# **Munich Cancer Registry**



- ▶ Survival
- ▶ Selection Matrix
- ▶ Homepage

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

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

## **Cancer statistics: Baseline statistics**

C74: Adrenal cancer

Year of diagnosis	1998-2012
Patients	168
Diseases	168
Creation date	03/20/2014
Export date	02/12/2014
Population	4.5 m



http://www.tumorregister-muenchen.de/en/facts/base/base\_C74\_\_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<sup>#</sup>, with a total of 4.5 million inhabitants, account for the frequency of cancer diseases<sup>##</sup> 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

				Prop.		Prop.
		DCO	Prop.	mult.	Prop.	actively
Year of	Cases	cases	DCO	primaries	deaths	followed
diagnosis	n	'n	%	%	%	ଚ୍ଚ
1998	8			37.5	37.5	100.0
1999	6	/ 1	16.7	33.3	100.0	100.0
2000	9	1	11.1	/11.1 /	55.6	100.0
2001	9	1	11.1	11.1/	55.6	100.0
2002	7			14.3	85.7	100.0 #
2003	11	1	9.1	9.1	54.5	100.0 #
2004	16	1	6.3	18.8	43.8	100.0 #
2005	14	2	14.3	14.3	35.7	85.7 #
2006	12			16.7	66.7	91.7 #
2007	12			8.3	41.7	75.0 # ##
2008	/10			10.0	50.0	70.0
2009	14	/ 1	7.1	14.3	28.6	57.1
2010	14			21.4	42.9	64.3
2011	16			18.8	31.3	50.0
2012	10	3	30.0	20.0	40.0	100.0 ###
1998-2012	168	11	6.5	16.7	47.6	83.3

<sup>#</sup> The increases of incident cases in 2002 and 2007 reflect the expansion to additional registry areas.

<sup>##</sup> 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.

<sup>###</sup> 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	All	Males	Females	Prop. males	
diagnosis	n	n	n	%	
1998 1999 2000	8 6 9	1 1 6	7 5 3	12.5 16.7 66.7	
2001	9 9	3	6	33.3	
2002	7	3 3	4	42.9	
2003	/11	/ 3	8	27.3	
2004 2005	16 14	7 10	9 4	43.8 71.4	
2005	12	5	7	41.7	
2007	12	6	6	50.0	
2008	10	3	7 /	30.0	
2009	14	5	9	35.7	
2010	14	5	9	35.7	
2011 2012	16 10	8 6	8 4	50.0 60.0	
2012	10	O	-	00.0	
1998-2012	168	72	96	42.9	

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)

			Males	Fem.	Males	Fem.	Males	Fem.	Males	Fem.
Year of	Males	Females	Inc.	Inc.	Inc.	Inc.	Inc.	Inc.	Inc.	Inc.
diagnosis	n	n	raw	raw	WS	WS	ES	ES	BRD-S	BRD-S
1998	1	7	0.1	0.6	0.2	0.7	0.1	0.6	0.1	0.6
1999	1	5	0.1	0.4	0.1	0.2	0.1	0.3	0.1	0.4
2000	6	3	0.5	0.2	0.4	0.3	0.5	0.3	0.5	0.3
2001	3	6	0.3	0.5	0.5	0.5	0.4	0.5	0.2	0.5
2002	3	4	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.2
2003	3	8	0.2	0.4	0.3	0.4	0.2	0.4	0.1	0.4
2004	7	9 /	0.4	0.5	0.2	0.7	0.3	0.6	0.4	0.4
2005	10	4	0.5	0.2	0.8	0.2	0.7	0.2	0.6	0.2
2006	5	7	0.3	0.3	0.2	0.3	0.2	0.3	0.2	0.3
2007	6	6	0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.2
2008	3	7	0.1	0.3	0.1	0.2	0.1	0.2	0.1	0.3
2009	5	9	0.2	0.4	0.2	0.3	0.2	0.4	0.2	0.4
2010	5	9	0.2	0.4	0.4	0.3	0.3	0.3	0.2	0.4
2011	8	8	0.4	0.3	0.5	0.3	0.4	0.3	0.3	0.3
2012	6	4	0.3	0.2	0.3	0.1	0.3	0.1	0.3	0.1
1998-2012	72	96	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3

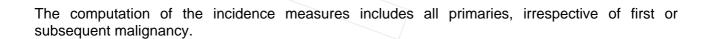


Table 3

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

Year of	Cases		Std.					Median		
diagnosis	n	Mean	dev.	Min.	Max.	10%	25%	50%	75%	90%
1998	8	37.1	30.9	0.1	66.7	0.1	0.6	53.1	61.4	66.7
1999	6	65.5	17.8	31.1	83.1	31.1	65.8	70.3	72.6	83.1
2000	9	54.2	25.1	4.6	75.5	4.6	61.1	63.0	66.0	75.5
2001	9	34.0	27,9	0.1	77.8	0.1	4.1	33.2	53.8	77.8
2002	7	35.6	32.9	0.1	76.1	0.1	1.1	47.9	67.2	76.1
2003	11	41.4	30.9	0.3	78.5	0.8	2.5	56.6	64.2	71.3
2004	16	45.6	32.5	2.0	84.6	2.1	7.0	52.7	73.7	83.8
2005	14	39.4	36.1	0.3	87.9	0.6	1.0	47.4	76.2	79.4
2006	12	53.0	21.7	0.5	81.5	40.3	43.0	54.8	67.7	77.6
2007	12	36.1	29.6	0.0	80.5	0.0	4.4	38.0	62.2	72.7
2008	10	60.5	27.0	1.4	88.2	15.0	56.1	66.3	80.9	85.9
2009	14	51.2	19.3	5.5	78.7	26.3	42.4	53.7	62.7	77.6
2010	14	41.2	31.8	0.0	82.7	0.8	4.3	38.7	72.7	77.4
2011	16	41.3	27.3	0.1	78.5	0.5	14.5	49.2	58.6	74.1
2012	10	53.1	27.9	0.3	90.4	7.7	49.1	56.7	65.3	88.1
1998-2012	168	45.4	28.7	0.0	90.4	0.8	16.4	54.1	69.7	77.9

Table 3a

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

Year of	Cases		Std.					Median		
diagnosis	n	Mean	dev.	Min.	Max.	10%	25%	50%	75%	90%
1998	1	0.8		0.8	0.8	0.8	0.8	0.8	0.8	0.8
1999	1	70.6		70.6	70.6	70.6	70.6	70.6	70.6	70.6
2000	6	55.9	25.6	4.6	75.5	4.6	62.4	63.4	66.0	75.5
2001	3	17.3	29.3	0.1	51.2	0.1	0.1	0.8	51.2	51.2
2002	3	17.8	26.1	1.1	47.9	1.1	1.1	4.4	47.9	47.9
2003	3	22.4	36.3	0.3	64.2	0.3	0.3	2.5	64.2	64.2
2004	7	69.4	12.5	47.5	83.8	47.5	57.8	72.4	77.9	83.8
2005	10	35.0	36.8	0.6	87.9	0.7	1.0	26.0	74.4	82.1
2006	5	57.6	14.7	42.2	77.6	42.2	43.9	60.8	63.3	77.6
2007	6	28.0	25.1	0.0	60.7	0.0	0.0	29.7	48.0	60.7
2008	3	61.8	8.2	56.1	71.2	56.1	56.1	57.9	71.2	71.2
2009	5	46.9	6.6	39.6	54.9	39.6	42.4	45.1	52.6	54.9
2010	5	21.9	35.2	0.0	82.7	0.0	0.8	3.5	22.4	82.7
2011	8	37.6	32.8	0.5	78.5	0.5	1.4	44.4	65.0	78.5
2012	6	39.5	25.6	0.3	62.2	0.3	15.0	49.4	60.5	62.2
1998-2012	72	40.8	29.6	0.0	87.9	0.6	2.9	48.9	63.5	75.5

Table 3b

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

Year of	Cases		Std.					Median		
diagnosis	n	Mean	dev.	Min.	Max.	10%	25%	50%	75%	90%
1998	7	42.3	29.3	0.1	66.7	0.1	0.3	57.1	64.8	66.7
1999	5	64.5	19.7	31.1	83.1	31.1	65.8	70.1	72.6	83.1
2000	3	50.7	29.3	17,7	73.4	17.7	17.7	61.1	73.4	73.4
2001	6	42.3	25,5	4.1	77.8	4.1	29.7	43.5	55.0	77.8
2002	4	49.0	34.0	0.1	76.1	0.1	26.3	59.8	71.7	76.1
2003	8	48.6	27.8	0.8	78.5	0.8	28.4	59.5	66.9	78.5
2004	9	27.2	31.4	2.0	84.6	2.0	5.8	7.1	43.4	84.6
2005	4	50.6	36.7	0.3	79.4	0.3	23.2	61.3	77.9	79.4
2006	7	49.7	26.2	0.5	81.5	0,5	40.3	54.7	72.2	81.5
2007	6	44.1	33.9	0.2	80.5	0.2	8.6	51.5	72.7	80.5
2008	7	59.9	32.8	1.4	88.2	1.4	28.6	75.5	83.5	88.2
2009	9	53.7	23.7	5.5	78.7	5.5	51.9	60.3	64.2	78.7
2010	9	52.0	25.7	4.3	77.4	4.3	32.7	63.9	72.7	77.4
2011	8	45.0	22.3	0.1	70.3	0.1	34.2	51.8	58.6	70.3
2012	4	73.6	17.6	53.0	90.4	53.0	59.1	75.5	88.1	90.4
1998-2012	96	48.9	27.7	0.1	90.4	2.0	28.6	56.1	71.8	79.4

Age at									
diagnosis	Cases			Males	3		Females		
Years	n	%	Cum.%	n	%	Cum.%	n	%	Cum.%
0-4	35	20.8	20.8	22	30.6	30.6	13	13.5	13.5
5-9	5	3.0	23.8			30.6	5	5.2	18.8
10-14	1	0.6	24.4			30.6	1	1.0	19.8
15-19	2	1.2	25.6	/ 1	1.4	31.9	1	1.0	20.8
20-24	3	1.8	27.4	2	2.8	34.7	1	1.0	21.9
25-29	5	3.0	30.4			34.7	5	5.2	27.1
30-34	3	1.8	32.1			34.7	3	3.1	30.2
35-39	4	2.4	34.5	3	4.2	38.9	1	1.0	31.3
40 - 44	9	5.4	39.9	3	4.2	43.1	6	6.3	37.5
45-49	10	6.0	45.8	7	9.7	52.8	3	3.1	40.6
50-54	12	7.1	53.0	5	6.9	59.7	7	7.3	47.9
55-59	10	6.0	58.9	4	5.6	65.3	6	6.3	54.2
60-64	20	11.9	70.8	9	12.5	77.8	11	11.5	65.6
65-69	7	4.2	75.0	1	1.4	79.2	6	6.3	71.9
70-74	15	8.9	83.9	7	9.7	88.9	8	8.3	80.2
75-79	15	8.9	92.9	5	6.9	95.8	10	10.4	90.6
80-84	8	4.8	97.6	2	2.8	98.6	6	6.3	96.9
85+	4	2.4	100.0	1	1.4	100.0	3	3.1	100.0
All ages	168	100.0		72	100.0		96	100.0	

Included in the statistics are 16.7% multiple primaries in males and 22.9% 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	Age- spec.	Females Age- spec. incid.		Females DCO rate n=7 %	cancers	Females Prop.all cancers n=142297
0 - 4	22	13	1.6	1.0			7.2	5.8
5- 9		5	0.0	0.4				4.4
10-14		1	0.0	0.1				0.6
15-19	1	1	0.1	0.1			0.3	0.4
20-24	2	1	0.1	0.1			0.4	0.2
25-29		5	0.0	0.3				0.5
30-34		3	0.0	0.1				0.2
35-39	3	1	0.1	0.0			0.1	0.0
40 - 44	3	6	0.1	0.3			0.1	0.1
45-49	7	3	0.3	0.1			0.1	0.0
50-54	5	7	0.3	0.4	20.0	14.3	0.1	0.1
55-59	4	6	0.2	0.3			0.0	0.0
60-64	9	11	0.5	0.6	11.1	9.1	0.0	0.1
65-69	1	6	0.1	0.4		16.7	0.0	0.0
70-74	7	8	0.6	0.6			0.0	0.0
75-79	5	10	0.7	0.9	20.0	20.0	0.0	0.1
80-84	2	6	0.4	0.7	50.0	16.7	0.0	0.0
85+	1	3	0.3	0.4		33.3	0.0	0.0
All ages	72	96			5.6	7.3	0.0	0.1
Incidence Raw WS ES BRD-S			0.3 0.3 0.3	0.3 0.3 0.3 0.3				

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).

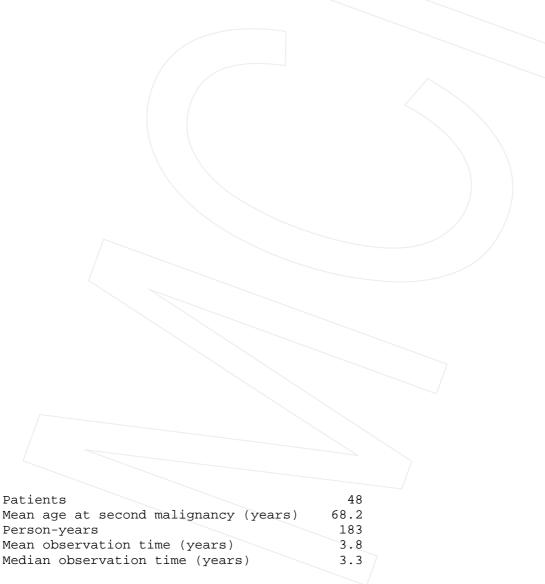
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Table 6a

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 %
C61 Prostate	3	0.4	6.8	1.4	19.9 #	139.5	
Other primaries Not observed	4	0.3	14.4	3.9 0.0	37.0 #	203.0 -45.4	
All mult. primaries	7	1.6	4.5	1.8	9.3 #	297.1	



# 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	D
Other primaries Not observed	5	0.2	24.3	7.9 0.0	56.8 # 2.9	182.9 -49.1	
All mult. primaries		1.5	3.4	1.1	7.8 #		
All mult. primaries		1.5	3.4	1.1	7.0 #	133.0	
atients ean age at second ma	lignancy (s	rears) 54	64 1.1				

# The occurrence of second malignancy is statistically significant.

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

Median observation time (years)

2.9

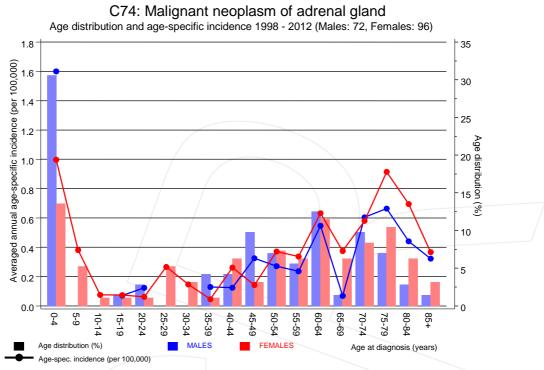
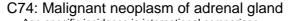
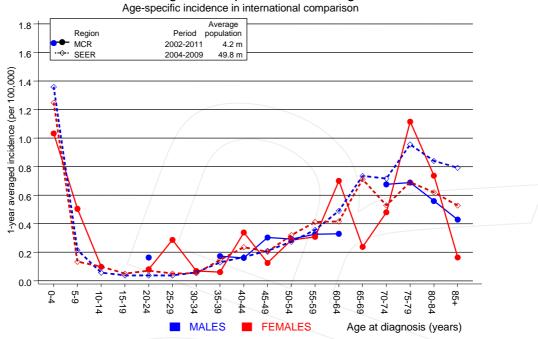


Figure 7. Age distribution and age-specific incidence







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

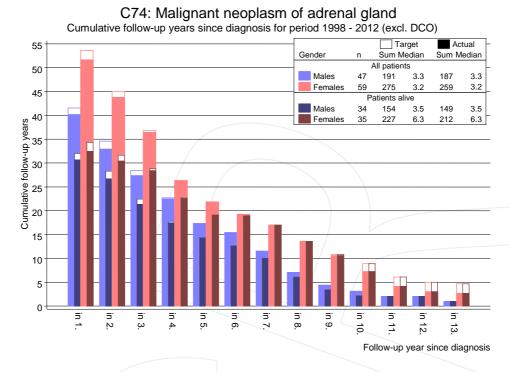
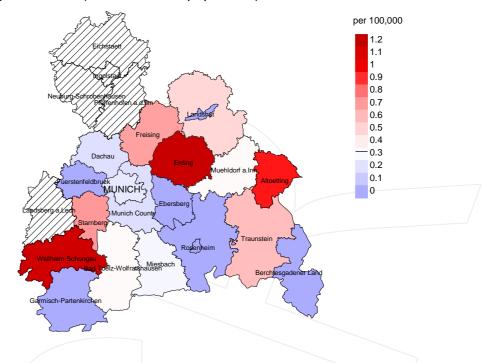


Figure 8. Cumulative follow-up years depending on time since diagnosis

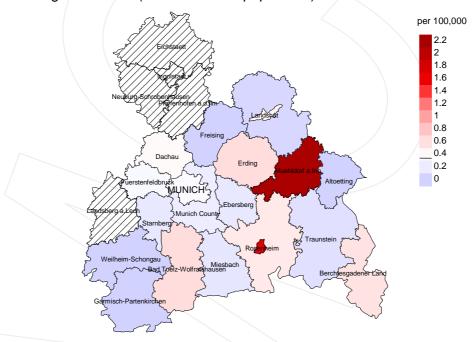
The increase of the lost to follow-up rate can be interpreted as a consequence of a declining number of survivors over time.



#### Average incidence (world standard population) 2003 - 2008: Males



### Average incidence (world standard population) 2003 - 2008: Females



**Figure 9a.** Map of cancer incidence (world standard population, incl. DCO cases) by county averaged for period 2003 to 2008. According to their individual incidence rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 0.3/100,000 WS N=33, females 0.3/100,000 WS N=39). Since cancer data are not available in some counties until 2007, the local incidence rates were not calculated, and the map tiles show as shaded.

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 63,131 female residents (averaged) in the period from 2003 to 2008 a total of 2 women were identified with newly diagnosed adrenal cancer. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 0.2/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.0 and 0.7/100,000.

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

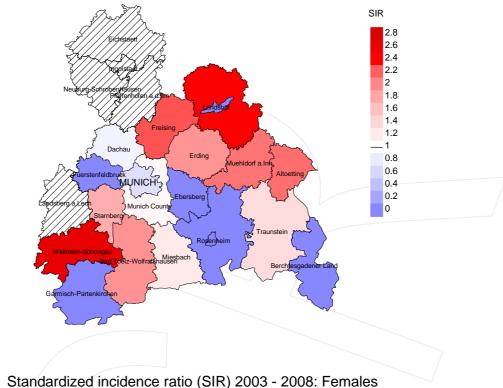




Figure 9b. Map of standardized incidence ratio (SIR, incl. DCO cases) by county averaged for period 2003 to 2008. According to their individual SIR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=33, females N=39). Since cancer data are not available in some counties until 2007, the local SIR values were not calculated, and the map tiles show as shaded.

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 63,131 female residents (averaged) in the period from 2003 to 2008 a total of 2 women were identified with newly diagnosed adrenal cancer. Therefore, the mean standardized incidence ratio (SIR) for this cancer type in this area can be calculated at 1.63. Though, the value of this parameter may vary with an underlying probability of 99% between 0.08 and 7.54, 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)

		Prop.				Prop. deaths
	Incident	actively	Prop.		Prop.	with death
Year of	cases	followed	DCO	Deaths	deaths	certific.
diagnosis	n	%	%	n	%	%
1998	8	100.0		3	37.5	100.0
1999	6	100.0	16.7	6	100.0	100.0
2000	9	100.0	11.1	5	55.6	100.0
2001	9	100.0	11.1	5	55.6	80.0
2002	7	100.0		6	85.7	100.0
2003	11	100.0	9.1	6	54.5	100.0
2004	16	100.0	6.3	7	43.8	100.0
2005	14	85.7	14.3	5	35.7	100.0
2006	12	91.7		8 5	66.7	100.0
2007	12	75.0		5	41.7	100.0
2008	10	70.0		5	50.0	100.0
2009	14	57.1	7.1	4	28.6	100.0
2010	14	64.3		6	42.9	83.3
2011	16	50.0		5	31.3	100.0
2012	10	100.0	30.0	4	40.0	100.0
1998-2012	168	83.3	6.5	80	47.6	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)

			Prop.		
			deaths		Prop.
Year of	Incident		with death	Deaths in	deaths in
diagnosis/	cases	Deaths	certific.	same year	same year
death	n	/ n /	%	n	%
1998	8	/	100.0		
1999	6	4	100.0	1	16.7
2000	9	3	66.7		
2001	9	6	100.0	2	22.2
2002	7	8	100.0	2	28.6
2003	11	7	100.0	3	27.3
2004	16	7	85.7	2	12.5
2005	14	7	100.0	3	21.4
2006	12	5	100.0		
2007	12	6	100.0		
2008	10	11	100.0	3	30.0
2009	14	8	100.0	_ 1	7.1
2010	14	6	100.0	1	7.1
2011	16	9	100.0	1	6.3
2012	10	13	100.0	4	40.0
1998-2012	168	104	98.1	23	13.7
		_01			• ·

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)

				Prop.	
				cancer	
		Prop.	Prop.	recorded	
		cancer-	not cancer-	on death	
Year of	Deaths	related	related	certificate	
death	n	96	96	96	
1998	4	100.0		100.0	
1999	4 4	100.0		100.0	
2000	3	100.0		100.0	
2001	6	100.0		100.0	
2002	8	100.0		87.5	
2003	7	100.0		100.0	
2004	7	85.7	14.3	83.3	
2005	7	100.0		100.0	
2006	5	80.0	20.0	80.0	
2007	6	100.0		100.0	
2008	/ 11	90.9	9.1	90.9	
2009	/ 8	87.5	12.5	87.5	
2010	6	83.3	16.7	100.0	
2011	9	77.8	22.2	100.0	
2012	13	92.3	7.7	100.0	
1998-2012	104	92.3	7.7	95.1	

Table 11a  $\begin{tabular}{ll} Means of age at death according to the grouping in Table 10 \\ \hline MALES \end{tabular}$ 

		Age at death	Age at death	Age at death	Age at death (according
V F	Daatha	(all	(cancer-	(not cancer-	to death
Year of	Deaths	causes)	related)	related)	certificate)
death	n	Years	Years	Years	Years
1998					
1999	1	48.2	48.2		48.2
2000	1	4.2	4.2		
2001	4	61.7	61.7		61.7
2002	2	27.6	27.6		27.6
2003					
2004	3	67.4	67.4		67.4
2005	3	81.0	81.0		81.0
2006	3	62.2	67.3	51.8	67.3
2007	2	58.8	58.8		58.8
2008	5	52.4	52.4		52.4
2009	3	67.1	60.4	80.5	60.4
2010	4	49.8	39.0	82.1	49.8
2011	4 5	56.0	48.2	79.6	56.0
2012	5	58.2	53.9	75.1	58.2
1998-2012	40	57.0	54.6	73.8	58.0

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

					Age at
		Age at	Age at	Age at	death
		death	death	death	(according
		(all	(cancer-	(not cancer-	to death
Year of	Deaths	causes)	related)	related)	certificate)
death	n	Years	Years	Years	Years
1998	4	68.1	68.1		68.1
1999	3	71.1	71.1		71.1
2000	2	66.7	66.7		66.7
2001	2	66.8	66.8		66.8
2002	6	58.9	58.9		58.4
2003	7	66.3	66.3		66.3
2004	4	55.7	46.8	82.3	52.5
2005	4	70.5	70.5		70.5
2006	2	62.2	62.2		62.2
2007	4	47.0	47.0		47.0
2008	6	63.7	59.7	83.6	59.7
2009	5	47.2	47.2		47.2
2010	2	64.6	64.6		64.6
2011	5	55.7	54.1	62.4	55.7
2012	8	56.0	56.0		56.0
1998-2012	64	60.3	59.6	76.1	60.0



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 12a  $\begin{tabular}{ll} Mortality measures (cancer-related death) and mortality-incidence-index \\ by year of death \\ \hline MALES \\ \end{tabular}$ 

Year of	Deaths	Mort.	MI-Index	Mort.	MI-Index	Mort.	MI-Index	Mort.	MI-Index
death	n	raw	raw	WS	WS	ES	ES	BRD-S	BRD-S
1998									
1999	1	0.1	1.00/	0.1	1.49	0.1	1.16	0.1	1.05
2000	1	0.1	0.17	0.2	0.44	0.1	0.27	0.1	0.15
2001	4	0.3	1.33	0.2	0.48	0.3	0.82	0.3	1.22
2002	2	0.1	0.67	0.2	0.56	0.1	0.64	0.1	0.65
2003									
2004	3	0.2	0.43	0.1	0.45	0.1	0.41	0.2	0.36
2005	3	0.2	0.30	0.1	0.08	0.1	0.19	0.2	0.36
2006	2	0.1	0.40	0.1	0.32	0.1	0.32	0.1	0.31
2007	2	0.1	0.33	0.1	0.15	0.1	0.21	0.1	0.27
2008	5	0.2	1.67	0.2	2.16	0.2	1.70	0.2	1.84
2009	2	0.1	0.40	0.1	0.34	0.1	0.37	0.1	0.38
2010	3	0.1	0.60	0.2	0.41	0.1	0.49	0.1	0.49
2011	3	0.1	0.38	0.2	0.33	0.1	0.34	0.1	0.40
2012	4	0.2	0.67	0.1	0.37	0.1	0.52	0.2	0.58
1998-2012	35	0.1	0.49	0.1	0.34	0.1	0.42	0.1	0.48

Table 12b

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

FEMALES

Year of	Deaths	Mort.	MI-Index	Mort.	MI-Index	Mort.	MI-Index	Mort.	MI-Index
death	n	raw	raw	WS	WS	ES	ES	BRD-S	BRD-S
1998	4	0.3	0.57	0.2	0.26	0.3	0.41	0.3	0.55
1999	3	0.3	0.60	0.1	0.49	0.2	0.56	0.2	0.59
2000	2	0.2	0.67	0.1	0.34	0.1	0.47	0.1	0.50
2001	2	0.2	0.33	0.1	0.14	0.1	0.24	0.2	0.31
2002	6	0.3	1.50	0.3	1.19	0.3	1.27	0.3	1.42
2003	7	0.4	0.88	0.2	0.45	0.2	0.62	0.3	0.82
2004	3	0.2	0.33	0.1	0.14	0.1	0.23	0.1	0.31
2005	4	0.2	1.00	0.1	0.46	0.1	0.72	0.2	0.87
2006	2	0.1	0.29	0.1	0.21	0.1	0.28	0.1	0.31
2007	4	0.2	0.67	0.2	0.50	0.2	0.61	0.2	0.65
2008	5	0.2	0.71	0.1	0.54	0.2	0.77	0.2	0.68
2009	5	0.2	0.56	0.2	0.71	0.2	0.62	0.2	0.52
2010	2	0.1	0.22	0.1	0.16	0.1	0.20	0.1	0.21
2011	4	0.2	0.50	0.1	0.38	0.1	0.37	0.2	0.51
2012	8	0.3	2.00	0.2	3.32	0.3	2.89	0.3	3.04
1998-2012	61	0.2	0.64	0.1	0.43	0.2	0.54	0.2	0.61

Table 13

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

Age at								
death	Cases		Males			Females		
Years	n	% Cum.	k n	90	Cum.%	n	%	Cum.%
0 - 4	6	6.3 6./	3 4	11.4	11.4	2	3.3	3.3
5-9	0	0.0 6.3	3		11.4			3.3
10-14	1	1.0 7.3	3 /		11.4	1	1.6	4.9
15-19	0	0.0 7.3	3 /		11.4			4.9
20-24	1	1.0 8.3	3 / 1	2.9	14.3			4.9
25-29	3	3.1 /11.5	5 /		14.3	3	4.9	9.8
30-34	1	1.0 / 12.5	5/		14.3	1	1.6	11.5
35-39	4	4.2 / 16.7	7 1	2.9	17.1	3	4.9	16.4
40 - 44	2	2.1 18.8	3		17.1	2	3.3	19.7
45-49	6	6.3 25.0	5	14.3	31.4	1	1.6	21.3
50-54	7	7.3 32.3	3 4	11.4	42.9	3	4.9	26.2
55-59	9	9.4 41.7	7 1	2.9	45.7	8	13.1	39.3
60-64	13	13.5 55.2	2 5	14.3	60.0	8	13.1	52.5
65-69	13	13.5 68.8	6	17.1	77.1	7	11.5	63.9
70-74	15	15.6 84.4	4 4	11.4	88.6	11	18.0	82.0
75-79	10	10.4 94.8	3 2	5.7	94.3	8	13.1	95.1
80-84	4	4.2 99.0	) 1	2.9	97.1	3	4.9	100.0
85+	1	1.0 100.0	) 1	2.9	100.0			100.0
All ages	96	100.0	35	100.0		61	100.0	

Included in the statistics are 16.7% multiple primaries in males and 22.9% in females.

Table 14

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

			Males		Females		Males	Females
Age at			Age-		Age-		Prop.all	Prop.all
death	Males	Females	spec.		spec.		cancers	cancers
Years	n	n	mortal.	MI-index	mortal.	MI-index	%	%
0 - 4	4	2	0.3	0.18	0.2	0.15	12.9	8.7
5- 9			0.0		0.0			
10-14		1	0,0		0.1	1.00		3.6
15-19			0.0		0.0			
20-24	1		0.1	0.50	0.0		1.2	
25-29		3 /	0.0		0.2	0.60		2.8
30-34		1 <	0.0		0.0	0.33		0.5
35-39	1	3	0.0	0.33	0.1	3.00	0.3	0.6
40-44		2	0.0		0.1	0.33		0.2
45-49	5	1	0.2	0.71	0.0	0.33	0.3	0.1
50-54	4	3	0.2	0.80	0.2	0.43	0.1	0.1
55-59	1	8	0.1	0.25	0.4	1.33	0.0	0.2
60-64	5	8	0.3	0.56	0.5	0.73	0.1	0.1
65-69	6	7	0.4	6.00	0.4	1.17	0.1	0.1
70-74	4	11/	0.3	0.57	0.8	1.38	0.0	0.1
75-79	2	8	0.3	0.40	0.7	0.80	0.0	0.1
80-84	1	3	0.2	0.50	0.3	0.50	0.0	0.0
85+	1		0.3	1.00	0.0		0.0	
All ages	35	61					0.0	0.1
Mortality								
Raw			0.1	0.49	0.2	0.64		
WS			0.1	0.34	0.1	0.43		
ES			0.1	0.42	0.2	0.54		
BRD-S			0.1	0.48	0.2	0.61		
PYLL-70								
per 100,000			2.4		3.1			
ES			2.9		3.3			
AYLL-70			22.1		19.6			

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

Table 15a  $\begin{tabular}{ll} Multiple primaries in deaths in period 1998-2012 \\ \hline MALES \end{tabular}$ 

					Syn- chron	Syn- chron		
	Total 7	Cotal	Pre	Pre	±30d	±30d	Post	Post
Diagnosis	n /	%↓	n	<b>~%</b>	n	<b>←%</b>	n	<b>←</b> %
C16 Stomach	1/	10.0					1	100.0
C33-C34 Lung	2	20.0	1	50.0			1	50.0
C43 Malign. melanoma	/3	30.0	3	100.0				
C61 Prostate	/1 /	10.0	1	100.0				
C64 Kidney	/ 1 /	10.0					1	100.0
C67 Bladder	/ 1 /	10.0	1	100.0				
C73 Thyroid	/ 1 <	10.0					1	100.0



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  $\label{eq:multiple primaries in deaths in period 1998-2012 FEMALES }$ 

					Syn- chron	Syn- chron		
	Total	Total	Pre	Pre	±30d	±30d	Post	Post
Diagnosis	n /	%↓	n	<b>←%</b>	n	<b>←</b> %	n	<b>←</b> %
C16 Stomach	1	5.9					1	100.0
C17 Small intestine	/1	5.9					1	100.0
C33-C34 Lung	/ 3	17.6			2	66.7	1	33.3
C43 Malign. melanoma	/ 1	5.9					1	100.0
C46,C49 Soft tissue	/ 1	5.9			1	100.0		
C50 Breast	3 /	17.6	2	66.7	1	33.3		
C54 Corpus uteri	2	11.8	2	100.0				
C64 Kidney	1	5.9			/ 1	100.0		
C67 Bladder	2	11.8			1	50.0	1	50.0
C70-C72 CNS cancer	1	5.9					1	100.0
C73 Thyroid	1	5.9			1	100.0		
All mult. primaries	17	100.0	4	23.5	7	41.2	6	35.3
_								

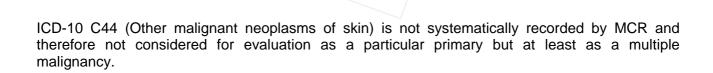


Table 16

Age-specific mortality (cancer-related) and proportion of all cancers for period 1998-2012

(Singular primaries only \*)

Age at			Males Age-		Females Age-		Males Prop.all	Females Prop.all
death	Males	Females			spec.		cancers	cancers
Years	n	n	_ /	MI-index	mortal.	MI-index	%	8
0- 4	4	2	0.3	0.18	0.2	0.15	15.4	8.7
5- 9			0.0		0.0			
10-14		1	0.0		0.1	1.00		3.8
15-19			0.0		0.0			
20-24	1		0.1	0.50	0.0		1.3	
25-29		3 /	0.0		0.2			2.9
30-34		1 <	0.0		0.0	0.33		0.5
35-39	1	3	0.0	0.33	0.1	3.00	0.3	0.7
40-44		2	0.0		0.1	0.40		0.2
45-49	4	1	0.2	0.80	0.0	0.33	0.3	0.1
50-54	4	3	0.2	0.80	0.2		0.1	0.1
55-59	1	7	0.1	0.33	0.4		0.0	0.2
60-64	4	6	0.2	0.50	0.3		0.1	0.1
65-69	6	6	0.4		0.4		0.1	0.1
70-74	3	7	0.3	0.50	0.5		0.0	0.1
75-79	2	6	0.3	0.50	0.5		0.0	0.1
80-84		3	0.0		0.3			0.0
85+	1		0.3	1.00	0.0		0.0	
All ages	31	51					0.1	0.1
Mortality								
Raw			0.1	0.48	0.2			
WS			0.1	0.33	0.1			
ES			0.1		0.1			
BRD-S			0.1	0.47	0.2	0.59		
PYLL-70			0 0		2 0			
per 100,000			2.3		3.0			
ES 70			2.8		3.2			
AYLL-70			22.7		20.9			

<sup>\*</sup> See corresponding tables with multiple primaries.

Table 17

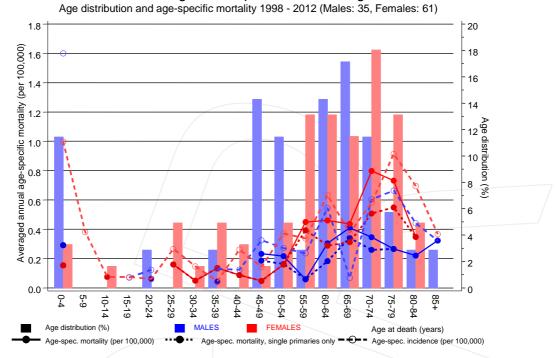
Age-specific mortality (cancer-related) and proportion of all cancers for period 1998-2012

(Single primaries only \*)

Age at			Males Age-		Females Age-		Males	Females Prop.all
death	Males	Females			spec.		cancers	cancers
Years	n	n	_ /	MI-index	-	MI-index		%
0- 4	4	2	0.3	0.18	0.2	0.17	16.0	8.7
5- 9			0.0		0.0			
10-14		1	0.0		0.1	1.00		4.2
15-19			0.0		0.0			
20-24	1		0.1	0.50	0.0		1.4	
25-29		3 /	0.0		0.2	0.60		3.1
30-34		1 <	0.0		0.0	0.33		0.6
35-39	1	3	0.0	0.33	0.1	3.00	0.3	0.7
40-44		2	0.0		0.1	0.40		0.2
45-49	4	1	0.2	0.80	0.0	0.33	0.3	0.1
50-54	3	3	0.2	0.75	0.2	0.50	0.1	0.1
55-59	1	7	0.1	0.33	0.4	1.40	0.0	0.2
60-64	3	5	0.2	0.43	0.3	0.71	0.0	0.1
65-69	5	5	0.3	5.00	0.3	1.67	0.1	0.1
70-74	3	7	0.3	0.75	0.5	1.00	0.0	0.1
75-79	2	6	0.3	0.50	0.5	0.86	0.0	0.1
80-84		3	0.0		0.3	0.60		0.0
85+	1		0.3	1.00	0.0		0.0	
All ages	28	49					0.1	0.1
Mortality								
Raw			0.1	0.46	0.2	0.62		
WS			0.1	0.31	0.1	0.41		
ES			0.1	0.39	0.1	0.52		
BRD-S			0.1	0.45	0.2	0.59		
PYLL-70								
per 100,000			2.2		2.9			
ES			2.7		3.1			
AYLL-70			24.5		21.9			

<sup>\*</sup> See corresponding tables with multiple primaries.

### C74: Malignant neoplasm of adrenal gland

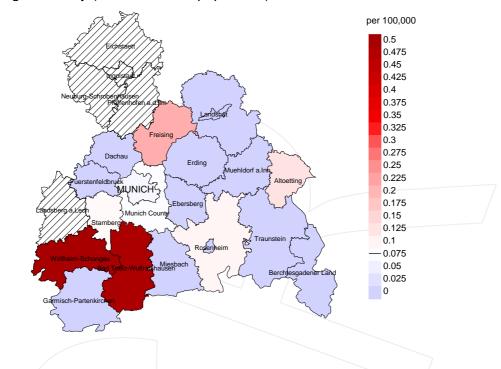


**Figure 18.** Distribution of age at death (bars) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

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



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



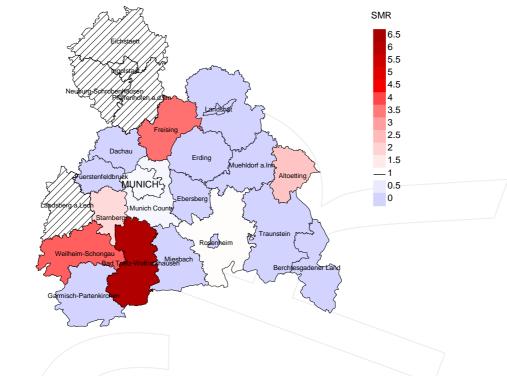
### Average mortality (world standard population) 2003 - 2008: Females



**Figure 19a.** Map of cancer mortality (world standard population) by county averaged for period 2003 to 2008. According to their individual mortality rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 0.1/100,000 WS N=15, females 0.1/100,000 WS N=24). Since cancer data are not available in some counties until 2007, the local mortality rates were not calculated, and the map tiles show as shaded.

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 63,131 female residents (averaged) in the period from 2003 to 2008 a total of 1 women died from adrenal cancer. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 0.1/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.0 and 0.6/100,000.

### 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=15, females N=24). Since cancer data are not available in some counties until 2007, the local SMR values were not calculated, and the map tiles show as shaded.

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 63,131 female residents (averaged) in the period from 2003 to 2008 a total of 1 women died from adrenal cancer. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 1.35. Though, the value of this parameter may vary with an underlying probability of 99% between 0.01 and 10.03, 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

#### **Recommended Citation**

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