# **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**

# **C81: Hodgkin lymphoma**

Year of diagnosis	1998-2011
Patients	1293
Diseases	1293
Creation date	04/02/2013
Export date	01/03/2013
Population	4.5 m



http://www.tumorregister-muenchen.de/en/facts/base/base\_C81\_\_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, April 2013

- 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 2011 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.
- <sup>###</sup> 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	84	/ 4 /	4.8	11.9	21.4	92.9
1999	65	6	9.2	18.5	33.8	92.3
2000	61	5	8.2	18.0	26.2	95.1
2001	58	3	5.2	12.1	25.9	86.2
2002	99	6	6.1	13.1	25.3	87.9
2003	109	4	3.7	7.3	19.3	90.8
2004	108	3	2.8	14.8	15.7	95.4
2005	113	3	2.7	15.0	15.9	88.5
2006	87	2	2.3	19.5	21.8	98.9
2007	107	2	1.9	11.2	17.8	78.5 ##
2008	/111	1	0.9	9.0	18.9	57.7
2009	95	3	3.2	10.5	12.6	72.6
2010	111	2	1.8	5.4	9.0	87.4
2011	85	3	3.5	11.8	12.9	61.2 ###
1998-2011	1293	47	3.6	12.3	18.9	84.1

<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	84	49	35	58.3	
1999	65	/33	32	50.8	
2000	61	/ 31	30	50.8	
2001	58	27	31	46.6	
2002	99	57	42	57.6	
2003	109	58	51	53.2	
2004	108	60	48	55.6	
2005	/113	61	52	54.0	
2006	87	52	35	59.8	
2007	107	63	44	58.9	
2008	111	59	52	53.2	
2009	95	57	38	60.0	
2010	111	66	45	59.5	
2011	85	47	38	55.3	
1998-2011	1293	720	573	55.7	

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	49	35	4.4	3.0	3.9	3.1	4.2	3.1	4.5	3.2
1999	33	32	2.9	2.7	2.5	2.6	2.7	2.6	2.9	3.0
2000	31	30	2.7	2.5	2.1	2.7	2.4	2.6	2.5	2.9
2001	27	31	2.3	2.5	2.0	2.3	2.2	2.5	2.2	2.7
2002	57	42	3.1	2.1	2.5	2.0	2.7	2.1	2.9	2.2
2003	58	51	3.1	2.6	2.6	2.8	2.9	2.7	3.1	3.0
2004	60	48	3.2	2.4	3.0	2.2	3.0	2.4	3.2	2.6
2005	61	52	3.2	2.6	3.0	2.4	3.1	2.5	3.4	2.7
2006	52	35	2.7	1.7	2.3	1.8	2.5	1.8	2.7	1.9
2007	63	44	2.8	1.9	2.6	1.7	2.7	1.8	2.9	1.9
2008	59	52	2.7	2.2	2.5	2.0	2.6	2.0	2.8	2.3
2009	57	38	2.6	1.6	2.1	1.6	2.3	1.6	2.5	1.8
2010	66	45	2.9	1.9	2.6	1.9	2.8	1.9	3.0	2.1
2011	47	38	2.1	1.6	1.9	1.5	2.0	1.5	2.2	1.7
1998-2011	720	573	2.9	2.2	2.5	2.1	2.7	2.1	2.9	2.3



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	Cases		Std.					Median		
diagnosis	n	Mean	dev.	Min.	Max.	10%	25%	50%	75%	90%
1998	84	39.7	19.4	6.1	94.0	18.2	24.8	34.9	56.3	64.0
1999	65	44.5	21.4	9.1	84.3	17.3	28.8	39.6	61.5	77.0
2000	61	41.4	19.6	6.6	85.3	20.1	27.3	35.7	57.7	69.1
2001	58	44.3	19.3	9.4	86.0	19.6	29.9	41.3	58.5	72.3
2002	99	43.2	19.1	7.5	82.6	20.8	28.1	38.9	61.0	71.2
2003	109	40.4	18.8	6.1	85.1	18.5	26.2	36.7	55.0	70.4
2004	108	40.1	17.8	11.2	85.7	21.0	26.4	36.4	52.7	66.1
2005	113	43.5	21.3	12.6	86.4	17.5	23.8	39.1	62.7	76.1
2006	87	43.6	21.4	9.2	89.9	16.9	26.5	39.9	61.8	77.7
2007	107	43.8	19.8	5.2	84.2	20.2	27.5	41.7	60.2	73.2
2008	111	43.5	22.1	5.5	87.7	17.1	23.7	39.3	61.6	76.6
2009	95	44.6	21.1	7.9	92.1	18.9	28.3	40.2	63.0	74.0
2010	111	43.9	21.5	3.2	85.5	19.2	25.5	41.7	62.6	73.8
2011	85	44.9	21.7	6.9	96.6	20.7	26.5	41.2	59.3	79.8
1998-2011	1293	42.9	20.3	3.2	96.6	19.0	26.3	38.9	59.3	73.2

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	49	41.7	19.5	6.1	94.0	19.1	30.4	36.1	56.0	64.1
1999	33	42.7	18.4	12.5	77.8	22.2	30.9	38.7	55.6	69.7
2000	31	48.4	18.6	6.6	85.3	31.8	35.7	52.0	62.1	69.2
2001	27	42.2	17.9	9.4	72.9	17.5	29.9	39.8	56.9	67.7
2002	57	44.2	17.8	11.2	76.7	24.2	31.6	38.9	62.5	70.3
2003	58	44.0	19.1	6.1	85.1	20.0	31.1	40.4	57.9	70.4
2004	60	37.0	15.1	14.3	81.7	18.8	26.9	35.6	42.9	63.0
2005	61	43.6	22.0	12.6	84.7	17.3	23.3	39.1	65.5	72.7
2006	52	46.4	19.3	9.2	81.0	19.1	34.4	46.0	61.9	74.1
2007	63	42.8	20.1	5.2	80.4	19.3	26.3	40.0	61.8	71.3
2008	59	40.4	19.7	5.5	82.2	17.1	23.3	36.1	57.3	72.0
2009	57	45.8	20.1	7.9	80.0	21.1	30.4	43.0	68.6	74.0
2010	66	44.3	21.0	3.2	85.5	19.1	26.8	42.0	58.1	73.8
2011	47	44.1	20.6	6.9	96.6	22.9	26.5	40.5	55.7	77.1
1998-2011	720	43.3	19.4	3.2	96.6	19.2	28.3	39.9	58.1	71.6

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	35	37.0	19.2	12.4	87.5	17.2	23.9	30.7	56.7	64.0
1999	32	46.3	24.3	9.1	84.3	17.3	25.9	41.7	69.3	80.8
2000	30	34.2	18.3	11.4	79.5	17.2	21.7	29.7	35.1	66.0
2001	31	46.1	20.5	11.4	86.0	20.8	28.5	45.4	61.3	74.0
2002	42	41.9	20.9	7.5	82.6	20.1	24.6	38.9	60.6	77.5
2003	51	36.4	17.6	11.9	77.4	18.4	22.6	31.7	41.8	64.2
2004	48	43.9	20.2	11.2	85.7	21.4	25.2	40.5	61.6	70.1
2005	52	43.4	20.7	15.3	86.4	18.1	26.7	39.1	58.6	77.7
2006	35	39.3	23.7	11.2	89.9	13.8	22.0	30.8	58.8	78.3
2007	44	45.3	19.5	7.3	84.2	24.9	28.4	43.3	58.9	74.7
2008	52	47.0	24.2	11.8	87.7	17.1	26.5	41.6	71.2	80.3
2009	38	42.8	22.5	13.7	92.1	17.8	24.8	35.5	59.3	76.9
2010	45	43.3	22.3	9.8	84.8	19.2	22.3	41.3	62.6	75.3
2011	38	45.9	23.2	16.7	90.5	20.4	23.1	41.8	62.4	84.0
1998-2011	573	42.5	21.4	7.3	92.1	18.3	24.7	36.1	60.2	76.1

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Age at									
diagnosis	Cases			Males			Females		
Years	n	%	Cum.%	n	96	Cum.%	n	%	Cum.%
0 - 4	2	0.2	0.2	2	0.3	0.3			0.0
5-9	18	1.4	1.5	14	1.9	2.2	4	0.7	0.7
10-14	35	2.7	4.3	18	2.5	4.7	17	3.0	3.7
15-19	96	7.4	11.7	44	6.1	10.8	52	9.1	12.7
20-24	135	10.4	22.1	60	8.3	19.2	75	13.1	25.8
25-29	131	10.1	32.3	62	8.6	27.8	69	12.0	37.9
30-34	130	10.1	42.3	73	10.1	37.9	57	9.9	47.8
35-39	123	9.5	51.8	90	12.5	50.4	33	5.8	53.6
40-44	105	8.1	59.9	59	8.2	58.6	46	8.0	61.6
45-49	65	5.0	65.0	41	5.7	64.3	24	4.2	65.8
50-54	65	5.0	70.0	47	6.5	70.8	18	3.1	68.9
55-59	74	5.7	75.7	42	5.8	76.7	32	5.6	74.5
60-64	73	5.6	81.4	39	5.4	82.1	34	5.9	80.5
65-69	65	5.0	86.4	42	5.8	87.9	23	4.0	84.5
70-74	68	5.3	91.6	42	5.8	93.8	26	4.5	89.0
75-79	58	4.5	96.1	26	3.6	97.4	32	5.6	94.6
80-84	33	2.6	98.7	13	1.8	99.2	20	3.5	98.1
85+	17	1.3	100.0	6	0.8	100.0	11	1.9	100.0
All ages	1293	100.0		720	100.0		573	100.0	

Included in the statistics are 14.7% multiple primaries in males and 14.1% in females.

Table 5

Age-specific incidence, DCO rate and proportion of all cancers for period 1998-2011

Age at diagnosis Years	Males n	Females n	Age- spec.	Females Age- spec. incid.		Females DCO rate n=23 %	cancers	Females Prop.all cancers n=129521
0- 4	2		0.2	0.0			0.7	
5- 9	14	4	1.1	0.3			9.1	3.8
10-14	18	17	1.4	1.4			13.5	11.2
15-19	44	52	3.4	4.2			15.1	21.7
20-24	60	75	4.1	5.0		2.7	11.8	17.2
25-29	62	69	3.7	4.0			7.7	7.5
30-34	73	57	3.7	3.0			5.6	3.3
35-39	90	33	4.1	1.6			4.6	1.0
40 - 44	59	46	2.6	2.2		2.2	2.1	0.9
45-49	41	24	2.1	1.3	4.9	4.2	0.9	0.3
50-54	47	18	2.8	1.0		11.1	0.6	0.2
55-59	42	32	2.7	2.0		3.1	0.3	0.3
60-64	39	34	2.6	2.1	7.7	5.9	0.2	0.2
65-69	42	23	3.1	1.5	9.5	4.3	0.2	0.1
70-74	42	26	4.1	2.1	14.3		0.2	0.2
75-79	26	32	3.8	3.2	3.8	18.8	0.2	0.2
80-84	13	20	3.2	2.5		25.0	0.1	0.1
85+	6	11	2.2	1.5	50.0	18.2	0.1	0.1
All ages	720	573			3.3	4.0	0.5	0.4
Incidence								
Raw			2.9	2.2				
WS			2.5	2.1				
ES			2.7	2.1				
BRD-S			2.9	2.3				

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).

Table 6a

Standardized incidence ratio (SIR, with 95% confidence limits), excess absolute risk (EAR) and DCO rate of second primaries for period 1998-2011

MALES

	Observed :	Expected	LCL	UCL		DCO	
Diagnosis	n/	n	SIR	95%	95%	EAR	%
C16 Stomach	/ 2	0.5	4.1	0.5	15.0	6.0	50.0
C18 Colon	2 /	1.1	1.8	0.2	6.4	3.5	
C19-C20 Rectum	2	0.7	2.7	0.3	9.9	5.0	
C25 Pancreas	2	0.4	5.0	0.6	17.9	6.3	50.0
C33-C34 Lung	/ 10 /	1.5	6.8	3.3	12.5 #	33.6	
C43 Malign. melanoma/	2/	0.6	3.1	0.4	11.2	5.3	
C60 Penis	2	0.0	72.5	8.8	262.0 #	7.8	
C61 Prostate	8	3.3	2.4	/1.1	4.8 #	18.6	
C82-C85 NHL	9	0.5	17.1	7.8	32.5 #	33.4	
C91-C96 Leukaemia	4	0.2	19.2	5.2	49.1 #	14.9	
Other primaries	3	0.4	7.0	1.5	20.6 #	10.1	
Not observed	0	3.6	0.0	0.0	1.0	-14.0	
All mult. primaries	46	12.9	3.6	2.6	4.8 #	130.5	4.3

Patients	523
Mean age at second malignancy (years)	58.7
Person-years	2540
Mean observation time (years)	4.9
Median observation time (years)	4.2

# The occurrence of second malignancy is statistically significant.

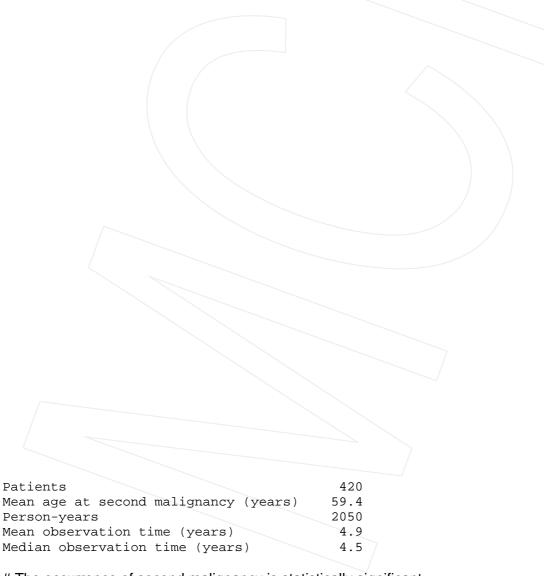
Observed second primaries with count 1 are pooled in category "Other primaries".

Table 6b

Standardized incidence ratio (SIR, with 95% confidence limits), excess absolute risk (EAR) and DCO rate of second primaries for period 1998-2011

FEMALES

	Observed	Expected		LCL	UCL		DCO
Diagnosis	n	n	SIR	95%	95%	EAR	%
C33-C34 Lung	2	0.5	4.2	0.5	15.1	7.4	
C50 Breast	3 /	2.6	1.1	0.2	3.3	1.8	
C82-C85 NHL	11 /	0.3	42.8	21.4	76.6 #	52.4	
C91-C96 Leukaemia	2	0.1	17.8	2.2	64.2 #	9.2	
Other primaries	6	1.5	3.9	1.4	8.5 #	21.8	
Not observed	0	2.6	0.0	0.0	1.4	-12.9	
All mult. primaries	24	7.7	3.1	2.0	4.7 #	79.7	



# The occurrence of second malignancy is statistically significant.

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

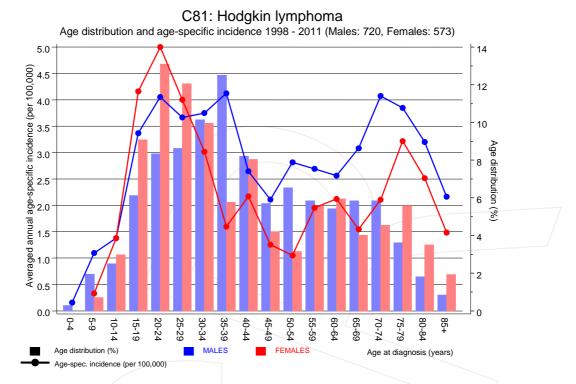
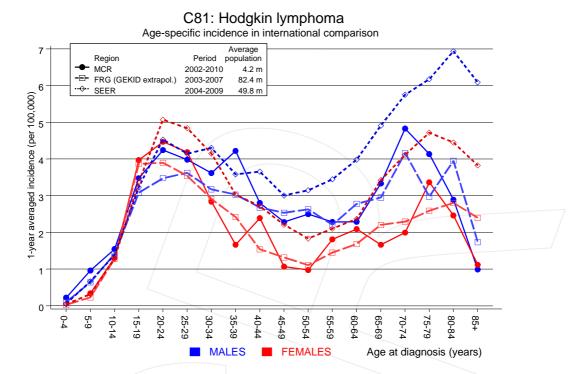


Figure 7. Age distribution and age-specific incidence





**Figure 7a.** Age-specific incidence in MCR registry areas compared to 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.

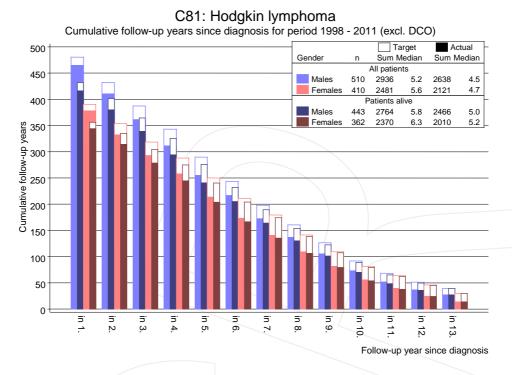
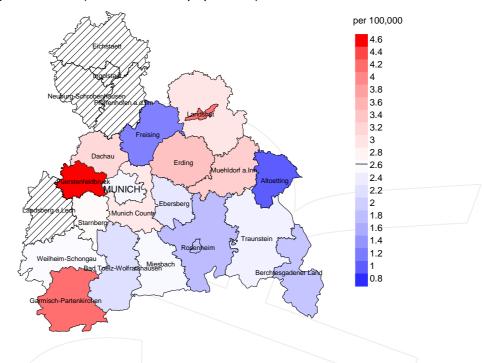


Figure 8. Cumulative follow-up years depending on time since diagnosis

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: Males



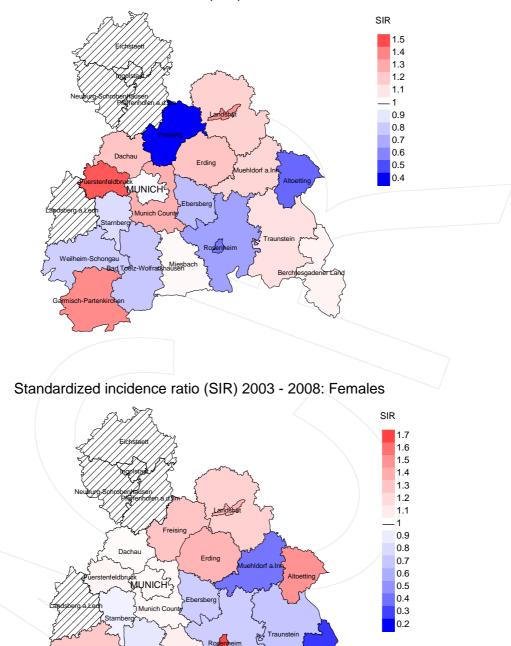
## Average incidence (world standard population) 2003 - 2008: Females



**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 2.6/100,000 WS N=334, females 2.1/100,000 WS N=266). 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 6 women were identified with newly diagnosed hodgkin lymphoma. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 1.4/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.2 and 4.6/100,000.

#### 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=334, females N=266). 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 6 women were identified with newly diagnosed hodgkin lymphoma. Therefore, the mean standardized incidence ratio (SIR) for this cancer type in this area can be calculated at 0.74. Though, the value of this parameter may vary with an underlying probability of 99% between 0.19 and 1.93, 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	84	92.9	4.8	18	21.4	100.0
1999	65	92.3	9.2	22	33.8	100.0
2000	61	95.1	8.2	16	26.2	93.8
2001	58	86.2	5.2	15	25.9	93.3
2002	99	87.9	6.1	25	25.3	96.0
2003	109	90.8	3.7	21	19.3	95.2
2004	108	95.4	2.8	17	15.7	94.1
2005	113	88.5	2.7	18	15.9	100.0
2006	87	98.9	2.3	19	21.8	100.0
2007	107	78.5	1.9	19	17.8	94.7
2008	111	57.7	0.9	21	18.9	100.0
2009	95	72.6	3.2	12	12.6	100.0
2010	111	87.4	1.8	10	9.0	100.0
2011	85	61.2	3.5	11	12.9	100.0
1998-2011	1293	84.1	3.6	244	18.9	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)

			Prop.		<b>.</b>
			deaths		Prop.
Year of	Incident		with death	Deaths in	deaths in
diagnosis/	cases	Deaths	certific.	same year	same year
death	n	n	%	n	%
1998	84	23	82.6	4	4.8
1999	65	28	92.9	8	12.3
2000	61	22	100.0	8	13.1
2001	58	18	94.4	4	6.9
2002	99	36	100.0	8	8.1
2003	109	34	97.1	5	4.6
2004	108	33	97.0	5	4.6
2005	113	36	94.4	8	7.1
2006	87	28	100.0	5	5.7
2007	107	39	94.9	7	6.5
2008	111	45	97.8	8	7.2
2009	95	37	100.0	6	6.3
2010	/ 111 /	46	95.7	7	6.3
2011	85	45	97.8	7	8.2
1998-2011	1293	470	96.4	90	7.0

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	%	%	%	
1998	23	56.5	43.5	89.5	
1999	28	67.9	32.1	88.5	
2000	22	54.5	45.5	90.9	
2001	18	55.6	44.4	70.6	
2002	36	69.4	30.6	86.1	
2003	34	55.9	44.1	87.9	
2004	33	72.7	27.3	81.3	
2005	36	80.6	19.4	91.2	
2006	28	64.3	35.7	82.1	
2007	39	59.0	41.0	78.4	
2008	45	66.7	33.3	81.8	
2009	37	81.1	18.9	94.6	
2010	46	69.6	30.4	93.2	
2011	45	68.9	31.1	79.5	
1998-2011	470	67.0	33.0	85.7	

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

					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	11	47.5	40.2	56.4	51.3
1999	13	59.0	57.0	65.5	60.4
2000	13	61.1	53.7	65.8	61.1
2001	10	60.6	69.3	54.8	61.0
2002	20	63.2	66.0	58.1	65.8
2003	23	62.4	60.3	65.0	62.9
2004	16	62.3	59.1	69.3	64.7
2005	18	64.5	65.7	61.5	65.3
2006	17	66.2	63.3	71.4	66.0
2007	21	64.9	62.9	67.6	60.5
2008	23	60.7	59.9	62.1	60.4
2009	20	64.3	63.0	67.9	64.3
2010	29	64.9	65.1	64.6	65.7
2011	32	67.3	69.4	62.7	69.2
1998-2011	266	63.0	62.5	63.8	63.7

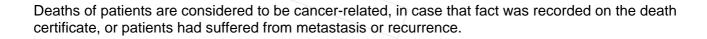


Table 11b Means of age at death according to the grouping in Table 10 FEMALES

					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	12	51.0	46.4	57.5	58.4
1999	15	55.0	44.5	70.7	52.3
2000	9	49.3	49.1	50.3	49.5
2001	8	78.4	76.6	83.9	78.6
2002	16	62.9	57.8	78.3	62.3
2003	11	52.0	49.8	54.6	54.5
2004	17	69.0	67.4	74.4	67.4
2005	18	68.9	67.9	76.5	68.9
2006	11	73.2	69.3	80.1	70.2
2007	18	69.4	71.0	67.1	70.0
2008	22	60.2	56.6	67.9	59.3
2009	17	67.3	66.7	71.6	66.3
2010	17/	68.5	67.2	72.5	67.8
2011	1,3	61.6	61.0	63.1	61.0
1998-2011	204	63.7	61.8	68.4	63.4



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	6	0.5	0.12	0.5	0.12	0.5	0.12	0.6	0.12
1999	10	0.9	0.30	0.6	0.26	0.8	0.30	0.9	0.31
2000	5	0.4	0.16	0.3	0.17	0.4	0.17	0.5	0.20
2001	4	0.3	0.15	0.2	0.09	0.3	0.14	0.5	0.21
2002	13	0.7	0.23	0.4	0.17	0.6	0.22	0.7	0.25
2003	13	0.7	0,22	0.4	0.16	0.6	0.20	0.7	0.24
2004	11	0.6	0.18	0.3	0.11	0.5	0.16	0.6	0.19
2005	13	0.7	0.21	0.4	0.13	0.5	0.17	0.7	0.20
2006	11	0.6	0.21	0.3	0.15	0.5	0.19	0.6	0.21
2007	12	0.5	0.19	0.3	0.12	0.4	0.16	0.5	0.17
2008	15	0.7	0.25	0.4	0.16	0.6	0.21	0.6	0.21
2009	15	0.7	0.26	0.4	0.17	0.5	0.22	0.6	0.25
2010	19	0.8	0.29	0.4	0.16	0.6	0.22	0.8	0.28
2011	22	1.0	0.47	0.5	0.25	0.7	0.34	1.0	0.43
1998-2011	169	0.7	0.23	0.4	0.16	0.6	0.20	0.7	0.24

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	7	0.6	0.20	0.6	0.18	0.6	0.19	0.7	0.21
1999	9	0.8	0.28	0.6	0.23	0.7	0.27	0.8	0.26
2000	7	0.6	0.23	0.5	0.18	0.6	0.21	0.6	0.21
2001	6	0.5	0.19	0.2	0.07	0.3	0.11	0.4	0.16
2002	12	0.6	0.29	0.4	0.19	0.5	0.23	0.6	0.27
2003	6	0.3	0.12	0.2	0.08	0.3	0.10	0.3	0.11
2004	13	0.7	0.27	0.3	0.14	0.5	0.20	0.6	0.22
2005	16	0.8	0.31	0.4	0.16	0.5	0.21	0.7	0.25
2006	7	0.3	0.20	0.1	0.08	0.2	0.11	0.3	0.16
2007	11	0.5	0.25	0.2	0.12	0.3	0.16	0.4	0.20
2008	15	0.6	0.29	0.4	0.22	0.5	0.25	0.6	0.26
2009	15	0.6	0.39	0.3	0.21	0.4	0.27	0.5	0.30
2010	13	0.6	0.29	0.2	0.13	0.3	0.18	0.4	0.20
2011	9	0.4	0.24	0.2	0.15	0.3	0.18	0.3	0.18
1998-2011	146	0.6	0.25	0.3	0.15	0.4	0.19	0.5	0.21

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Table 13

Age distribution of age at death (cancer-related) for period 1998-2011 (incl. multiple primaries)

Age at								
death	Cases		Males			Females		
Years	n	% Cum.%	n	%	Cum.%	n	8	Cum.%
15-19	3	1.0 1.0			0.0	3	2.1	2.1
20-24	7	2.2 3.2	2	1.2	1.2	5	3.4	5.5
25-29	9	2.9 6.0	/ 5	3.0	4.1	4	2.7	8.2
30-34	11	3.5 9.5	4	2.4	6.5	7	4.8	13.0
35-39	14	4.4 14.0	5	3.0	9.5	9	6.2	19.2
40 - 44	16	5.1 /19.0	10	5.9	15.4	6	4.1	23.3
45-49	31	9.8 28.9	19	11.2	26.6	12	8.2	31.5
50-54	18	5.7 34.6	12	7.1	33.7/	6	4.1	35.6
55-59	18	5.7 40.3	13	7.7	41.4	5	3.4	39.0
60-64	20	6.3 46.7	13	7.7	49.1	7	4.8	43.8
65-69	36	11.4 58.1	19	11.2	60.4	17	11.6	55.5
70-74	40	12.7 70.8	24	14.2	74.6	16	11.0	66.4
75-79	39	12.4 83.2	19	11.2	85.8	20	13.7	80.1
80-84	35	11.1 94.3	16	9.5	95.3	19	13.0	93.2
85+	18	5.7 100.0	8	4.7	100.0	10	6.8	100.0
All ages	315	100.0	169	100.0		146	100.0	

Included in the statistics are 14.7% multiple primaries in males and 14.1% in females.

Table 14

Age-specific mortality (cancer-related) and proportion of all cancers for period 1998-2011 (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			0.0		0.0			
5- 9			0.0		0.0			
10-14			0,0		0.0			
15-19		3	0.0		0.2	0.06		10.3
20-24	2	5	0.1		0.3	0.07	2.5	11.6
25-29	5	4	0.3		0.2	0.06	5.7	3.9
30-34	4	7 <	0.2		0.4	0.12	2.4	3.4
35-39	5	9	0.2	0.06	0.4	0.27	1.4	2.0
40-44	10	6	0.4	0.17	0.3	0.13	1.3	0.6
45-49	19	12	1.0	0.46	0.6	0.50	1.2	0.7
50-54	12	6	0.7	0.26	0.3	0.33	0.4	0.2
55-59	13	5	0.8	0.31	0.3	0.16	0.3	0.1
60-64	13	7	0.9	0.33	0.4	0.21	0.2	0.1
65-69	19	17	1.4	0.45	1.1	0.74	0.2	0.2
70-74	24	16	2.3	0.57	1.3	0.62	0.2	0.2
75-79	19	20	2.8	0.73	2.0	0.63	0.2	0.2
80-84	16	19	3.9	1.23	2.4	0.95	0.2	0.2
85+	8	10	2.9	1.33	1.3	0.91	0.1	0.1
All ages	169	146					0.3	0.2
Mortality								
Raw			0.7	0.23	0.6	0.25		
WS			0.4	0.16	0.3	0.15		
ES			0.6	0.20	0.4	0.19		
BRD-S			0.7	0.24	0.5	0.21		
PYLL-70								
per 100,000			8.1		8.1			
ES			7.3		7.6			
AYLL-70			18.0		22.4			

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

				_	Syn- chron	Syn- chron		
	Total	Total	Pre	Pre	±30d	±30d	Post	Post
Diagnosis	n /	%↓	n	<b>←%</b>	n	<b>←</b> %	n	-%
C03-C06 Oral cavity	2	1.6	1	50.0			1	50.0
C09-C10 Oropharynx	2	1.6	_	30.0			2	100.0
C11 Nasopharynx	2	1.6	2	100.0			2	100.0
C12-C13 Hypopharynx	2	1.6	2	100.0			2	100.0
C15 Oesophagus	6	4.7					6	100.0
C16 Stomach	6	4.7					6	100.0
C17 Small intestine	1	0.8			1	100.0	U	100.0
C18 Colon	3	2.3			/ -	100.0	3	100.0
C19-C20 Rectum	4	3.1	1	25.0			3	75.0
C22 Liver	1	0.8	_	7 23.0			1	100.0
C23-C24 Bile	1	0.8					1	100.0
C25 Pancreas	3	2.3					3	100.0
C33-C34 Lung	30	23.3			1	3.3	29	96.7
C38,C45 Mesothelioma	1	0.8				3.5	1	100.0
C40-C41 Bone	1	0.8					71	100.0
C43 Malign. melanoma	3	2.3	1	33.3			2	66.7
C44 Skin others	3 7	5.4	2	28.6			5	71.4
C46,C49 Soft tissue	1	0.8	2	20.0			1	100.0
C61 Prostate	11	8.5	3	27.3	1	9.1	7	63.6
C64 Kidney	3	2.3	J	27.5		7.1	3	100.0
C67 Bladder	3	2.3	2	66.7			1	33.3
C69 Eye lymphoma	1	0.8	2	00.7			1	100.0
C70-C72 CNS cancer	2	1.6					2	100.0
C73 Thyroid	1	0.8					1	100.0
C76-C79 CUP	3	2.3					3	100.0
C82-C85 NHL	23	17.8	9	39.1	2	8.7	12	52.2
C90 Mult. myeloma	2	1.6	2	100.0		0.7	12	22.2
C91-C96 Leukaemia	4	3.1	2	100.0	1	25.0	3	75.0
C)1 C)0 Deuxaemia	ı	3.1				23.0	3	73.0
All mult. primaries	129	100.0	23	17.8	6	4.7	100	77.5
-								

Multiple primaries with number of cases n<1 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  $\label{eq:multiple primaries in deaths in period 1998-2011 }$  FEMALES

	Total	Total	Pre	Pre	Syn- chron ±30d	Syn- chron ±30d	Post	Post
Diagnosis	n	%↓	n	<b>←%</b>	n	<b>←</b> %	n	<b>←</b> %
C16 Stomach	1	1.2					1	100.0
C18 Colon	5	6.0			\ 1	20.0	4	80.0
C19-C20 Rectum	2	2.4	1	50.0	\ _	20.0	1	50.0
C21 Anus/canal	/ 1	1.2	_	30.0			1	100.0
C25 Pancreas	3	3.6					3	100.0
C33-C34 Lung	8	9.6			1	12.5	7	87.5
C38,C45 Mesothelioma	/ 1	1.2					1	100.0
C40-C41 Bone	1	1.2					1	100.0
C43 Malign. melanoma	2	2.4					2	100.0
C44 Skin others	7	8.4			1	14.3	6	85.7
C48 Peritoneal	1	1.2					1	100.0
C50 Breast	22	26.5	10	45.5	1	4.5	11	50.0
C51 Vulva	2	2.4					2	100.0
C53 Cervix uteri	1	1.2					1	100.0
C54 Corpus uteri	1	1.2					1	100.0
C56 Ovary	1	1.2					/1	100.0
C64 Kidney	1	1.2					1	100.0
C70-C72 CNS cancer	2	2.4	1	50.0			1	50.0
C73 Thyroid	1	1.2					1	100.0
C76-C79 CUP	1	1.2					1	100.0
C82-C85 NHL	11	13.3	2	18.2			9	81.8
C90 Mult. myeloma	1	1.2					1	100.0
C91-C96 Leukaemia	7	8.4			1	14.3	6	85.7
All mult. primaries	83	100.0	14	16.9	5 /	6.0	64	77.1

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 1998-2011

(Singular primaries only \*)

Age at			Males Age-		Females Age-		Males Prop.all	Females Prop.all
death	Males	Females	spec.		spec.		cancers	cancers
Years	n	n	mortal.	MI-index	mortal.	MI-index	%	%
0 - 4			0.0		0.0			
5- 9			0.0		0.0			
10-14			0.0		0.0			
15-19		3	0.0		0.2	0.06		11.1
20-24	2	5	0.1	0.03	0.3	0.07	2.7	12.8
25-29	5	3	0.3	0.08	0.2	0.04	6.2	3.1
30-34	4	5 <	0.2		0.3	0.09	2.4	2.8
35-39	5	9	0.2	0.06	0.4	0.29	1.5	2.2
40-44	10	5	0.4	0.18	0.2	0.12	1.4	0.6
45-49	16	12	0.8	0.41	0.6	0.55	1.1	0.8
50-54	11	6	0.7		0.3	0.35	0.4	0.3
55-59	12	5	0.8		0.3		0.3	0.1
60-64	9	7	0.6	0.28	0.4	0.25	0.1	0.2
65-69	15	15	1.1	0.47	1.0	0.75	0.2	0.3
70-74	21	15	2.0	0.60	1.2	0.63	0.2	0.2
75-79	14	1/7	2.1	0.78	1.7	0.68	0.2	0.2
80-84	11	17	2.7	1.10	2.1	1.06	0.2	0.2
85+	6	6	2.2	2.00	0.8	0.86	0.1	0.1
All ages	141	130					0.3	0.3
Mortality								
Raw			0.6	0.21	0.5	0.25		
WS			0.3	0.14	0.3	0.15		
ES			0.5		0.4	0.18		
BRD-S			0.6	0.21	0.4	0.20		
PYLL-70								
per 100,000			7.5		7.4			
ES			6.7		7.0			
AYLL-70			19.1		22.2			

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

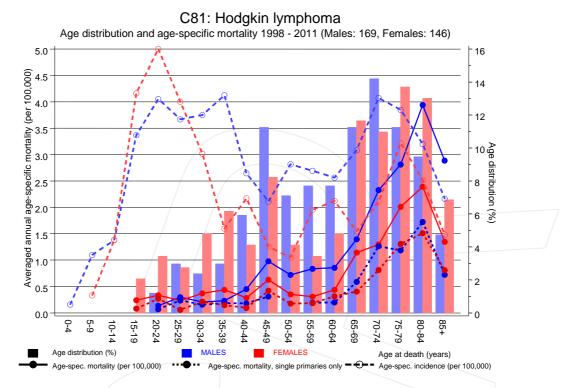
Table 17

Age-specific mortality (cancer-related) and proportion of all cancers for period 1998-2011

(Single primaries only \*)

Age at death Years	Males n	Females	Males Age- spec. mortal.	MI-index	Females Age- spec. mortal.	MI-index	cancers	Females Prop.all cancers
0 4								
0 - 4			0.0		0.0			
5- 9			0.0		0.0			
10-14		-1	0.0		0.0	0.00		4 2
15-19	-1	1	0.0	0 00	0.1	0.02	1 4	4.3
20-24	1	4	0.1		0.3	0.05	1.4	11.1
25-29	4	1	0.2		0.1	0.02	5.3	1.1
30-34	3	4	0.2		0.2	0.08	1.9	2.5
35-39	4	3	0.2		0.1	0.10	1.2	0.8
40-44	4	2	0.2		0.1	0.05	0.6	0.3
45-49	6	8	0.3		0.4		0.5	0.6
50-54	2	3	0.0		0.2	0.18	0 1	0.2
55-59	3	3	0.2		0.2		0.1	0.1
60-64	3	5 6	0.2		0.3	0.22	0.1	0.1
65-69	8		0.6		0.4	0.30	0.1	0.1
70-74	13	10	1.3		0.8	0.45	0.2	0.2
75-79	8	13	1.2		1.3	0.52	0.1	0.2
80-84	7	12	1.7		1.5	0.80	0.1	0.2
85+	2	6	0.7	0.67	0.8	0.86	0.0	0.1
All ages	66	81					0.1	0.2
Mortality								
Raw			0.3		0.3			
WS			0.2		0.2	0.09		
ES			0.2		0.2	0.11		
BRD-S			0.3	0.11	0.3	0.13		
PYLL-70								
per 100,000			3.5		4.0			
ES			3.1		3.9			
AYLL-70			21.8		22.8			

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



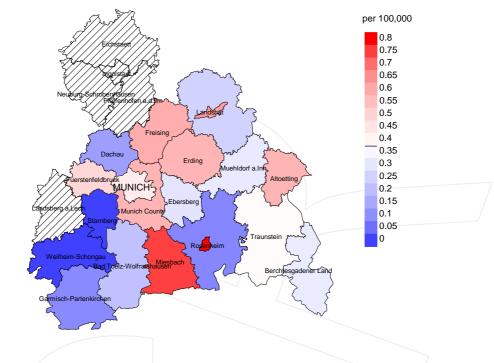
**Figure 18.** Distribution of age at death (bars) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

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

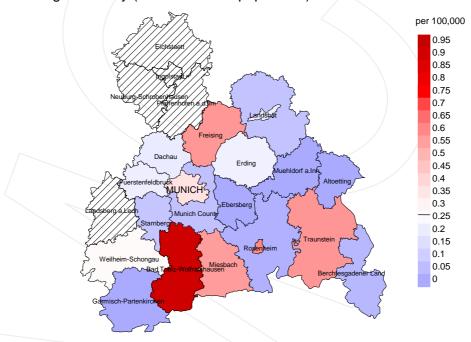


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## Average mortality (world standard population) 2003 - 2008: Males



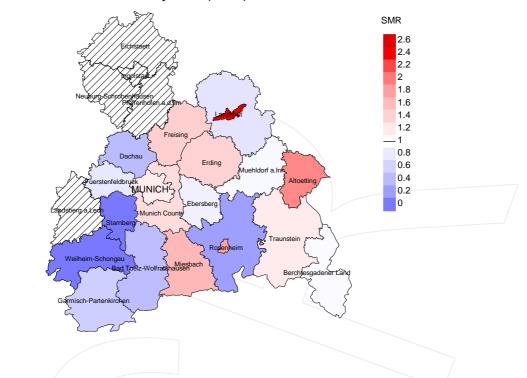
## Average mortality (world standard population) 2003 - 2008: Females



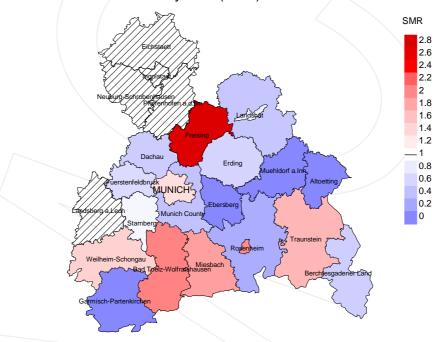
**Figure 19a.** Map of cancer mortality (world standard population) by county averaged for period 2003 to 2008. According to their individual mortality rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 0.4/100,000 WS N=73, females 0.3/100,000 WS N=63). 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 0 women died from hodgkin lymphoma. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 0.0/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.0 and 1.4/100,000.

#### 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=73, females N=63). 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 0 women died from hodgkin lymphoma. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 0.00. Though, the value of this parameter may vary with an underlying probability of 99% between 0.00 and 2.86, 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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