Munich Cancer Registry



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ICD-10 C69: Eye cancer

Incidence and Mortality

Year of diagnosis	1998-2014
Patients	524
Diseases	525
Creation date	04/13/2016
Export date	12/23/2015
Population	4.64 m



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

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

http://www.tumorregister-muenchen.de/en/facts/base/bC69__E-ICD-10-C69-Eye-cancer-incidence-and-mortality.pdf

Global Statements about the statistics on the Internet – Baseline Statistics (grey button ——), Survival (red button ——)

In these analyses, the clinics and physicians of Upper Bavaria and the city and county of Landshut[#], with a total of 4.64 million inhabitants, account for the frequency of cancer diseases^{##} and the achieved long term results. Additionally, the long term survival evaluated by the Munich Cancer Registry (MCR) is compared with the results of the population-based registry in the USA (SEER), which is useful for checking the consistency of the data on an international level.

In comparing several tables, inconsistent figures may be detected. This is based on the fact that different patient cohorts are included in the base calculation, for example when proportions of multiple tumors or DCO-cases**** are concerned. In other cases the individual tumor diagnosis is the basis for calculation, for example with incidence.

The foot notes describe the currentness of the data. The baseline statistics and survival data are updated annually. This yearly analysis comprises the Annual Report of the MCR.

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 2016

- 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).
- 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.

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

Code	Description
C69	Malignant neoplasm of eye and adnexa
C69.0	Conjunctiva
C69.1	Cornea
C69.2	Retina
C69.3	Choroid
C69.4	Ciliary body
C69.5	Lacrimal gland and duct
C69.6	Orbit
C69.8	Overlapping lesion of eye and adnexa
C69.9	Eye, unspecified

DCO (death certificate only) identifies a cancer case that first becomes available to the MCR through the death certificate.

INCIDENCE

Table 1

All patients with invasive cancer by year of diagnosis, proportions of DCO, multiple primaries, deaths, and active follow-up (incl. DCO)

				Prop.			
		/DCO	Prop.	mult.	Prop.	actively	
Year of	Cases	cases	DCO	primaries	deaths	followed	
diagnosis	n	n	%	%	%	90	
1998	22			13.6	63.6	90.9	
1999	23			21.7	43.5	95.7	
2000	26			46.2	80.8	96.2	
2001	13			46.2	84.6	92.3	
2002	35			28.6	48.6	82.9 #	
2003	39			30.8	41.0	79.5	
2004	49			28.6	59.2	81.6	
2005	55	1	1.8	21.8	56.4	90.9	
2006	43			32.6	41.9	76.7	
2007	47			25.5	66.0	74.5 #	
2008	42			26.2	52.4	73.8	
2009	32			31.3	43.8	71.9	
2010	30			33.3	46.7	73.3	
2011	28			25.0	50.0	71.4	
2012	15			13.3	40.0	80.0	
2013	18			11.1	22.2	100.0	
2014	8			50.0	12.5	100.0 ##	
1998-2014	525	1	0.2	27.8	52.0	82.1	

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

^{##} Please be aware that data of recent annual patient cohorts may not yet be fully processed. The years under evaluation can be found in the respective headings.

Table 1a

All patients with invasive cancer by year of diagnosis and gender (incl. DCO)

Year of	All	Males	Females	Prop. males
diagnosis	n /	n	n	ଚ
1998	22	9	13	40.9
1999	/23	/ 11	12 /	47.8
2000	26	14	12/	53.8
2001	/ 13	6	7	46.2
2002	35	24	1/1	68.6
2003	39	14	25	35.9
2004	49	23	26	46.9
2005	55	22	33	40.0
2006	43	18	25	41.9
2007	47	25	22	53.2
2008	42	24	18	57.1
2009	32	14	18	43.8
2010	30	17	13	56.7
2011	28	14	14	50.0
2012	15	10	5	66.7
2013	18	11	7	61.1
2014	8	4	4	50.0
1998-2014	525	260	265	49.5

Table 2

Incidence measures by year of diagnosis including DCO cases (with respect to registry area expansion from 2.51 to 3.96 m as of 2002, and from 3.96 to 4.64 m as of 2007, respectively)

			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	9	13	0.8	1.1	0.6	0.7	0.8	0.8	1.1	0.9
1999	11	12	1.0	1.0	0.7	0.5	0.9	0.8	0.9	0.9
2000	14	12 /	1.2	1.0	0.7	0.6	1.1	0.8	1.5	0.9
2001	6	7 <	0.5	0.6	0.3	0.3	0.5	0.4	0.5	0.5
2002	24	11	1.3	0.6	1.0	0.4	1.2	0.5	1.3	0.5
2003	14	25	0.7	1.3	0.6	1.0	0.7	1.1	0.7	1.2
2004	23	26	1.2	1.3	0.8	1.0	1.0	1.2	1.2	1.2
2005	22	33	1.2	1.7	0.8	0.8	1.1	1.1	1.2	1.3
2006	18	25	0.9	1.2	0.6	0.7	0.8	0.9	0.9	1.0
2007	25	22	1.1	1.0	0.7	0.5	0.9	0.7	1.2	0.8
2008	24	18	1.1	0.8	0.6	0.3	0.9	0.5	1.1	0.6
2009	14	18	0.6	0.8	0.4	0.5	0.5	0.6	0.6	0.7
2010	17/	13	0.8	0.6	0.5	0.5	0.6	0.5	0.7	0.5
2011	14	14	0.6	0.6	0.3	0.5	0.4	0.6	0.6	0.5
2012	10	5	0.4	0.2	0.3	0.2	0.3	0.2	0.4	0.2
2013	11	7	0.5	0.3	0.4	0.2	0.4	0.3	0.4	0.2
2014	4	\4	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.2
1998-2014	260	265	0.8	0.8	0.5	0.5	0.7	0.6	0.8	0.7

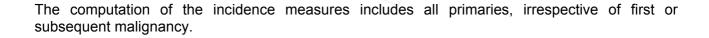


Table 3

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

Year of	Cases		Std.					Median		
diagnosis	n	Mean	dev.	Min.	Max.	10%	25%	50%	75%	90%
1998	22	58.5	24.8	0.5	89.9	31.1	41.2	63.7	77.0	82.2
1999	23	60.6	10.9	31.8	81.1	50.4	54.7	60.5	66.9	75.1
2000	26	66.0	15.6	27.5	88.6	40.9	55.8	70.9	76.2	84.2
2001	13	66.3	11.7	39.8	83.3	53.7	59.9	69.8	71.9	80.8
2002	35	56.6	21.8	0.2	90.9	16,7	47.8	62.0	71.9	75.0
2003	39	54.7	21.6	0.2	81.2	8.2	47.5	60.6	69.1	77.3
2004	49	60.5	20.0	1.5	86.8	35.3	57.6	64.3	72.5	80.6
2005	55	65.3	19.3	0.3	91.9	39.3	56.5	70.6	80.6	83.8
2006	43	64.8	16.4	7.3	94.2	48.2	55.1	65.6	74.3	85.2
2007	47	65.6	17.4	0.2	96.8	43.1	53.2	69.4	78.7	83.7
2008	42	67.8	14.9	28.8	89.6	44.0	60.4	69.7	79.3	83.4
2009	32	59.5	21.0	1.0	86.4	38.6	48.3	63.7	74.7	82.2
2010	30	58.4	24.6	0.2	86.4	17.4	43.8	68.3	74.5	83.6
2011	28	63.9	21.6	0.4	97.2	44.4	56.2	66.3	77.5	84.0
2012	15/	61.8	27.3	1.1	84.2	2.6	46.2	72.9	82.6	83.8
2013	18	54.4	26.8	0.7	89.7	1.1	43.7	62.9	72.0	77.8
2014	8	67.1	16.0	33.0	84.3	33.0	61.9	71.5	76.2	84.3
1998-2014	525	62.0	19.9	0.2	97.2	38.6	54.1	65.6	75.0	82.5

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	9	60.5	25.8	0.5	82.2	0.5	54.9	70.5	75.3	82.2
1999	11	60.0	7.5	46.5	68.4	50.4	51.6	61.0	66.9	67.1
2000	14	67.9	14.4	39.0	88.6	40.9	61.1	72.5	76.2	80.4
2001	6	60.8	12.4	39.8	71.7	39.8	53.7	64.9	69.9	71.7
2002	24	56.3	21.8	0.2	81.6	16.7	53.0	62.0	69.8	74.0
2003 —	14	55.8	18.3	0.6	76.6	44.1	53.0	59.5	65.4	71.4
2004	23	64.0	20.1	2.0	81.8	58.8	61.0	66.9	78.0	80.6
2005	22	61.8	23.2	0.3	89.7	34.3	55.8	68.1	74.8	82.3
2006	18	62.8	10.5	40.8	81.8	49.6	55.1	64.4	68.2	79.2
2007	25	64.5	19.2	0.2	86.7	42.0	54.3	70.2	78.5	81.3
2008	24	65.2	17.1	28.8	89.6	35.7	55.7	69.3	77.5	84.7
2009	14	63.2	21.0	1.1	82.2	38.6	61.2	68.0	74.7	80.3
2010	17	63.3	22.9	0.4	86.4	28.4	62.7	71.0	72.4	84.2
2011	14	71.7	11.0	55.1	88.5	56.2	63.7	69.5	83.6	84.0
2012	10	63.7	24.9	1.1	82.9	23.1	62.2	72.6	80.7	82.8
2013	11	50.4	26.3	0.7	77.8	13.8	24.6	60.8	71.4	72.0
2014	4	73.5	8.0	66.8	84.3	66.8	67.5	71.5	79.6	84.3
1998-2014	260	62.5	19.3	0.2	89.7	39.8	56.0	66.7	74.6	81.5

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	13	57.1	25.1	5.4	89.9	31.1	38.1	60.5	77.0	85.4
1999	12	61.1	13.5	31.8	81.1	52.1	55.0	59.4	70.5	80.2
2000	12	63.7	17.2	27.5	86.8	49.0	52.8	63.2	77.7	84.2
2001	7	70.9	9.5	57.5	83.3	57.5	63.3	71.9	80.8	83.3
2002	11	57.2	23.0	9.2	90.9	31.0	44.1	62.0	72.4	75.0
2003	25	54.1	23.5	0.2	81.2	8.2	43.5	61.8	69.1	78.0
2004	26	57.4	19.8	1.5	86.8	35.3	52.8	59.5	67.3	77.2
2005	33	67.6	16.3	30.7	91.9	40.2	61.7	70.9	81.8	83.8
2006	25	66.1	19.7	7.3	94.2	40.9	57.7	67.7	77.3	91.5
2007	22	66.9	15.5	40.4	96.8	47.4	53.2	66.0	79.5	84.4
2008	18	71.2	10.7	44.0	84.2	54.8	65.3	72.4	82.4	83.4
2009	18	56.5	21.1	1.0	86.4	36.8	46.3	53.7	74.7	85.8
2010	13	52.0	26.3	0.2	85.8	6.4	43.6	58.5	74.5	75.7
2011	14 /	56.0	26.8	0.4	97.2	1.1	55.2	59.0	71.8	79.5
2012	5	57.9	34.6	2.6	84.2	2.6	46.2	72.9	83.8	84.2
2013	7	60.5	28.5	1.1	89.7	1.1	54.9	69.5	76.1	89.7
2014	4	60.6	20.5	33.0	76.7	33.0	45.0	66.4	76.2	76.7
1998-2014	265	61.4	20.6	0.2	97.2	36.6	52.3	64.5	75.8	83.8

Table 4

Age distribution by 5-year age group and gender for period 2007-2014 (incl. DCO)

Age at	_		/					
diagnosis	Cases	_ /	Males		\ .\	Females		
Years	n	% Cum.	% / n	%	Cum.%	n	용	Cum.%
0 - 4	11	5.0 /5.	0 5	4.2	4.2	6	5.9	5.9
5-9	1	0.5 / 5.	5 /		4.2	1	1.0	6.9
10 - 14	1	0.5 / 5.	9/ 1	0.8	5.0			6.9
15-19	0	0.0 / 5.	9		5.0			6.9
20-24	1	0.5 6.	4 1	0.8	5.9			6.9
25-29	2	0.9 7.	3 2	1.7	7.6			6.9
30-34	3	1.4 8.	6 1	0.8	8.4	2	2.0	8.9
35-39	5	2.3 10.	9 4	3.4	11.8	1	1.0	9.9
40 - 44	12	5.5 16.	4 5	4.2	16.0	7	6.9	16.8
45-49	10	4.5 20.	9 3	2.5	18.5	7	6.9	23.8
50-54	13	5.9 26.	8 4	3.4	21.8	9	8.9	32.7
55-59	17	7.7 34.		5.0	26.9	11	10.9	43.6
60-64	20	9.1 43.	6 13	10.9	37.8	7	6.9	50.5
65-69	24	10.9 54.		12.6	50.4	9	8.9	59.4
70-74	36	16.4 70.		21.0	71.4	11	10.9	70.3
75-79	23	10.5 81.		9.2	80.7	12	11.9	82.2
80-84	30	13.6 95.		15.1	95.8	12	11.9	94.1
85+	11	5.0 100.		4.2	100.0	6	5.9	100.0
001	T T	3.0 100.	0 9	4.2	100.0	\	J.J	100.0
All ages	220	100.0	119	100.0		101	100.0	
- 5								

Included in the statistics are 47.9% multiple primaries in males and 34.0% in females.



Table 5

Age-specific incidence, DCO rate and proportion of all cancers for period_2007-2014

							Males	Females
			Males	Females	Males	Females	Prop.all	Prop.all
Age at			Age-	Age-	DCO rate	DCO rate	cancers	cancers
diagnosis	Males		/ =	spec.	n=0	n=0	n=91183	
Years	n	n	incid.	incid.	%	90	%	%
0 - 4	5	6	0.6	0.7			2.8	4.3
5- 9		1 /	0.0					1.3
10-14	1		0.1	0.0			1.0	
15-19			0.0	0.0				
20-24	1		0.1	0.0			0.3	
25-29	2		0.2	0.0			0.4	
30-34	1	2	0.1	0.2			0.1	0.2
35-39	4	1	0.3				0.3	0.1
40 - 44	5	7	0.3	0.5			0.3	0.2
45-49	3	7	0.2	0.5			0.1	0.1
50-54	4	9	0.3	0.7			0.1	0.1
55-59	6	/ 11 /	0.6	1.0			0.1	0.1
60-64	13	7	1.3	0.7			0.1	0.1
65-69	15	9	1.6	0.9			0.1	0.1
70-74	25	\ 11\	2.7				0.1	0.1
75-79	11	12	2.0	1.7			0.1	0.1
80-84	18	12	5.2	2.1			0.2	0.1
85+	5	6	2.2	1.0			0.1	0.1
All ages	119	101			0.0	0.0	0.1	0.1
Incidence								
Raw			0.7	0.5				
WS			0.4	0.3				
ES			0.5	0.4				
BRD-S			0.6	0.5				

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).



ICD-10 C69: Malignant neoplasm of eye and adnexa

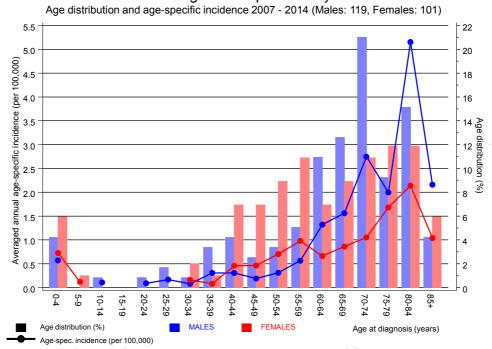


Figure 6. Age distribution and age-specific incidence



ICD-10 C69: Malignant neoplasm of eye and adnexa Age-specific incidence rates: international comparison

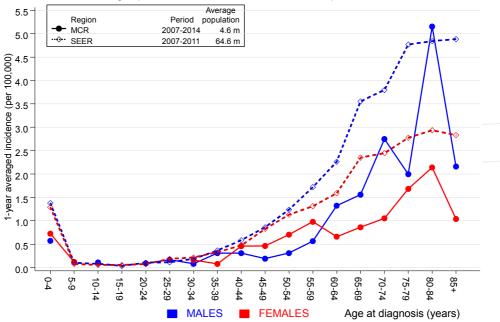


Figure 6a. Age-specific incidence in MCR registry areas compared to SEER (Surveillance, Epidemiology, and End Results, USA).



Reference:

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

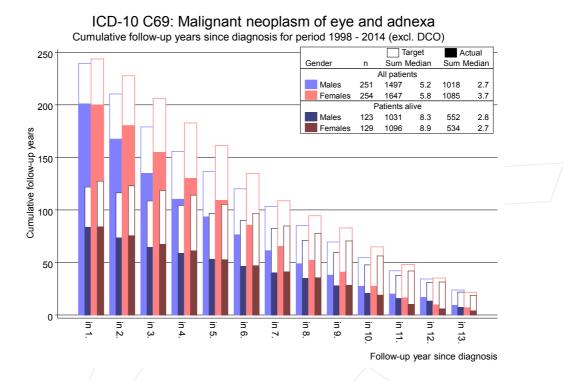


Figure 7. Cumulative follow-up years depending on time since diagnosis

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

Table 8a

Standardized incidence ratio (SIR, with 95% confidence limits), excess absolute risk (EAR) and DCO rate of second primaries for period 1998-2014

MALES

	Observed E	Expected		LCL	UCL		DCO
Diagnosis	n	n	SIR	95%	95%	EAR	왕
C18 Colon	3	1.7	1.7	0.4	5.1	12.4	
C19-C20 Rectum	2	0.9	2.1	0.3	7.7	10.5	
C33-C34 Lung	9	2.0	4.5	2.0	8.5 #	68.6	22.2
C43 Malign. melanoma	3	0.7	4.3	0.9	12.5	22.6	
C61 Prostate	12	5.1	2.4	1.2	4.1 #	67.8	8.3
C64 Kidney	2	0.6	3.4	0.4	12.2	13.8	
C67 Bladder	2	0.8	2.5	0.3	9.0	11.8	
Other primaries	5	1.0	5.2	1.7	12.0 #	39.6	
Not observed	0	4.6	0.0	0.0	0.8 #	+ -45.4	
All mult. primaries	38	17.5	2.2	1.5	3.0 #	201.6	7.9

Patients	247						
Median age at second malignancy (years)	74.3						
Person-years	1018						
Mean observation time (years)							
Median observation time (years)	2.8						

The occurrence of second malignancy is statistically significant.

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



Table 8b

Standardized incidence ratio (SIR, with 95% confidence limits), excess absolute risk (EAR) and DCO rate of second primaries for period 1998-2014

FEMALES

		Observed	Expected		LCL	UCL		DCO
Diagnosis		/ n /	n	SIR	95%	95%	EAR	왕
C16 S	tomach	2	0.4	4.6	0.6	16.5	14.4	50.0
C43 M	align. melanoma	2 2 9	0.4	4.8	0.6	17.2	14.6	
C50 B	reast	9	3.5	2.6	1.2	4.9	# 51.1	11.1
C54 C	orpus uteri 🔍	2	0.6	3.2	0.4	11.7	12.8	
C56 0	vary	2	0.5	4.2	0.5	15.3	14.1	
C70-C72 C	NS cancer	2	0.2	12.7	1.5	45.8	# 17.0	
C76-C79 C	UP	3	0.2	13.8	2.8	40.3	# 25.7	
C82-C85 N	HL	2	0.5	4.4	0.5	16.1	14.3	
Other pri	maries	12	3.9	3.1	1.6	5.4	# 74.8	
Not obser	ved	0	1.5	0.0	0.0	2.5	-13.9	
All mult.	primaries	36	11.7	3.1	2.2	4.3	# 225.1	5.6
Patients			24	2				
Median age a	t second maligna	ancy (year	s) 66.	5				
Person-years			108	1				
Mean observa	tion time (years	3)	4.	5				

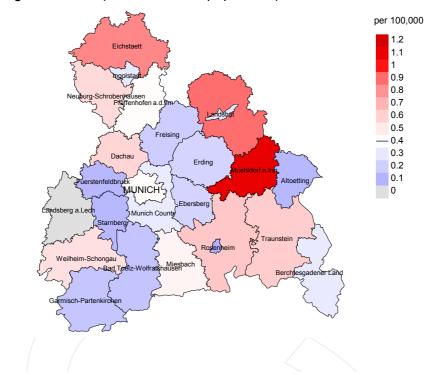
3.8

The occurrence of second malignancy is statistically significant.

Median observation time (years)

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

Average incidence (world standard population) 2007 - 2014: Males



Average incidence (world standard population) 2007 - 2014: Females

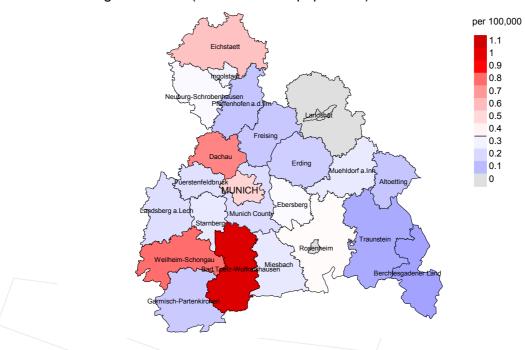
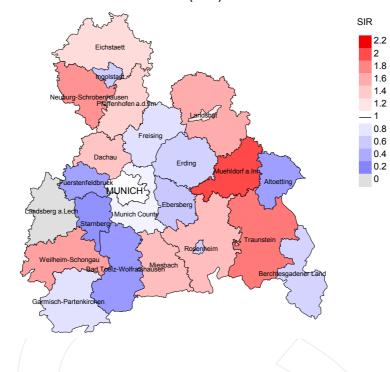


Figure 9a. Map of cancer incidence (world standard population, incl. DCO cases) by county averaged for period 2007 to 2014. According to their individual incidence rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 0.4/100,000 WS N=119, females 0.4/100,000 WS N=101).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 65,347 female residents (averaged) in the period from 2007 to 2014 a total of 3 women were identified with newly diagnosed eye cancer. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 0.3/100,000 (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 incidence ratio (SIR) 2007 - 2014: Males



Standardized incidence ratio (SIR) 2007 - 2014: Females

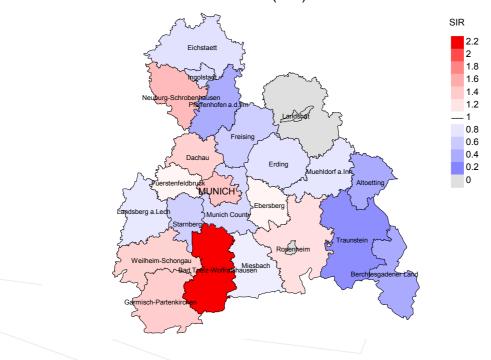


Figure 9b. Map of standardized incidence ratio (SIR, incl. DCO cases) by county averaged for period 2007 to 2014. According to their individual SIR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=119, females N=101).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 64,924 female residents (averaged) in the period from 2007 to 2014 a total of 3 women were identified with newly diagnosed eye cancer. Therefore, the mean standardized incidence ratio (SIR) for this cancer type in this area can be calculated at 1.08. Though, the value of this parameter may vary with an underlying probability of 99% between 0.12 and 3.97, and is therefore not statistically striking.

MORTALITY

Table 10a

Patient cohorts of incident cancers by year of diagnosis, follow-up status, proportion of DCO, deaths among the annual cohorts and proportion of available death certificates (with respect to registry area expansion from 2.51 to 3.96 m as of 2002, and from 3.96 to 4.64 m as of 2007, respectively)

	Incident	Prop. actively	Prop.		Prop.	Prop. deaths with death
Year of	cases	followed	DCO	Deaths	deaths	certific.
diagnosis	n	%	90	n	%	90
1998	22	90.9		14	63.6	92.9
1999	23	95.7		10	43.5	100.0
2000	26	96.2		21	80.8	95.2
2001	13	92.3		11/\	84.6	100.0
2002	35	82.9		17	48.6	94.1
2003	39	79.5		16	41.0	93.8
2004	49	81.6		29	59.2	89.7
2005	55	90.9	1.8	31	56.4	93.5
2006	43	76.7		18	41.9	100.0
2007	47	74.5		31	66.0	90.3
2008	42	73.8		22	52.4	86.4
2009	32	71.9		14	43.8	100.0
2010	30	73.3		14	46.7	92.9
2011	28	71.4		14	50.0	100.0
2012	15	80.0		6	40.0	100.0
2013	18	100.0		4	22.2	75.0
2014	8	100.0		1	12.5	100.0
1998-2014	525	82.1	0.2	273	52.0	93.8

Table 10b

Annual cohorts of incident cancers and deaths, proportion of death certificates and cases deceased the same year of cancer diagnosis (incl. DCO)

(with respect to registry area expansion from 2.51 to 3.96 m as of 2002, and from 3.96 to 4.64 m as of 2007, respectively)

			Prop		
			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	22	17	94.1		
1999	23	14	85.7	1	4.3
2000	26	19	94.7	1	3.8
2001	13	11	90.9		
2002	35	28	92.9		
2003	39	31	90.3	2	5.1
2004	49	32	100.0	2	4.1
2005	55	37	94.6	8	14.5
2006	43	30	96.7	2	4.7
2007	47	34	100.0	3	6.4
2008	42	36	91.7	1	2.4
2009	32	42	97.6	4	12.5
2010	30 \	39	97.4	\1	3.3
2011	28	46	93.5	2	7.1
2012	15	26	100.0	2 1 1	6.7
2013	18	40	100.0	1	5.6
2014	8	35	97.1	/1 /	12.5
1998-2014	525	517	95.7	30	5.7

Table 10c

Annual cohorts of deaths, proportion of cancer-related and non-cancer-related deaths, and cancer recorded on death certificates (incl. DCO)

(with respect to registry area expansion from 2.51 to 3.96 m as of 2002, and from 3.96 to 4.64 m as of 2007, respectively)

				Prop.
				cancer
		Prop.	Prop.	recorded
		cancer-	non-cancer-	on death
Year of	Deaths	related	related	certificate
death	n	%	%	%
1998	17	70.6	29.4	68.8
1999	14	64.3	35.7	75.0
2000	19	68.4	31.6	77.8
2001	11	63.6	36.4	70.0
2002	28	71.4	28.6	76.9
2003	31	74.2	25.8	85.7
2004	32	75.0	25.0	81.3
2005	/ 37	73.0	27.0	82.9
2006	30	66.7	33.3	72.4
2007	34	73.5	26.5	76.5
2008	36	72.2	27.8	84.8
2009	42	76.2	23.8	78.0
2010	39	64.1	35.9	73.7
2011	46	67.4	32.6	74.4
2012	26	61.5	38.5	61.5
2013	40	65.0	35.0	72.5
2014	35	62.9	37.1	58.8
1998-2014	517	69.2	30.8	75.2

 $\begin{array}{c} \text{Table 11a} \\ \text{Medians of age at death according to the grouping in Table 10} \\ \text{MALES} \end{array}$

					Age at
		Age at	Age at	Age at	death
		death	death	death	(according
		(all	(cancer-	(non-cancer-	to death
Year of	Deaths	causes)	related)	related)	certificate)
death	n	Years	Years	Years	Years
1998	5	77.4	77.4	71.0	67.0
1999	5	86.2	86.2	82.4	83.3
2000	6	78.1	76.4	78.2	78.6
2001	3	81.8	79.3	87.2	79.3
2002	15	70.4	69.8	72.3	71.2
2003	15	62.9	69.0	61.0	65.9
2004	15	71.8	71.0	83.5	68.0
2005	20	74.6	70.6	82.3	72.5
2006	15	76.8	74.7	86.2	73.8
2007	1,1	73.3	65.5	81.3	67.4
2008	17	72.3	68.1	85.1	68.3
2009	20	76.7	69.0	84.1	69.0
2010	17	80.0	78.9	81.3	79.7
2011	25	75.0	75.0	76.7	74.2
2012	15	76.1	66.8	86.1	66.8
2013	16	78.2	80.8	77.7	82.9
2014	22	78.9	76.7	86.2	76.9
1998-2014	242	75.3	73.2	82.7	73.4

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.

 $\begin{tabular}{ll} Table 11b \\ \hline \begin{tabular}{ll} Medians of age at death according to the grouping in Table 10 \\ \hline \begin{tabular}{ll} FEMALES \end{tabular}$

					Age at
		Age at	Age at	Age at	death
		death	death	death	(according
		(all	(cancer-	(non-cancer-	to death
Year of	Deaths	causes)	related)	related)	certificate)
death	n	Years	Years	Years	Years
1998	12	78.7	72.9	90.5	72.9
1999	9	65.3	70.3	27.6	75.3
2000	13	75.6	71.7	78.7	71.7
2001	8	75.3	74.8	93.6	75.8
2002	13	80.8	74.9	85.9	74.9
2003	16	71.2	67.2	86.1	67.2
2004	17	73.4	70.6	83.4	71.1
2005	17	82.4	78.2	86.1	78.4
2006	15/	80.0	67.9	83.7	68.4
2007	23	71.0	69.6	88.6	69.6
2008	19	79.0	68.0	90.6	73.3
2009	22	74.0	71.1	87.2	71.1
2010	22	78.4	66.9	90.3	67.2
2011	21	81.2	77.6	81.8	75.4
2012	11	73.6	63.1	87.0	63.1
2013	24	75.0	70.4	83.4	71.3
2014	13	89.0	70.4	92.4	65.0
1998-2014	275	77.9	70.6	85.9	71.1

By 2010, life expectancy at birth was 77.5 years for boys and 82.6 years for girls.

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.

Year of	Deaths	Mort.	MI-Inde	x Mort.	MI-Index	Mort.	MI-Index	Mort.	MI-Index
death	n	raw	raw	WS	WS	ES	ES	BRD-S	BRD-S
1998	3	0.3	0.33	0.1	0.23	0.3	0.32	0.3	0.32
1999	1	0.1	0,09	0.0	0.06	0.1	0.10	0.1	0.12
2000	4	0.4	0.29	0.2	0.27	0.3	0.29	0.4	0.29
2001	2	0.2	0.33	0.1	0.22	0.1	0.32	0.3	0.61
2002	12	0.6	0.50	0.4	0.35	0.5	0.45	0.7	0.52
2003	13	0.7	0.93	0.4	0.72	0,6	0.87	0.7	1.02
2004	11	0.6	0.48	0.3	0.40	0.5	0.49	0.6	0.52
2005	15	0.8	0.68	0.4	0.53	0.7	0.65	0.9	0.70
2006	11	0.6	0.61	0.3	0.48	0.4	0.58	0.6	0.71
2007	6	0.3	0.24	0.2	0.23	0.2	0.25	0.3	0.25
2008	14	0.6	0.58	0.3	0.54	0.5	0.56	0.6	0.56
2009	13	0.6	0.93	0.3	0.69	0.4	0.85	0.6	0.95
2010	12	0.5	0.71	0.2	0.50	0.4	0.68	0.5	0.81
2011	17	0.7	1.21	0.3	1.01	0.5	1.09	0.7	1.16
2012	10	0.4	1.00	0.3	0.89	0.4	1.11	0.4	1.03
2013	12	0.5	1.09	0.2	0.47	0.3	0.78	0.5	1.09
2014	15	0.7	3.75	0.3	3.12	0.4	3.59	0.6	3.93
1998-2014	171	0.5	0.66	0.3	0.50	0.4	0.61	0.6	0.69

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	9	0.8	0.69	0.3	0.46	0.5	0.61	0.6	0.65
1999	8	0.7	0.67	0.3	0.63	0.5	0.61	0.6	0.72
2000	9	0.7	0.75	0.3	0.58	0.5	0.65	0.6	0.63
2001	5	0.4	0.71	0.2	0.70	0.3	0.74	0.3	0.70
2002	8	0.4	0.73	0.2	0.38	0.2	0.49	0.3	0.64
2003	10	0.5	0.40	0.3	0.27	0.4	0.34	0.4	0.37
2004	13	0.7	0.50	0.3	0.32	0.5	0.39	0.6	0.48
2005	12	0.6	0.36	0.2	0.27	0.3	0.31	0.4	0.33
2006	9	0.4	0.36	0.2	0.33	0.3	0.36	0.4	0.38
2007	19	0.8	0.86	0.4	0.74	0.5	0.75	0.6	0.78
2008	12	0.5	0.67	0.2	0.70	0.3	0.70	0.4	0.65
2009	19	0.8	1.06	0.4	0.67	0.5	0.85	0.6	0.94
2010	13	0.6	1.00	0.3	0.67	0.4	0.81	0.5	1.01
2011	14	0.6	1.00	0.2	0.40	0.3	0.57	0.4	0.71
2012	6	0.3	1.20	0.1	0.79	0.2	1.18	0.2	1.14
2013	14	0.6	2.00	0.3	1.25	0.4	1.67	0.5	1.99
2014	7	0.3	1.75	0.2	2.09	0.2	1.65	0.2	1.38
1998-2014	187	0.6	0.71	0.3	0.51	0.4	0.60	0.4	0.66

Table 13

Age distribution of age at death (cancer-related) for period 2007-2014 (incl. multiple primaries)

Age at death	Cases			Males			Females		
Years	n	용 (Cum.%	n	응	Cum.%	n	%	Cum.%
10010				/ 11	Ü			v	o din C
10-14	1	0.5	0.5			0.0	1	1.0	1.0
15-19	0	0.0	0.5			0.0			1.0
20-24	1	0.5	1.0			0.0	1	1.0	1.9
25-29	0	0.0	1.0			0.0			1.9
30-34	1	0.5	1.5	1	1.0	1.0			1.9
35-39	0	0.0	1.5			1.0			1.9
40 - 44	5	2.5	3.9	3	3.0	4.0	2	1.9	3.8
45-49	3	1.5	5.4			4.0	3	2.9	6.7
50-54	10	4.9	10.3	4	4.0	8.1	6	5.7	12.4
55-59	20	9.8	20.1	8	8.1	16.2	12	11.4	23.8
60-64	20	9.8	29.9	10	10.1	26.3	10	9.5	33.3
65-69	31	15.2	45.1	11	11.1	37.4	20	19.0	52.4
70-74	33	16.2	61.3	18	18.2	55.6	15	14.3	66.7
75-79	26	12.7	74.0	16	16.2	71.7	10	9.5	76.2
80-84	25	12.3	86.3	16	16.2	87.9	9	8.6	84.8
85+	28	13.7	100.0	12	12.1	100.0	16	15.2	100.0
All ages	204	100.0		99	100.0		105	100.0	

Included in the statistics are 47.9% multiple primaries in males and 34.0% in females.



Table 14

Age-specific mortality (cancer-related) and proportion of all cancers for period 2007-2014 (incl. multiple primaries)

Age at death	Males Females	/ = /		Females Age- spec.		cancers	Females Prop.all cancers
Years	n n	mortal. M	II-index	mortal.	MI-index	ଚ	90
0- 4 5- 9 10-14	1	0.0		0.0 0.0 0.1	1.00		5.0
15-19		0.0		0.0			
20-24 25-29	1	0.0		$0.1 \\ 0.0$	1.00		3.6
30-34 35-39	1	0.1	1.00	0.0		1.1	
40-44 45-49	3 2 3	0.2	0.60	0.1 0.2	0.29	0.7	0.3 0.2
50-54 55-59	4 6 8 12	0.3 0.8	1.00 1.33	0.5 1.1	0.67 1.09	0.2	0.3 0.5
60-64 65-69	10 10 11 20	1.0 1.1	0.77 0.73	0.9	1.43 2.22	0.2 0.2	0.3 0.4
70-74 75-79	18 15 16 10	2.0 2.9	0.72 1.45	1.4 1.4	1.36 0.83	0.2	0.2 0.2
80-84 85+	16 9 12 16	4.6 5.2	0.89	1.6 2.8	0.75 2.67	0.2	0.1 0.2
All ages	99 105					0.2	0.2
Mortality Raw WS ES		0.5 0.3 0.4	0.83 0.63 0.77	0.6 0.3 0.4	1.04 0.75 0.89		
BRD-S		0.5	0.85	0.4	0.96		
PYLL-70 per 100,000 ES AYLL-70		2.4 2.2 10.6		3.8 3.5 11.0			

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

Table 15a $\begin{tabular}{ll} Multiple primaries in deaths in period 1998-2014 \\ \hline MALES \\ \end{tabular}$

					Syn-	Syn-		
					chron	chron		
	Total	Total	Pre	Pre	±30d	±30d	Post	Post
Diagnosis	n	%↓	n	← %	n	← %	n	← %
C07-C08 Salivary gland	/ 1	1.0	1	100.0				
C09-C10 Oropharynx	2 /	2.0					2	100.0
C11 Nasopharynx	/ 1	1.0					1	100.0
C18 Colon	~ 7	7.1			/ 1	14.3	6	85.7
C19-C20 Rectum	2	2.0	1	50.0	1	50.0		
C22 Liver	3	3.0					3	100.0
C23-C24 Bile	2	2.0	1	50.0			1	50.0
C25 Pancreas	2	2.0	1	50.0			1	50.0
C33-C34 Lung	12	12.1					12	100.0
C43 Malign. melanor	ma 12	12.1	6	50.0	3	25.0	3	25.0
C44 Skin others	8	8.1	5	62.5			3	37.5
C46,C49 Soft tissue	1	1.0	1	100.0				
C61 Prostate	17	17.2	6	35.3/	1	5.9	10	58.8
C64 Kidney	5	5.1	2	40.0			3	60.0
C66 Ureter	1	1.0					1	100.0
C67 Bladder	5	5.1	2	40.0	1	20.0	2	40.0
C68 Urethra	1	1.0			1	100.0		
C69 Eye carcinoma	1	1.0					1	100.0
C70-C72 CNS cancer	3	3.0	2	66.7			1	33.3
C73 Thyroid	1	1.0					1	100.0
C76-C79 CUP	2	2.0					2	100.0
C82-C85 NHL	4	4.0	1	25.0			3	75.0
C90 Mult. myeloma	2	2.0	2	100.0				
C91-C96 Leukaemia	4	4.0					4	100.0
All mult. primaries	99	100.0	31	31.3	8	8.1	60	60.6

ICD-10 C44 (Other malignant neoplasms of skin) is not systematically recorded by MCR and therefore not considered for evaluation as a particular primary but at least as a multiple malignancy.

Table 15b

Multiple primaries in deaths in period 1998-2014
FEMALES

					Syn-	Syn-		
					chron	chron		
	Total	Total	Pre	Pre	±30d	±30d	Post	Post
Diagnosis	n	% ↓	n	← %	n	← %	n	← %
C07-C08 Salivary gland	/ 1 /	1.1					1	100.0
C16 Stomach	3 /	3.4	1	33.3			2	66.7
C18 Colon	/ 2 /	2.3	1	50.0			1	50.0
C19-C20 Rectum	2	2.3	1	50.0			1	50.0
C22 Liver	4	4.6					4	100.0
C23-C24 Bile	1	1.1					1	100.0
C25 Pancreas	3	3.4					3	100.0
C33-C34 Lung	8	9.2	2	25.0	1	12.5	5	62.5
C43 Malign. melanoma	12	13.8	3	25.0			9	75.0
C46,C49 Soft tissue	1	1.1	1	100.0				
C50 Breast	26	29.9	15	57.7	2	7.7	9	34.6
C53 Cervix uteri	1	1.1					$\sqrt{1}$	100.0
C54 Corpus uteri	6	6.9	2	33.3			4	66.7
C56 Ovary	2	2.3					2	100.0
C64 Kidney	1	1.1					1	100.0
C67 Bladder	2	2.3	1	50.0	1	50.0		
C69 Eye carcinoma	1	1.1					1	100.0
C70-C72 CNS cancer	3	3.4					3	100.0
C73 Thyroid	2	2.3	1	50.0			1	50.0
C76-C79 CUP	2	2.3			1	50.0	1	50.0
C90 Mult. myeloma	2	2.3					2	100.0
C91-C96 Leukaemia	2	2.3					2	100.0
All mult. primaries	87	100.0	28	32.2	5	5.7	54	62.1

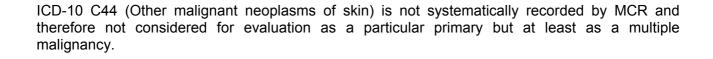


Table 16

Age-specific mortality (cancer-related) and proportion of all cancers for period 2007-2014

(First primaries only *)

			Males		Females		Males	Females
Age at			Age-		Age-			Prop.all
death	Males Fe	emales	spec.		spec.		cancers	cancers
Years	n	n		MI-index		MI-index		%
0- 4			0.0		0.0			
5- 9			0.0		0.0			
10-14		1 <	0.0		0.1	1.00		5.3
15-19			0.0		0.0			
20-24		1	0.0		0.1	1.00		3.8
25-29			0.0		0.0			
30-34	1		0.1	1.00	0.0		1.2	
35-39			0.0		0.0			
40 - 44	3	1	0.2	0.60	0.1	0.25	0.7	0.2
45-49		2	0.0		0.1	0.29		0.2
50-54	4	5	0.3	1.33	0.4	0.63	0.3	0.3
55-59	7 /	12	0.7	2.33	1.1	1.33	0.3	0.6
60-64	8	8	0.8	0.80	0.8	2.00	0.2	0.3
65-69	8	19	0.8	0.73	1.8	3.80	0.1	0.5
70-74	16	8	1.8	0.76	0.8	0.89	0.2	0.2
75-79	14	10	2.5	1.75	1.4	1.00	0.2	0.2
80-84	10	7	2.9	0.83	1.2	0.70	0.2	0.1
85+	10	14	4.3	3.33	2.4	2.33	0.2	0.2
All ages	81	88					0.2	0.3
Mortality								
Raw			0.4		0.5			
WS			0.2	0.66	0.2			
ES			0.3	0.82	0.3			
BRD-S			0.4	0.91	0.4	0.99		
PYLL-70								
per 100,000			2.2		3.3			
ES			2.0		3.1			
AYLL-70			11.5		10.7			

^{*} See corresponding tables with multiple primaries.

Table 17

Age-specific mortality (cancer-related) and proportion of all cancers for period 2007-2014 (Single primaries only *)

			Males		Females		Males	Females
Age at			Age-		Age-			Prop.all
death	Males Fe	males	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		1 <	0.0		0.1	1.00		5.6
15-19			0.0		0.0			
20-24		1	0.0		0.1	1.00		4.2
25-29			0.0		0.0			
30-34	1		0.1	1.00	0.0		1.2	
35-39			0.0		0.0			
40 - 44	3	1	0.2	0.60	0.1	0.33	0.8	0.2
45-49		2	0.0		0.1	0.29		0.2
50-54	4	4	0.3	1.33	0.3		0.3	0.3
55-59	7 /	10	0.7	2.33	0.9		0.3	0.5
60-64	5	8	0.5	0.56	0.8	2.00	0.1	0.3
65-69	8	15	0.8	0.73	1.4	3.00	0.2	0.4
70-74	13	\ 7	1.4	0.72	0.7	1.00	0.2	0.2
75-79	8	\7	1.5	1.00	1.0	0.70	0.2	0.2
80-84	1	4	0.3	0.11	0.7	0.40	0.0	0.1
85+	5	9	2.2	1.67	1.6	1.50	0.1	0.2
All ages	55	69					0.2	0.2
Mortality								
Raw			0.3	0.65	0.4			
WS			0.2	0.52	0.2			
ES			0.2	0.62	0.3			
BRD-S			0.3	0.63	0.3	0.85		
PYLL-70								
per 100,000			2.1		3.0			
ES			1.8		2.8			
AYLL-70			12.0		11.2			

^{*} See corresponding tables with multiple primaries.

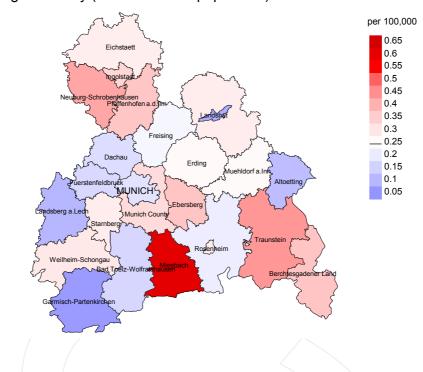
ICD-10 C69: Malignant neoplasm of eye and adnexa Age distribution and age-specific mortality 2007 - 2014 (Males: 99, Females: 104) 5.5 20 5.0 18 (per 100,000) 4.5 16 4.0 -specific mortality (1.2 specific mortality (1.3 speci Age distribution 10 <u>~</u> Averaged annual age 0.1 0.1 0.1 0.5 0.0 Age-spec. mortality (per 100,000) Age-spec. incidence (per 100,000)

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 eye cancer-related death (see Table 10) should be considered.



Average mortality (world standard population) 2007 - 2014: Males



Average mortality (world standard population) 2007 - 2014: Females

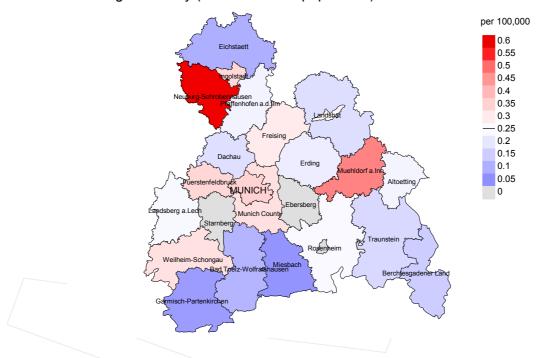
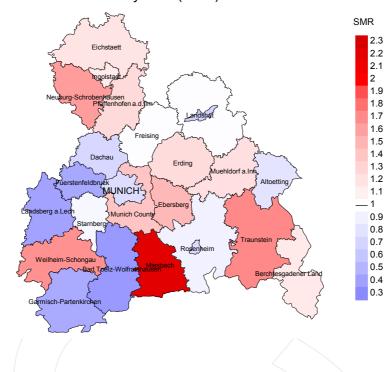


Figure 19a. Map of cancer mortality (world standard population) by county averaged for period 2007 to 2014. According to their individual mortality rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 0.2/100,000 WS N=96, females 0.3/100,000 WS N=103).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 65,347 female residents (averaged) in the period from 2007 to 2014 a total of 0 women died from eye cancer. 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 1.0/100,000.

Standardized mortality ratio (SMR) 2007 - 2014: Males



Standardized mortality ratio (SMR) 2007 - 2014: Females

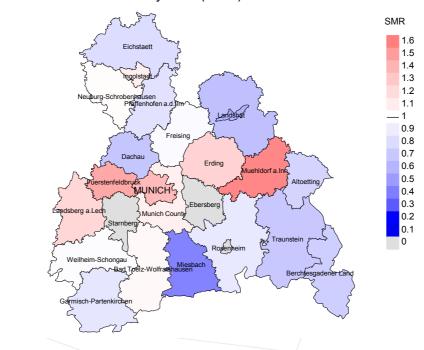


Figure 19b. Map of standardized mortality ratio (SMR, incl. DCO cases) by county averaged for period 2007 to 2014. According to their individual SMR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=96, females N=103).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 64,924 female residents (averaged) in the period from 2007 to 2014 a total of 0 women died from eye cancer. 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 1.93, 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, where applicable. For mortality statistics patients, diagnoses and progressive course of disease are presented. In the calculations, all courses of disease are considered whereby progressions occurred and/or death certificate identified progressive cancers were ascertained. Additionally there are three groups of disease course to consider:

1. All multiple primaries included

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

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

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

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

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

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

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

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

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

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

Shortcuts

FRG Federal Republic of Germany

GEKID Association of Population-based Cancer Registries in Germany

(Gesellschaft der epidemiologischen Krebsregister in Deutschland e.V.)

MCR Munich Cancer Registry (Tumorregister München)
SEER Surveillance, Epidemiology, and End Results (USA)

AYLL-70 Average years of life lost prior to age 70 given a person dies before that age

BRD-S German standard population

DCO Death certificate only EAR Excess absolute risk

= excess cancer cases (O - E) per 10,000 person-years

ES European standard population (old)

LCL Lower confidence limit

MI-index Ratio between mortality and incidence

PYLL-70 Potential years of life lost prior to age 70 given a person dies before that age

SIR Standardized incidence ratio
SMR Standardized mortality ratio
UCL Upper confidence limit
WS World standard population

Recommended Citation

Munich Cancer Registry. ICD-10 C69: Eye cancer - Incidence and Mortality [Internet]. 2016 [updated 2016 Apr 13; cited 2016 Jun 1]. Available from: http://www.tumorregister-muenchen.de/en/facts/base/bC69__E-ICD-10-C69-Eye-cancer-incidence-and-mortality.pdf

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