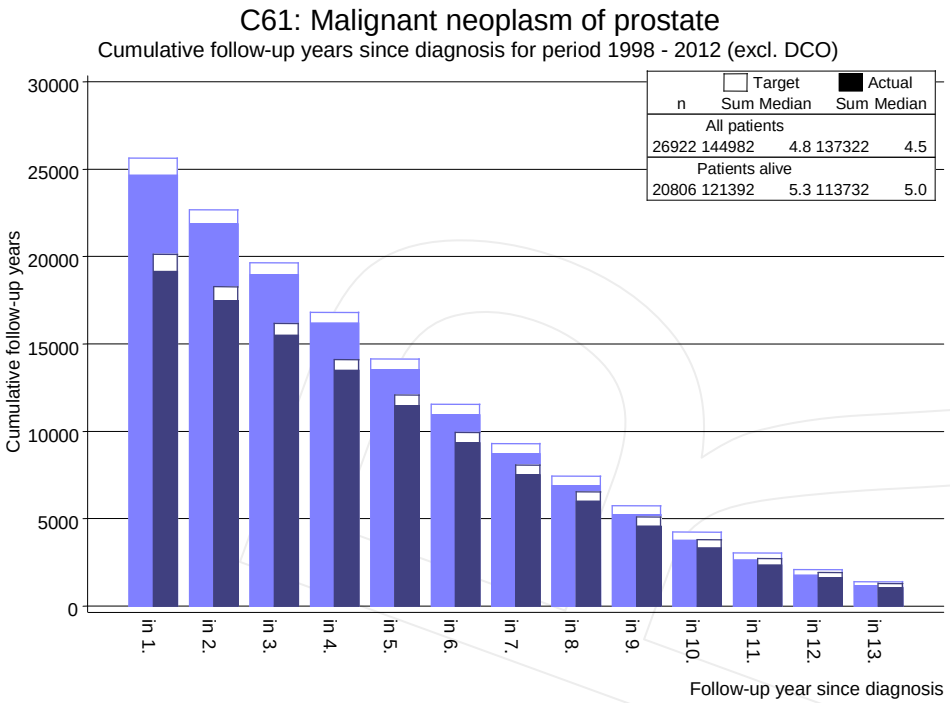

Figure 8. Cumulative follow-up years depending on time since diagnosis

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

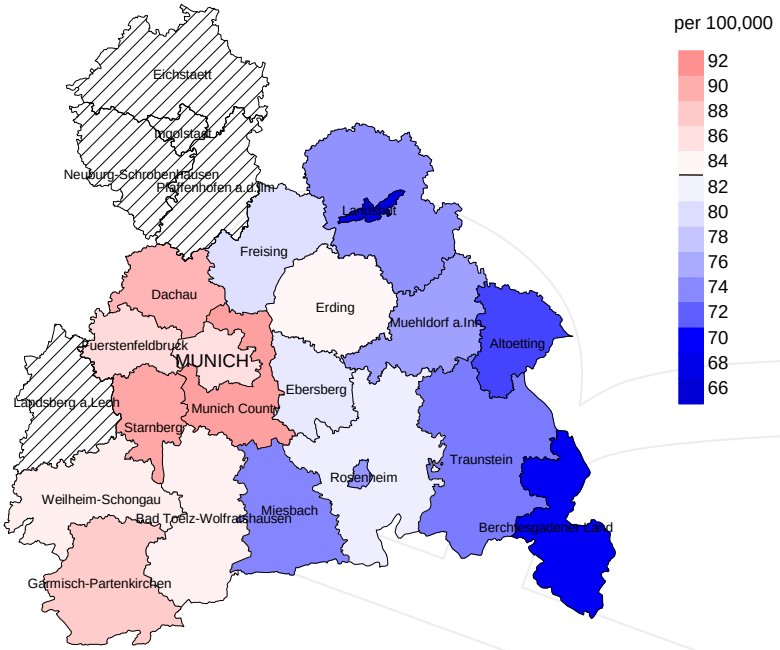

Figure 9a. Map of cancer incidence (world standard population, incl. DCO cases) by county averaged for period 2003 to 2008. According to their individual incidence rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (83.2/100,000 WS N=18,453). 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 61,449 male residents (averaged) in the period from 2003 to 2008 a total of 573 men were identified with newly diagnosed prostate cancer. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 80.9/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 72.3 and 90.4/100,000.

Standardized incidence ratio (SIR) 2003 - 2008

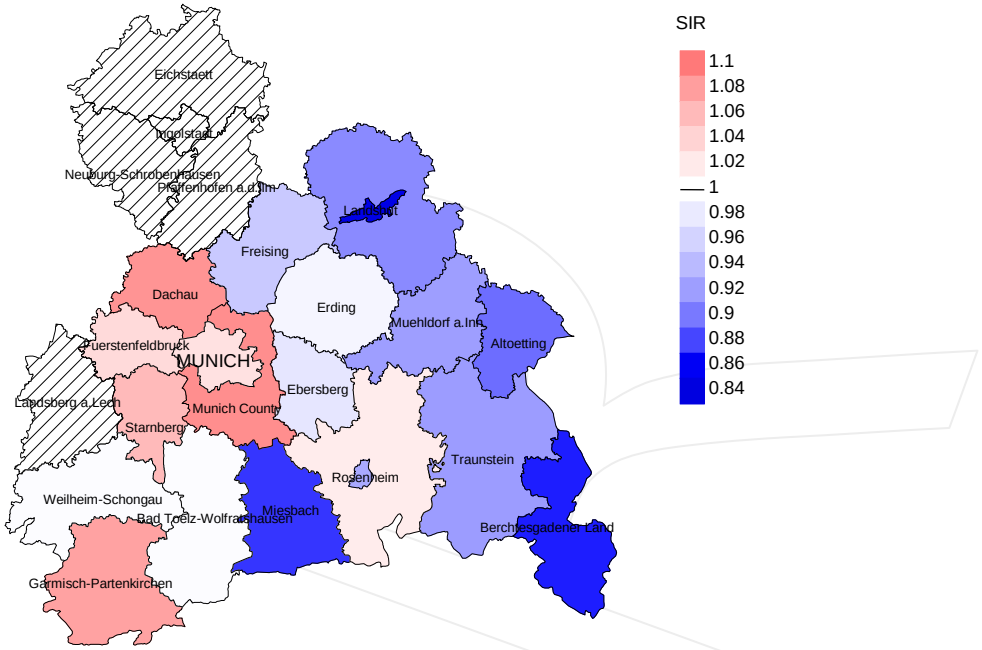

Figure 9b. Map of standardized incidence ratio (SIR, incl. DCO cases) by county averaged for period 2003 to 2008. According to their individual SIR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (N=18,453). 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 61,449 male residents (averaged) in the period from 2003 to 2008 a total of 573 men were identified with newly diagnosed prostate cancer. Therefore, the mean standardized incidence ratio (SIR) for this cancer type in this area can be calculated at 0.98. Though, the value of this parameter may vary with an underlying probability of 99% between 0.87 and 1.09, 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	1549	98.1	9.3	979	63.2	96.0
1999	1506	98.5	7.2	878	58.3	95.9
2000	1687	98.4	8.2	920	54.5	95.1
2001	1756	97.6	6.2	837	47.7	95.7
2002	3333	97.0	9.2	1574	47.2	97.5
2003	3262	96.5	7.0	1367	41.9	97.4
2004	3201	96.7	6.8	1202	37.6	98.3
2005	3114	94.7	6.3	1078	34.6	97.6
2006	3022	90.5	6.0	982	32.5	98.3
2007	3536	74.4	6.8	1045	29.6	98.5
2008	3215	56.5	6.1	863	26.8	98.8
2009	2919	56.5	5.8	723	24.8	98.8
2010	2826	56.4	6.7	591	20.9	98.8
2011	3037	60.0	6.2	485	16.0	96.9
2012	2490	97.6	6.3	272	10.9	96.3
1998-2012	40453	82.8	6.8	13796	34.1	97.4

Table 10b

Annual cohorts of incident cancers and deaths, proportion of death certificates and cases deceased the same year of cancer diagnosis
(incl. DCO)
(with respect to registry area expansion from 2.51 to 3.96 m as of 2002, and from 3.96 to 4.52 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	1549	658	94.5	196	12.7
1999	1506	613	94.1	143	9.5
2000	1687	634	95.0	161	9.5
2001	1756	663	92.3	151	8.6
2002	3333	990	95.5	372	11.2
2003	3262	1049	97.4	274	8.4
2004	3201	1045	97.3	258	8.1
2005	3114	1149	96.6	235	7.5
2006	3022	1212	97.2	233	7.7
2007	3536	1386	97.3	300	8.5
2008	3215	1500	98.8	264	8.2
2009	2919	1533	98.3	233	8.0
2010	2826	1651	98.5	255	9.0
2011	3037	1748	99.2	260	8.6
2012	2490	1768	98.8	225	9.0
1998-2012	40453	17599	97.3	3560	8.8

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	658	55.9	44.1	80.4
1999	613	58.2	41.8	77.8
2000	634	58.7	41.3	77.9
2001	663	53.8	46.2	76.0
2002	990	60.1	39.9	77.7
2003	1049	63.4	36.6	76.2
2004	1045	59.8	40.2	74.9
2005	1149	61.4	38.6	73.5
2006	1212	61.5	38.5	75.7
2007	1386	63.1	36.9	73.9
2008	1500	59.2	40.8	70.0
2009	1533	57.3	42.7	69.8
2010	1651	59.8	40.2	71.8
2011	1748	58.5	41.5	69.4
2012	1768	59.0	41.0	70.2
1998-2012	17599	59.6	40.4	73.3

Table 11

Means of age at death according to the grouping in Table 10

Year of death	Deaths n	Age at death (all causes) Years	Age at death (cancer-related) Years	Age at death (not cancer-related) Years	Age at death (according to death certificate) Years
1998	658	79.4	77.8	81.4	79.1
1999	613	79.4	77.6	82.0	79.2
2000	634	79.9	78.8	81.5	80.0
2001	663	80.0	78.6	81.6	80.1
2002	990	79.0	77.6	81.2	78.7
2003	1049	78.8	77.0	81.9	78.1
2004	1045	79.4	77.5	82.3	78.7
2005	1149	79.6	77.6	82.7	78.5
2006	1212	79.3	77.7	81.7	78.6
2007	1386	79.2	77.9	81.5	78.6
2008	1500	79.4	77.3	82.4	78.3
2009	1533	79.6	77.6	82.3	78.7
2010	1651	79.7	78.0	82.3	78.9
2011	1748	80.3	78.7	82.5	79.3
2012	1768	80.3	78.7	82.7	79.4
1998-2012	17599	79.6	77.9	82.1	78.9

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 12

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

Year of death	Deaths n	Mort. raw	MI-Index raw	Mort. WS	MI-Index WS	Mort. ES	MI-Index ES	Mort. BRD-S	MI-Index BRD-S
1998	368	33.2	0.24	18.1	0.22	31.4	0.25	48.0	0.28
1999	357	31.9	0.24	17.0	0.22	29.5	0.25	44.7	0.28
2000	372	32.7	0.22	17.0	0.20	30.1	0.23	45.9	0.27
2001	357	30.8	0.20	15.9	0.18	28.2	0.21	42.7	0.25
2002	595	31.9	0.18	15.7	0.16	27.1	0.18	40.0	0.21
2003	665	35.5	0.20	17.0	0.18	29.2	0.21	43.7	0.24
2004	625	33.2	0.20	15.2	0.17	26.3	0.19	40.0	0.23
2005	705	37.2	0.23	16.3	0.19	28.4	0.22	43.9	0.27
2006	745	38.9	0.25	16.9	0.21	29.2	0.24	44.0	0.28
2007	875	39.5	0.25	16.8	0.21	29.1	0.24	43.7	0.28
2008	888	39.9	0.28	16.4	0.23	28.1	0.26	42.4	0.31
2009	878	39.3	0.30	15.8	0.24	27.0	0.28	40.3	0.33
2010	987	43.8	0.35	16.9	0.28	29.1	0.32	43.8	0.37
2011	1023	44.8	0.34	16.7	0.26	29.0	0.30	43.8	0.36
2012	1043	45.7	0.42	16.9	0.32	29.4	0.37	44.6	0.44
1998-2012	10483	38.2	0.26	16.5	0.22	28.6	0.25	43.1	0.29

Table 13

Age distribution of age at death (cancer-related) for period 1998-2012
(**incl. multiple primaries**)

Age at death Years	Cases n	%	Cum.%
25-29	1	0.0	0.0
30-34	0	0.0	0.0
35-39	0	0.0	0.0
40-44	7	0.1	0.1
45-49	17	0.2	0.2
50-54	60	0.6	0.8
55-59	189	1.8	2.6
60-64	528	5.0	7.6
65-69	1161	11.1	18.7
70-74	1774	16.9	35.6
75-79	2215	21.1	56.8
80-84	2206	21.0	77.8
85+	2326	22.2	100.0
All ages	10484	100.0	

Included in the statistics are 27.6% multiple primaries.

Table 14

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

Age at death Years	Cases n	Age-spec. mortality	MI-index	Prop. all cancers %
0- 4		0.0		
5- 9		0.0		
10-14		0.0		
15-19		0.0		
20-24		0.0		
25-29	1	0.1	1.00	1.0
30-34		0.0		
35-39		0.0		
40-44	7	0.3	0.11	0.9
45-49	17	0.8	0.05	1.0
50-54	60	3.2	0.05	2.0
55-59	189	11.1	0.06	3.4
60-64	528	32.0	0.08	6.3
65-69	1161	79.1	0.13	10.3
70-74	1774	153.1	0.21	14.3
75-79	2215	294.0	0.40	18.3
80-84	2206	485.8	0.67	22.3
85+	2326	750.0	0.84	29.0
All ages	10484			14.2
Mortality				
Raw		38.2	0.26	
WS		16.5	0.22	
ES		28.6	0.25	
BRD-S		43.1	0.29	
PYLL-70				
per 100,000		44.0		
ES		36.8		
AYLL-70		5.5		

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

Table 15

Multiple primaries in deaths in period 1998-2012

Diagnosis		Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C15	Oesophagus	98	1.8	17	17.3	7	7.1	74	75.5
C16	Stomach	256	4.7	59	23.0	22	8.6	175	68.4
C18	Colon	573	10.5	208	36.3	42	7.3	323	56.4
C19-C20	Rectum	340	6.2	130	38.2	31	9.1	179	52.6
C22	Liver	132	2.4	10	7.6	5	3.8	117	88.6
C23-C24	Bile	58	1.1	9	15.5	4	6.9	45	77.6
C25	Pancreas	283	5.2	20	7.1	15	5.3	248	87.6
C32	Larynx	61	1.1	31	50.8	5	8.2	25	41.0
C33-C34	Lung	716	13.1	87	12.2	48	6.7	581	81.1
C43	Malign. melanoma	237	4.3	118	49.8	9	3.8	110	46.4
C44	Skin others	273	5.0	78	28.6	16	5.9	179	65.6
C64	Kidney	261	4.8	121	46.4	36	13.8	104	39.8
C67	Bladder	974	17.8	403	41.4	256	26.3	315	32.3
C70-C72	CNS cancer	126	2.3	16	12.7	4	3.2	106	84.1
C76-C79	CUP	126	2.3	17	13.5	16	12.7	93	73.8
C82-C85	NHL	216	3.9	69	31.9	35	16.2	112	51.9
C90	Mult. myeloma	92	1.7	17	18.5	6	6.5	69	75.0
C91-C96	Leukaemia	176	3.2	12	6.8	15	8.5	149	84.7
Other primaries		483	8.8	164	34.0	42	8.7	277	57.3
All mult. primaries		5481	100.0	1586	28.9	614	11.2	3281	59.9

Multiple primaries with number of cases n<50 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	Cases n	Age-spec. mortality	MI-index	Prop. all cancers %
0- 4		0.0		
5- 9		0.0		
10-14		0.0		
15-19		0.0		
20-24		0.0		
25-29		0.0		
30-34		0.0		
35-39		0.0		
40-44	5	0.2	0.08	0.7
45-49	13	0.6	0.04	0.8
50-54	49	2.7	0.04	1.8
55-59	156	9.2	0.05	3.3
60-64	426	25.9	0.07	6.1
65-69	943	64.3	0.12	10.3
70-74	1437	124.0	0.20	14.7
75-79	1820	241.6	0.39	19.7
80-84	1814	399.5	0.68	24.4
85+	1928	621.7	0.85	31.5
All ages	8591			14.5
Mortality				
Raw		31.3	0.24	
WS		13.5	0.20	
ES		23.4	0.23	
BRD-S		35.4	0.28	
PYLL-70				
per 100,000		35.5		
ES		29.7		
AYLL-70		5.5		

* 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	Cases n	Age-spec. mortality	MI-index	Prop. all cancers %
0- 4		0.0		
5- 9		0.0		
10-14		0.0		
15-19		0.0		
20-24		0.0		
25-29		0.0		
30-34		0.0		
35-39		0.0		
40-44	4	0.2	0.07	0.6
45-49	13	0.6	0.04	0.9
50-54	44	2.4	0.04	1.8
55-59	136	8.0	0.05	3.1
60-64	329	20.0	0.06	5.3
65-69	689	47.0	0.10	8.7
70-74	1005	86.7	0.16	12.2
75-79	1219	161.8	0.30	16.3
80-84	1266	278.8	0.54	21.4
85+	1473	475.0	0.69	29.7
All ages	6178			12.3
Mortality				
Raw		22.5	0.20	
WS		9.8	0.16	
ES		17.0	0.19	
BRD-S		25.3	0.22	
PYLL-70				
per 100,000		28.5		
ES		24.1		
AYLL-70		5.8		

* See corresponding tables with multiple primaries.

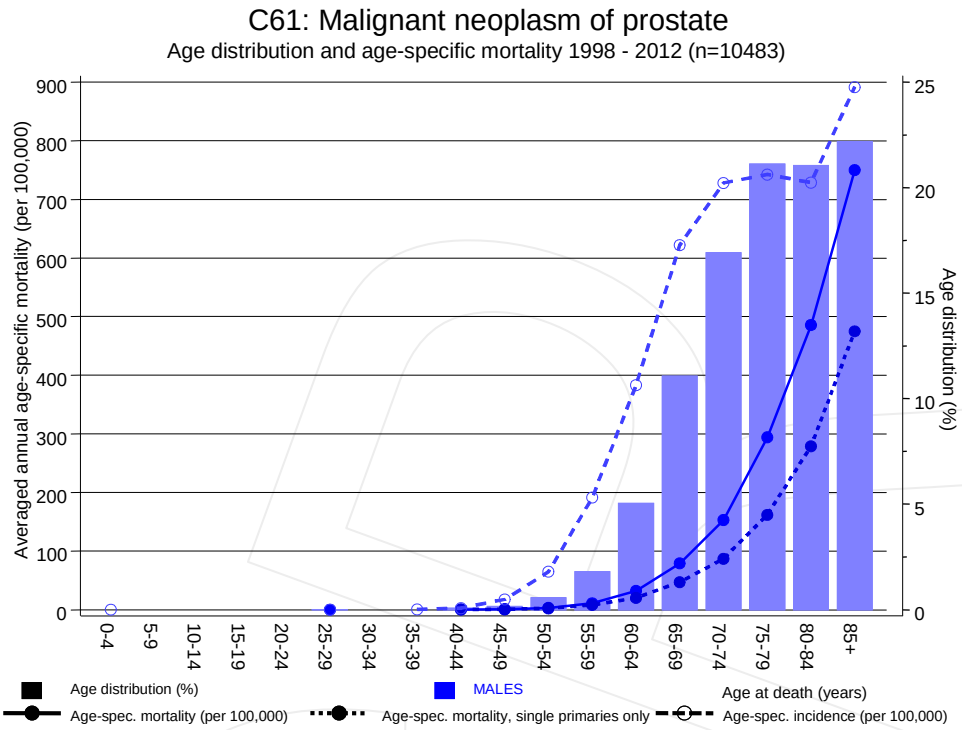

Figure 18. Distribution of age at death (bars) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

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

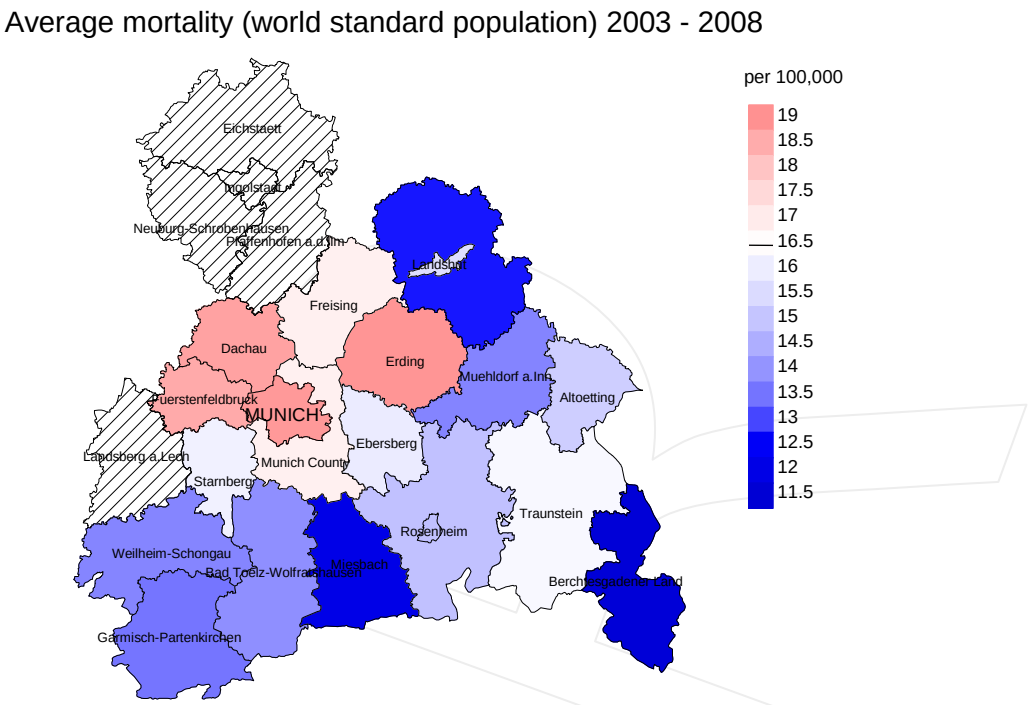

Figure 19a. Map of cancer mortality (world standard population) by county averaged for period 2003 to 2008. According to their individual mortality rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (16.5/100,000 WS N=4,338). 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 61,449 male residents (averaged) in the period from 2003 to 2008 a total of 131 men died from prostate cancer. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 15.9/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 12.5 and 20.1/100,000.

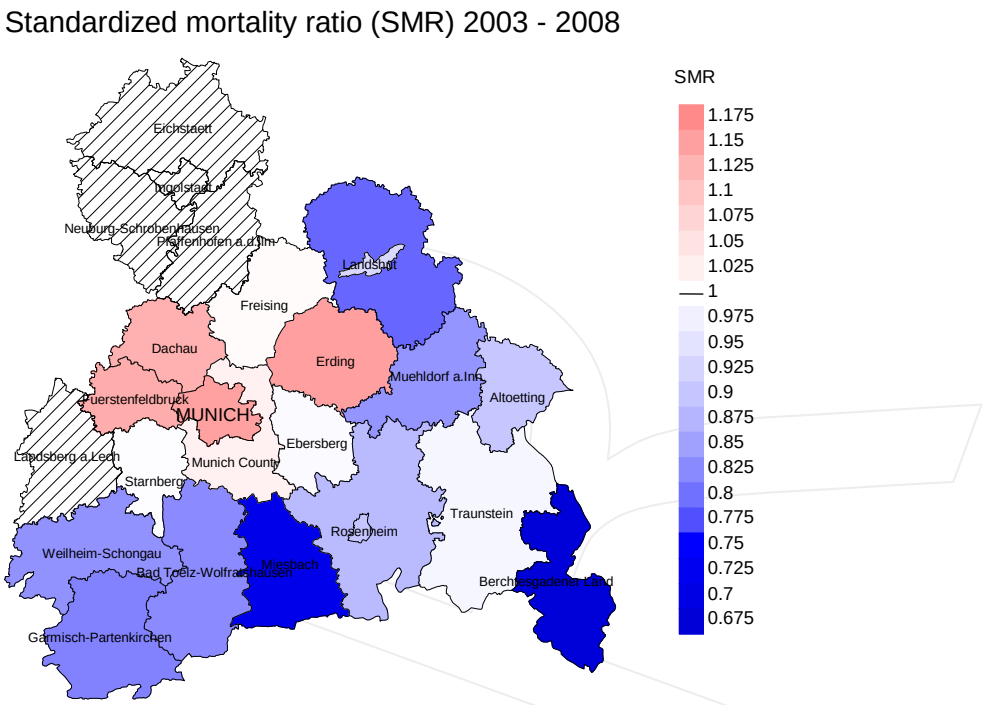

Figure 19b. Map of standardized mortality ratio (SMR, incl. DCO cases) by county averaged for period 2003 to 2008. According to their individual SMR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (N=4,338). 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 61,449 male residents (averaged) in the period from 2003 to 2008 a total of 131 men died from prostate cancer. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 0.99. Though, the value of this parameter may vary with an underlying probability of 99% between 0.79 and 1.24, 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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