Munich Cancer Registry

Tumorregister München (TRM)
Munich Cancer Registry (MCR)

ICD-10 C70: Meninges cancer

Incidence and Mortality

Year of diagnosis	1998-2020
Patients	127
Diseases	127
Creation date	12/21/2021
Database export	12/20/2021
Population	4.95 m

BERLIN

GERMANY

BAVARIA

MUNICH

Munich Cancer Registry
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https://www.tumorregister-muenchen.de/en

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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 4.69 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 currency 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, December 2021

[#]   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 2.65 million to 4.10 in 2002, and to 4.69 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.

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

ICD-10 codes (ICD-10 2018) used for specifying cancer site

Code	Description
C70.-	Malignant neoplasm of meninges
C70.0	Cerebral meninges
C70.1	Spinal meninges
C70.9	Meninges, unspecified

INCIDENCE

Table 1

Cases with invasive cancer by year of diagnosis, proportions of
DCO, further malignancies, deaths, and active follow-up (ALL PATIENTS)
(incl. DCO)

Year of diagnosis	All cases n	DCO cases n	Prop. DCO %	Prop. at least 1 further malign. prior + synchron. %	Prop. at least 1 further malign. after %	Prop. deaths %	Prop. actively followed %
1998	5	5	100.0	20.0	11.0	100.0	100.0
1999	1			16.7	11.5	100.0	100.0
2000	1			14.3	10.7		100.0
2001	0						
2002	3			30.0	10.0	33.3	100.0 #
2003	9	2	22.2	21.1	9.4	77.8	88.9
2004	3			18.2	10.2	33.3	100.0
2005	6			14.3	10.5	33.3	100.0
2006	10			13.2	10.1	40.0	70.0
2007	9			10.6	7.9	11.1	77.8 #
2008	8			10.9	8.8	50.0	87.5
2009	5			13.3	8.3	40.0	100.0
2010	5			13.8	9.0	40.0	100.0
2011	10			20.0	8.1	60.0	90.0
2012	8	1	12.5	18.1	7.7	37.5	100.0
2013	11			19.1	9.1	27.3	81.8
2014	10	1	10.0	19.2	9.1	20.0	100.0
2015	6			21.8	13.0	50.0	100.0
2016	10			20.8	11.8	40.0	90.0
2017	4	1	25.0	20.2	0.0	25.0	100.0
2018	2			19.8	0.0	50.0	100.0
2019	1			19.7	0.0		100.0
1998–2019	127	10	7.9	19.7	11.0	41.7	91.3

127 cases diagnosed 1998-2019 are related to a total of 127 patients. Currently, in 36 (28.3 %) of these 127 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 27 / 9 / 0 (21.3 % / 7.1 % / 0.0 %) patients exist having 2 / 3 / 4+ malignancies.

\#　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 retreived from the respective headings.

How to interpret:
In 2017, a subgroup of 4 cases has been diagnosed, of which 20.2 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 0.0 % of cases, at least one new malignancy has occurred during the follow-up period (all numbers refer to the date of the database export, see cover sheet).

Table 1a

##

Cases with invasive cancer by year of diagnosis, proportions of
DCO, further malignancies, deaths, and active follow-up (MALES)
(incl. DCO)

Year of diagnosis	Males n	Males %	DCO cases n	Prop. DCO %	Prop. at least 1 further malign. prior + synchron. %	Prop. at least 1 further malign. after %	Prop. deaths %	Prop. actively followed %
1998	0							
1999	0							
2000	1	100.0			0.0	8.8		100.0
2001	0							
2002	2	66.7			33.3	7.1	50.0	100.0 #
2003	6	66.7	2	33.3	22.2	7.4	83.3	100.0
2004	2	66.7			18.2	8.3		100.0
2005	3	50.0			14.3	8.7	33.3	100.0
2006	3	30.0			17.6	7.0	33.3	33.3
2007	7	77.8			12.5	5.0	14.3	71.4 #
2008	2	25.0			11.5	6.1	100.0	100.0
2009	3	60.0			13.8	6.5	66.7	100.0
2010	4	80.0			15.2	7.1	50.0	100.0
2011	4	40.0			21.6	4.2	75.0	100.0
2012	4	50.0			19.5	5.0	25.0	100.0
2013	4	36.4			22.2	6.3	50.0	100.0
2014	3	30.0			20.8	8.3		100.0
2015	2	33.3			24.0	11.1	50.0	100.0
2016	5	50.0			23.6	14.3	40.0	80.0
2017	1	25.0			23.2	0.0		100.0
2018	1	50.0			22.8	0.0	100.0	100.0
2019	0							
1998–2019	57	44.9	2	3.5	22.8	8.8	43.9	91.2

57 cases diagnosed 1998-2019 are related to a total of 57 patients. Currently, in 18 (31.6 %) of these 57 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 15 / 3 / 0 (26.3 % / 5.3 % / 0.0 %) patients exist having 2 / 3 / 4+ malignancies.

\#   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 retrieved from the respective headings.

How to interpret:
In 2017, a subgroup of 1 cases has been diagnosed, of which 23.2 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 0.0 % of cases, at least one new malignancy has occurred during the follow-up period (all numbers refer to the date of the database export, see cover sheet).

Table 1b

##

Cases with invasive cancer by year of diagnosis, proportions of
DCO, further malignancies, deaths, and active follow-up (FEMALES)
(incl. DCO)

Year of diagnosis	Females n	Females %	DCO cases n	Prop. DCO %	Prop. at least 1 further malign. prior + synchron. %	Prop. at least 1 further malign. after %	Prop. deaths %	Prop. actively followed %
1998	5	100.0	5	100.0	20.0	12.9	100.0	100.0
1999	1	100.0			16.7	13.8	100.0	100.0
2000	0							
2001	0							
2002	1	33.3			28.6	12.5		100.0 #
2003	3	33.3			20.0	11.1	66.7	66.7
2004	1	33.3			18.2	11.7	100.0	100.0
2005	3	50.0			14.3	11.9	33.3	100.0
2006	7	70.0			9.5	12.5	42.9	85.7
2007	2	22.2			8.7	10.2		100.0 #
2008	6	75.0			10.3	10.6	33.3	83.3
2009	2	40.0			12.9	9.8		100.0
2010	1	20.0			12.5	10.3		100.0
2011	6	60.0			18.4	10.5	50.0	83.3
2012	4	50.0	1	25.0	16.7	9.4	50.0	100.0
2013	7	63.6			16.3	10.7	14.3	71.4
2014	7	70.0	1	14.3	17.9	9.5	28.6	100.0
2015	4	66.7			20.0	14.3	50.0	100.0
2016	5	50.0			18.5	10.0	40.0	100.0
2017	3	75.0	1	33.3	17.6	0.0	33.3	100.0
2018	1	50.0			17.4	0.0		100.0
2019	1	100.0			17.1	0.0		100.0
1998–2019	70	55.1	8	11.4	17.1	12.9	40.0	91.4

70 cases diagnosed 1998-2019 are related to a total of 70 patients. Currently, in 18 (25.7 %) of these 70 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 12 / 6 / 0 (17.1 % / 8.6 % / 0.0 %) patients exist having 2 / 3 / 4+ malignancies.

\#   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 retrieved from the respective headings.

How to interpret:
In 2017, a subgroup of 3 cases has been diagnosed, of which 17.6 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 0.0 % of cases, at least one new malignancy has occurred during the follow-up period (all numbers refer to the date of the database export, see cover sheet).

Table 2

Incidence measures by year of diagnosis including DCO cases
(with respect to registry area expansion from 2.65 to 4.10 m as of 2002,
and from 4.10 to 4.94 m as of 2007, respectively)

Year of diagnosis	Males n	Females n	Males Inc. raw	Fem. Inc. raw	Males Inc. WS	Fem. Inc. WS	Males Inc. ES	Fem. Inc. ES	Males Inc. BRD-S	Fem. Inc. BRD-S
1998		5		0.4		0.1		0.2		0.4
1999		1		0.1		0.0		0.1		0.1
2000	1		0.1		0.0		0.1		0.1	
2001										
2002	2	1	0.1	0.1	0.1	0.0	0.1	0.0	0.1	0.0
2003	6	3	0.3	0.2	0.2	0.1	0.3	0.1	0.3	0.1
2004	2	1	0.1	0.1	0.1	0.0	0.1	0.0	0.1	0.0
2005	3	3	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.1
2006	3	7	0.2	0.3	0.2	0.1	0.2	0.2	0.2	0.3
2007	7	2	0.3	0.1	0.2	0.1	0.3	0.1	0.3	0.1
2008	2	6	0.1	0.3	0.0	0.1	0.1	0.2	0.1	0.2
2009	3	2	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1
2010	4	1	0.2	0.0	0.1	0.0	0.1	0.0	0.1	0.0
2011	4	6	0.2	0.3	0.1	0.2	0.1	0.2	0.2	0.2
2012	4	4	0.2	0.2	0.1	0.1	0.2	0.1	0.2	0.1
2013	4	7	0.2	0.3	0.1	0.2	0.1	0.2	0.2	0.3
2014	3	7	0.1	0.3	0.1	0.2	0.1	0.2	0.1	0.3
2015	2	4	0.1	0.2	0.0	0.1	0.0	0.1	0.1	0.1
2016	5	5	0.2	0.2	0.1	0.1	0.2	0.2	0.2	0.2
2017	1	3	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.1
2018	1	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2019		1		0.0		0.0		0.0		0.0
1998–2019	57	70	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1

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

Table 3

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

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	5	78.6	11.4	60.1	90.6	60.1	77.2	81.6	83.6	90.6
1999	1	57.6		57.6	57.6	57.6	57.6	57.6	57.6	57.6
2000	1	59.1		59.1	59.1	59.1	59.1	59.1	59.1	59.1
2002	3	53.3	18.0	35.0	71.0	35.0	35.0	54.1	71.0	71.0
2003	9	62.0	17.1	36.9	88.9	36.9	52.3	62.9	74.1	88.9
2004	3	53.0	27.8	30.0	83.9	30.0	30.0	45.2	83.9	83.9
2005	6	60.3	17.6	31.6	80.6	31.6	49.4	63.3	73.6	80.6
2006	10	64.0	17.9	20.9	86.5	37.4	56.8	68.0	75.7	81.4
2007	9	46.4	13.6	21.0	65.9	21.0	39.5	45.5	54.9	65.9
2008	8	68.4	16.9	31.0	85.1	31.0	63.4	74.1	77.9	85.1
2009	5	53.1	25.4	15.3	75.9	15.3	41.7	57.4	75.1	75.9
2010	5	54.5	15.2	41.8	71.3	41.8	42.3	46.4	70.7	71.3
2011	10	62.3	18.8	37.1	82.7	39.1	41.3	67.3	78.9	82.1
2012	8	58.7	22.2	25.2	81.5	25.2	38.8	64.5	78.2	81.5
2013	11	67.0	11.5	49.2	83.6	52.5	57.7	67.3	78.6	81.1
2014	10	53.3	16.2	36.2	95.0	37.1	45.7	51.5	56.3	75.9
2015	6	71.9	11.8	48.4	81.0	48.4	74.0	75.0	78.1	81.0
2016	10	57.7	17.4	29.2	75.5	29.7	47.1	66.0	69.6	74.7
2017	4	60.3	18.8	39.5	85.0	39.5	47.5	58.2	73.0	85.0
2018	2	58.2	22.1	42.5	73.8	42.5	42.5	58.2	73.8	73.8
2019	1	75.3		75.3	75.3	75.3	75.3	75.3	75.3	75.3
1998−2019	127	60.6	17.5	15.3	95.0	37.1	47.1	62.9	75.5	81.4

Table 3a

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

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
2000	1	59.1		59.1	59.1	59.1	59.1	59.1	59.1	59.1
2002	2	44.5	13.5	35.0	54.1	35.0	35.0	44.5	54.1	54.1
2003	6	64.4	20.9	36.9	88.9	36.9	41.6	70.3	78.5	88.9
2004	2	37.6	10.7	30.0	45.2	30.0	30.0	37.6	45.2	45.2
2005	3	51.6	21.1	31.6	73.6	31.6	31.6	49.4	73.6	73.6
2006	3	46.3	22.6	20.9	64.2	20.9	20.9	53.8	64.2	64.2
2007	7	48.8	10.9	37.1	65.9	37.1	39.5	45.5	60.8	65.9
2008	2	74.1	0.5	73.8	74.5	73.8	73.8	74.1	74.5	74.5
2009	3	69.5	10.5	57.4	75.9	57.4	57.4	75.1	75.9	75.9
2010	4	57.7	15.5	42.3	71.3	42.3	44.4	58.5	71.0	71.3
2011	4	70.3	19.7	41.1	82.7	41.1	58.6	78.7	82.1	82.7
2012	4	44.2	20.9	25.2	74.0	25.2	31.6	38.8	56.8	74.0
2013	4	68.8	12.2	52.5	81.1	52.5	59.9	70.8	77.7	81.1
2014	3	48.2	9.3	38.0	56.3	38.0	38.0	50.3	56.3	56.3
2015	2	76.9	1.6	75.8	78.1	75.8	75.8	76.9	78.1	78.1
2016	5	63.4	19.3	29.2	75.5	29.2	68.9	69.6	73.8	75.5
2017	1	39.5		39.5	39.5	39.5	39.5	39.5	39.5	39.5
2018	1	73.8		73.8	73.8	73.8	73.8	73.8	73.8	73.8
1998–2019	57	57.8	17.8	20.9	88.9	35.0	41.6	59.1	74.0	78.1

Table 3b

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

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	5	78.6	11.4	60.1	90.6	60.1	77.2	81.6	83.6	90.6
1999	1	57.6		57.6	57.6	57.6	57.6	57.6	57.6	57.6
2002	1	71.0		71.0	71.0	71.0	71.0	71.0	71.0	71.0
2003	3	57.3	5.3	52.3	62.9	52.3	52.3	56.6	62.9	62.9
2004	1	83.9		83.9	83.9	83.9	83.9	83.9	83.9	83.9
2005	3	69.1	10.0	63.3	80.6	63.3	63.3	63.3	80.6	80.6
2006	7	71.6	9.3	56.8	86.5	56.8	66.4	70.3	76.4	86.5
2007	2	38.0	24.0	21.0	54.9	21.0	21.0	38.0	54.9	54.9
2008	6	66.5	19.5	31.0	85.1	31.0	60.4	71.6	79.0	85.1
2009	2	28.5	18.7	15.3	41.7	15.3	15.3	28.5	41.7	41.7
2010	1	41.8		41.8	41.8	41.8	41.8	41.8	41.8	41.8
2011	6	56.9	17.8	37.1	78.9	37.1	41.3	53.7	76.9	78.9
2012	4	73.2	12.3	55.0	81.5	55.0	66.3	78.2	80.1	81.5
2013	7	66.0	11.9	49.2	83.6	49.2	57.7	62.9	78.6	83.6
2014	7	55.5	18.7	36.2	95.0	36.2	45.7	52.8	56.8	95.0
2015	4	69.4	14.4	48.4	81.0	48.4	61.2	74.1	77.6	81.0
2016	5	52.0	15.1	30.2	68.7	30.2	47.1	50.4	63.3	68.7
2017	3	67.2	15.7	55.5	85.0	55.5	55.5	60.9	85.0	85.0
2018	1	42.5		42.5	42.5	42.5	42.5	42.5	42.5	42.5
2019	1	75.3		75.3	75.3	75.3	75.3	75.3	75.3	75.3
1998–2019	70	62.9	17.1	15.3	95.0	41.5	52.3	63.1	77.2	83.6

Table 4
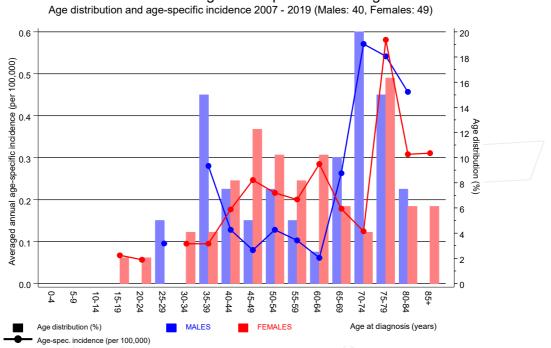
Age distribution by 5-year age group and sex for period 2007-2019
(incl. DCO)

Age at diagnosis Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
0-4									
5-9									
10-14									
15-19	1	1.1	1.1			0.0	1	2.0	2.0
20-24	1	1.1	2.2			0.0	1	2.0	4.1
25-29	2	2.2	4.5	2	5.0	5.0			4.1
30-34	2	2.2	6.7			5.0	2	4.1	8.2
35-39	8	9.0	15.7	6	15.0	20.0	2	4.1	12.2
40-44	7	7.9	23.6	3	7.5	27.5	4	8.2	20.4
45-49	8	9.0	32.6	2	5.0	32.5	6	12.2	32.7
50-54	8	9.0	41.6	3	7.5	40.0	5	10.2	42.9
55-59	6	6.7	48.3	2	5.0	45.0	4	8.2	51.0
60-64	6	6.7	55.1	1	2.5	47.5	5	10.2	61.2
65-69	7	7.9	62.9	4	10.0	57.5	3	6.1	67.3
70-74	10	11.2	74.2	8	20.0	77.5	2	4.1	71.4
75-79	14	15.7	89.9	6	15.0	92.5	8	16.3	87.8
80-84	6	6.7	96.6	3	7.5	100.0	3	6.1	93.9
85+	3	3.4	100.0			100.0	3	6.1	100.0
All ages	89	100.0		40	100.0		49	100.0	

Table 5

Age-specific incidence, DCO rate and proportion of all cancers
for period 2007-2019

Age at diagnosis Years	Males n	Females n	Males Age-spec. incid.	Females Age-spec. incid.	Males DCO rate n=0 %	Females DCO rate n=3 %	Males Prop.all cancers n=153686 %	Females Prop.all cancers n=155051 %
0- 4								
5- 9								
10-14								
15-19		1		0.1				0.4
20-24		1		0.1				0.2
25-29	2		0.1				0.2	
30-34		2		0.1				0.1
35-39	6	2	0.3	0.1			0.3	0.1
40-44	3	4	0.1	0.2			0.1	0.1
45-49	2	6	0.1	0.2			0.0	0.1
50-54	3	5	0.1	0.2			0.0	0.0
55-59	2	4	0.1	0.2			0.0	0.0
60-64	1	5	0.1	0.3			0.0	0.0
65-69	4	3	0.3	0.2			0.0	0.0
70-74	8	2	0.6	0.1			0.0	0.0
75-79	6	8	0.5	0.6		12.5	0.0	0.0
80-84	3	3	0.5	0.3			0.0	0.0
85+		3		0.3		66.7		0.0
All ages	40	49			0.0	6.1	0.0	0.0
Incidence								
Raw			0.1	0.2				
WS			0.1	0.1				
ES			0.1	0.1				
BRD-S			0.1	0.1				

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 C70: Malignant neoplasm of meninges
Age distribution and age-specific incidence 2007 - 2019 (Males: 40, Females: 49)

Figure 6. Age distribution (males: mean=59.8 yrs, median=66.6 yrs; females: mean=59.5 yrs, median=58.5 yrs) and age-specific incidence.

ICD-10 C70: Malignant neoplasm of meninges
Age-specific incidence rates: international comparison

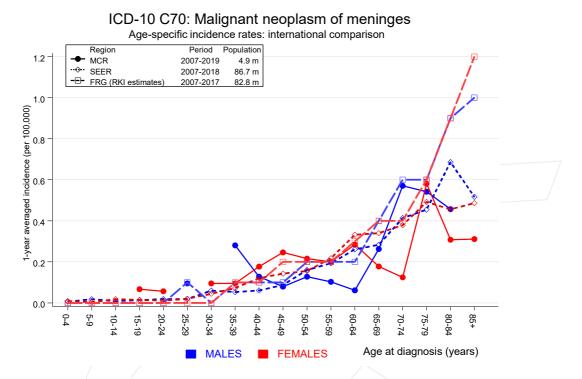| Region	Period	Population
MCR	2007-2019	4.9 m
SEER	2007-2018	86.7 m
FRG (RKI estimates)	2007-2017	82.8 m

MALES   **FEMALES**   Age at diagnosis (years)

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

Reference:

Estimated age-specific patient population of Germany, latest update: 16 March 2021. German Centre for Cancer Registry Data, Robert Koch Institute (RKI), based on data of the population based cancer registries. http://www.krebsdaten.de. Last access: 08/17/2021
Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Incidence - SEER 21 Regs Research Data, released April 2021, based on the November 2020 submission. http://www.seer.cancer.gov.

Table 7a

Standardized incidence ratio (SIR, with 95% confidence limits),
excess absolute risk (EAR) and DCO rate of further malignancies
for period 1998-2019
MALES

Diagnosis	Observed n	Expected n	SIR	CI 95%	CI 95%	EAR	DCO %
C12-C13 Hypopharynx	1	0.0	77.7	2.0	433.1 #	42.5	100.0
C43 Malign. melanoma	1	0.1	9.6	0.2	53.6	38.6	100.0
C61 Prostate	1	0.5	2.0	0.0	11.0	21.2	
Not observed	0	1.3	0.0	0.0	2.8	-56.7	
All further malignancies	3	1.9	1.5	0.3	4.5	45.7	66.7

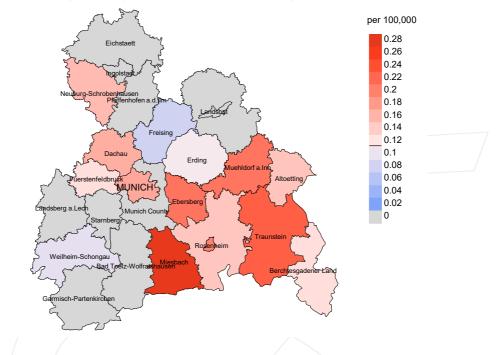|	
Patients	55
Median age at next malignancy (years)	71.6
Person-years	232
Mean observation time (years)	4.2
Median observation time (years)	2.8

The occurrence of further specified malignancy is statistically significant.

Table 7b

Standardized incidence ratio (SIR, with 95% confidence limits),
excess absolute risk (EAR) and DCO rate of further malignancies
for period 1998-2019
FEMALES

Diagnosis	Observed n	Expected n	SIR	CI 95%	CI 95%	EAR	DCO %
C18 Colon	1	0.2	5.2	0.1	29.0	37.7	100.0
C33-C34 Lung	1	0.2	5.9	0.2	33.0	38.8	
C43 Malign. melanoma	1	0.1	11.5	0.3	64.3	42.6	
C50 Breast	3	0.7	4.4	0.9	13.0	108.5	
C90 Mult. myeloma	1	0.0	35.8	0.9	199.6	45.4	
Not observed	0	1.0	0.0	0.0	3.7	-47.0	
All further malignancies	7	2.2	3.2	1.3	6.7 #	226.1	14.3

Patients	61
Median age at next malignancy (years)	69.1
Person-years	214
Mean observation time (years)	3.5
Median observation time (years)	2.2

The occurrence of further specified malignancy is statistically significant.

Average incidence (Germany 1987 standard population) 2007 - 2020: Males

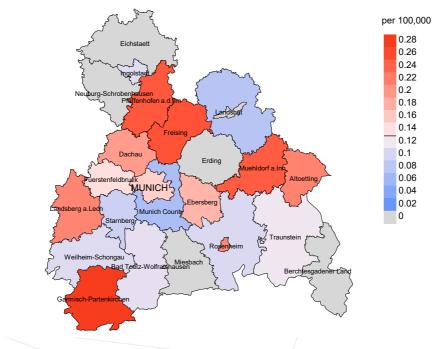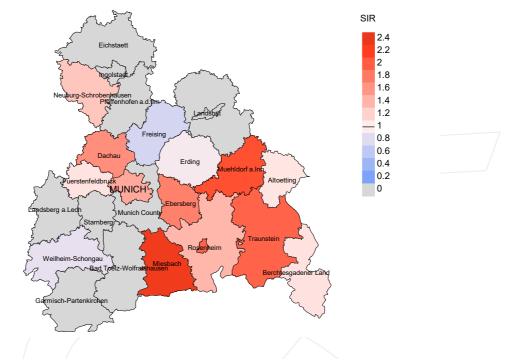Average incidence (Germany 1987 standard population) 2007 - 2020: Females

Figure 8a. Map of cancer incidence (german standard population, incl. DCO cases) by county averaged for period 2007 to 2020. According to their individual incidence rates, the counties are displayed in different red and blue hues, being the fine white color attributed to the population mean (males 0.1/100,000 WS N=40, females 0.1/100,000 WS N=49).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 67,727 female residents (averaged) in the period from 2007 to 2020 a total of 2 women were identified with newly diagnosed meninges cancer. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 0.2/100,000 (german standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.0 and 0.9/100,000.

Standardized incidence ratio (SIR) 2007 - 2020: Males

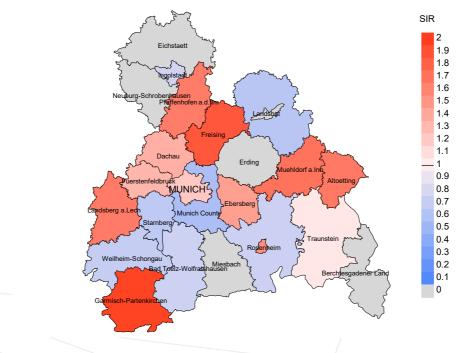Standardized incidence ratio (SIR) 2007 - 2020: Females

Figure 8b. Map of standardized incidence ratio (SIR, incl. DCO cases) by county averaged for period 2007 to 2020. According to their individual SIR values, the counties are displayed in different red and blue hues, being the fine white color attributed to the population overall of 1.0 (males N=40, females N=49).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 67,153 female residents (averaged) in the period from 2007 to 2020 a total of 2 women were identified with newly diagnosed meninges cancer. Therefore, the mean standardized incidence ratio (SIR) for this cancer type in this area can be calculated at 1.45. Though, the value of this parameter may vary with an underlying probability of 99% between 0.08 and 6.73, and is therefore not statistically striking.

MORTALITY

Table 9a

Annual cohorts: Incident cancers, follow-up status,
proportion of DCO, deaths among the annual cohorts
and proportion of available death certificates
(with respect to registry area expansion from 2.65 to 4.10 m as of 2002,
and from 4.10 to 4.94 m as of 2007, respectively)

Year of diagnosis	Incident cases n	Prop. actively followed %	Prop. DCO %	Deaths n	Prop. deaths %	Prop. deaths with death certific. %
1998	5	100.0	100.0	5	100.0	100.0
1999	1	100.0		1	100.0	
2000	1	100.0				
2001						
2002	3	100.0		1	33.3	100.0
2003	9	88.9	22.2	7	77.8	100.0
2004	3	100.0		1	33.3	100.0
2005	6	100.0		2	33.3	100.0
2006	10	70.0		4	40.0	100.0
2007	9	77.8		1	11.1	100.0
2008	8	87.5		4	50.0	100.0
2009	5	100.0		2	40.0	100.0
2010	5	100.0		2	40.0	100.0
2011	10	90.0		6	60.0	100.0
2012	8	100.0	12.5	3	37.5	66.7
2013	11	81.8		3	27.3	100.0
2014	10	100.0	10.0	2	20.0	100.0
2015	6	100.0		3	50.0	100.0
2016	10	90.0		4	40.0	100.0
2017	4	100.0	25.0	1	25.0	100.0
2018	2	100.0		1	50.0	100.0
2019	1	100.0				
1998-2019	127	91.3	7.9	53	41.7	96.2

Table 9b

Annual cohorts of incident cancers and deaths, proportion of death certificates
and cases deceased within the same year of being diagnosed with cancer
(incl. DCO)
(with respect to registry area expansion from 2.65 to 4.10 m as of 2002,
and from 4.10 to 4.94 m as of 2007, respectively)

Year of diagnosis/ death	Incident cases n	Deaths n	Prop. deaths with death certific. %	Deaths in same year n	Prop. deaths in same year %
1998	5	5	100.0	5	100.0
1999	1	1	100.0		
2000	1				
2001					
2002	3				
2003	9	2	100.0	1	11.1
2004	3	4	100.0	1	33.3
2005	6	1	100.0		
2006	10	1	100.0		
2007	9	2	100.0		
2008	8	2	100.0	1	12.5
2009	5	2	100.0		
2010	5	5	100.0	1	20.0
2011	10	8	100.0	3	30.0
2012	8	4	100.0	1	12.5
2013	11	4	75.0	2	18.2
2014	10	1	100.0	1	10.0
2015	6	5	100.0	2	33.3
2016	10	4	100.0	1	10.0
2017	4	5	100.0	1	25.0
2018	2	4	50.0		
2019	1	1	100.0		
1998–2019	127	61	95.1	20	15.7

Table 9c

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 2.65 to 4.10 m as of 2002,
and from 4.10 to 4.94 m as of 2007, respectively)

Year of death	Deaths n	Prop. cancer-related %	Prop. non-cancer-related %	Prop. cancer recorded on death certificate %
1998	5	40.0	60.0	100.0
1999	1	100.0		100.0
2000				
2001				
2002				
2003	2	100.0		100.0
2004	4	75.0	25.0	100.0
2005	1	100.0		100.0
2006	1	100.0		100.0
2007	2	50.0	50.0	50.0
2008	2	100.0		100.0
2009	2	100.0		100.0
2010	5	60.0	40.0	80.0
2011	8	75.0	25.0	87.5
2012	4	25.0	75.0	75.0
2013	4	50.0	50.0	66.7
2014	1		100.0	
2015	5	80.0	20.0	80.0
2016	4	75.0	25.0	75.0
2017	5	60.0	40.0	60.0
2018	4	50.0	50.0	100.0
2019	1		100.0	100.0
2020	1		100.0	
1998-2020	62	62.9	37.1	81.4

Table 10a

Medians of age at death according to the grouping in Table 9
MALES

Year of death	Deaths n	Age at death (all causes) Years	Age at death (cancer-related) Years	Age at death (non-cancer-related) Years	Age at death (according to death certificate) Years
1998					
1999					
2000					
2001					
2002					
2003	1	78.5	78.5		78.5
2004	3	67.0	67.0		67.0
2005					
2006					
2007	1	75.7	75.7		75.7
2008	1	74.0	74.0		74.0
2009	2	77.7	77.7		77.7
2010	2	74.3	71.6	77.0	71.6
2011	5	69.9	59.0	75.8	65.1
2012	1	76.6		76.6	
2013	2	86.6	81.3	92.0	81.3
2014					
2015	2	81.7	87.2	76.2	87.2
2016	3	74.4	74.2	80.9	74.2
2017	3	69.5	55.9	75.1	55.9
2018					
2019					
2020	1	75.6		75.6	
1998–2020	27	75.6	74.0	76.8	74.2

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 10b

Medians of age at death according to the grouping in Table 9
FEMALES

Year of death	Deaths n	Age at death (all causes) Years	Age at death (cancer-related) Years	Age at death (non-cancer-related) Years	Age at death (according to death certificate) Years
1998	5	81.6	79.4	83.6	81.6
1999	1	40.6	40.6		40.6
2000					
2001					
2002					
2003	1	63.8	63.8		63.8
2004	1	84.1		84.1	84.1
2005	1	83.5	83.5		83.5
2006	1	55.2	55.2		55.2
2007	1	81.9		81.9	
2008	1	58.8	58.8		58.8
2009					
2010	3	79.5	71.7	90.4	79.5
2011	3	59.2	59.2		59.2
2012	3	78.8	38.3	83.6	78.8
2013	2	77.9	83.7	72.1	83.7
2014	1	82.7		82.7	
2015	3	81.1	81.1		81.1
2016	1	55.0	55.0		55.0
2017	2	74.6	74.6		74.6
2018	4	67.0	65.7	71.2	65.7
2019	1	83.4		83.4	83.4
2020					
1998–2020	35	79.1	69.3	83.4	78.9

By 2018, Bavarians' life expectancy at birth is estimated at 79.3 years for boys and 83.8 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.

Table 11a

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

Year of death	Deaths n	Mort. raw	MI-Index raw	Mort. WS	MI-Index WS	Mort. ES	MI-Index ES	Mort. BRD-S	MI-Index BRD-S
1998									
1999									
2000									
2001									
2002									
2003	1	0.1	0.17	0.0	0.12	0.0	0.16	0.1	0.23
2004	3	0.2	1.50	0.1	1.06	0.1	1.45	0.2	1.50
2005									
2006									
2007	1	0.0	0.14	0.0	0.07	0.0	0.12	0.1	0.22
2008	1	0.0	0.50	0.0	0.50	0.0	0.50	0.0	0.50
2009	2	0.1	0.67	0.0	0.44	0.1	0.50	0.1	0.69
2010	1	0.0	0.25	0.0	0.18	0.0	0.21	0.0	0.24
2011	3	0.1	0.75	0.1	1.13	0.1	0.96	0.1	0.64
2012									
2013	1	0.0	0.25	0.0	0.13	0.0	0.18	0.0	0.31
2014									
2015	1	0.0	0.50	0.0	0.69	0.0	0.69	0.0	0.48
2016	2	0.1	0.40	0.0	0.31	0.1	0.38	0.1	0.39
2017	1	0.0	1.00	0.0	0.65	0.0	0.84	0.0	0.84
2018									
1998-2018	17	0.0	0.32	0.0	0.24	0.0	0.29	0.0	0.33

Table 11b

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

Year of death	Deaths n	Mort. raw	MI-Index raw	Mort. WS	MI-Index WS	Mort. ES	MI-Index ES	Mort. BRD-S	MI-Index BRD-S
1998	2	0.2	0.40	0.0	0.31	0.1	0.36	0.2	0.45
1999	1	0.1	1.00	0.1	1.60	0.1	1.24	0.1	1.11
2000									
2001									
2002									
2003	1	0.1	0.33	0.0	0.29	0.0	0.26	0.0	0.28
2004									
2005	1	0.1	0.33	0.0	0.10	0.0	0.15	0.0	0.27
2006	1	0.0	0.14	0.0	0.24	0.0	0.22	0.0	0.17
2007									
2008	1	0.0	0.17	0.0	0.23	0.0	0.24	0.0	0.19
2009									
2010	2	0.1	2.00	0.0	1.31	0.1	1.64	0.1	2.55
2011	3	0.1	0.50	0.1	0.46	0.1	0.48	0.1	0.51
2012	1	0.0	0.25	0.0	0.71	0.0	0.49	0.0	0.31
2013	1	0.0	0.14	0.0	0.05	0.0	0.07	0.0	0.13
2014									
2015	3	0.1	0.75	0.0	0.42	0.1	0.52	0.1	0.58
2016	1	0.0	0.20	0.0	0.17	0.0	0.20	0.0	0.19
2017	2	0.1	0.67	0.0	0.60	0.0	0.58	0.1	0.62
2018	2	0.1	2.00	0.0	0.87	0.1	1.15	0.1	1.60
1998-2018	22	0.1	0.33	0.0	0.28	0.0	0.30	0.0	0.32

Table 12

Age distribution of age at death (cancer-related) for period 2007-2018
(incl. multiple malignancies)

Age at death Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
0-4									
5-9									
10-14									
15-19									
20-24									
25-29									
30-34									
35-39	1	3.4	3.4			0.0	1	6.3	6.3
40-44	0	0.0	3.4			0.0			6.3
45-49	2	6.9	10.3	1	7.7	7.7	1	6.3	12.5
50-54	1	3.4	13.8			7.7	1	6.3	18.8
55-59	5	17.2	31.0	2	15.4	23.1	3	18.8	37.5
60-64	2	6.9	37.9			23.1	2	12.5	50.0
65-69	0	0.0	37.9			23.1			50.0
70-74	6	20.7	58.6	5	38.5	61.5	1	6.3	56.3
75-79	5	17.2	75.9	2	15.4	76.9	3	18.8	75.0
80-84	4	13.8	89.7	2	15.4	92.3	2	12.5	87.5
85+	3	10.3	100.0	1	7.7	100.0	2	12.5	100.0
All ages	29	100.0		13	100.0		16	100.0	

Table 13

Age-specific mortality (cancer-related) and proportion of all cancers
for period 2007-2018
(**incl. multiple malignancies**)

Age at death Years	Males n	Females n	Males Age- spec. mortal.	MI-index	Females Age- spec. mortal.	MI-index	Males Prop.all cancers %	Females Prop.all cancers %
0- 4								
5- 9								
10-14								
15-19								
20-24								
25-29								
30-34								
35-39		1			0.1	0.54		0.2
40-44								
45-49	1	1	0.0	0.54	0.0	0.18	0.1	0.1
50-54		1			0.0	0.22		0.0
55-59	2	3	0.1	1.10	0.2	0.82	0.0	0.1
60-64		2			0.1	0.44		0.0
65-69								
70-74	5	1	0.4	0.67	0.1	0.54	0.0	0.0
75-79	2	3	0.2	0.37	0.2	0.41	0.0	0.0
80-84	2	2	0.3	0.74	0.2	0.74	0.0	0.0
85+	1	2	0.3	1.00	0.2	0.72	0.0	0.0
All ages	13	16					0.0	0.0
Mortality								
Raw			0.0	0.35	0.1	0.35		
WS			0.0	0.26	0.0	0.27		
ES			0.0	0.31	0.0	0.31		
BRD-S			0.0	0.35	0.0	0.33		
PYLL-70								
per 100,000			0.2		0.5			
ES			0.2		0.4			
AYLL-70			15.8		15.6			

Table 14a

Further malignancies in deaths in period 1998-2018
MALES

Diagnosis	Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C09-C10 Oropharynx	1	10.0	1	100.0				
C12-C13 Hypopharynx	1	10.0					1	100.0
C18 Colon	1	10.0	1	100.0				
C43 Malign. melanoma	1	10.0					1	100.0
C61 Prostate	1	10.0	1	100.0				
C70-C72 CNS cancer	2	20.0					2	100.0
C81 Hodgkin lymphoma	1	10.0	1	100.0				
C82-C85 NHL	1	10.0	1	100.0				
C90 Mult. myeloma	1	10.0	1	100.0				
All further malignancies	10	100.0	6	60.0			4	40.0

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 further malignancy.

Table 14b

Further malignancies in deaths in period 1998-2018
FEMALES

Diagnosis	Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C33-C34 Lung	2	22.2	1	50.0			1	50.0
C64 Kidney	1	11.1	1	100.0				
C70-C72 CNS cancer	5	55.6					5	100.0
C90 Mult. myeloma	1	11.1					1	100.0
All further malignancies	9	100.0	2	22.2			7	77.8

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 further malignancy.

Table 15

Age-specific mortality (cancer-related) and proportion of all cancers
for period 2007-2018
(**First primaries only** *)
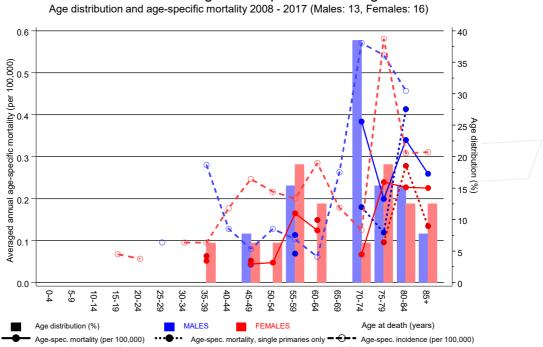
Age at death Years	Males n	Females n	Males Age-spec. mortal.	MI-index	Females Age-spec. mortal.	MI-index	Males Prop.all cancers %	Females Prop.all cancers %
0- 4								
5- 9								
10-14								
15-19								
20-24								
25-29								
30-34								
35-39		1			0.1	0.54		0.3
40-44								
45-49		1			0.0	0.18		0.1
50-54		1			0.0	0.36		0.0
55-59	1		0.1	0.55			0.0	
60-64		2			0.1	0.44		0.0
65-69								
70-74	3		0.2	0.65			0.0	
75-79	2	1	0.2	1.10	0.1	0.22	0.0	0.0
80-84	2	2	0.3	1.11	0.2	0.74	0.0	0.0
85+		2			0.2	1.09		0.0
All ages	8	10					0.0	0.0

Mortality					
Raw	0.0	0.29	0.0	0.28	
WS	0.0	0.17	0.0	0.21	
ES	0.0	0.22	0.0	0.23	
BRD-S	0.0	0.29	0.0	0.25	

PYLL-70		
per 100,000	0.1	0.4
ES	0.0	0.3
AYLL-70	12.5	17.5

* See corresponding tables with multiple malignancies.

Table 16

Age-specific mortality (cancer-related) and proportion of all cancers
for period 2008-2017
(**Single primaries only** *)

Age at death Years	Males n	Females n	Males Age-spec. mortal.	MI-index	Females Age-spec. mortal.	MI-index	Males Prop.all cancers %	Females Prop.all cancers %
0- 4								
5- 9								
10-14								
15-19								
20-24								
25-29								
30-34								
35-39		1			0.1	0.66		0.3
40-44								
45-49		1			0.1	0.21		0.1
50-54								
55-59	1		0.1	0.67			0.0	
60-64		2			0.1	0.65		0.1
65-69								
70-74	2		0.2	0.63			0.0	
75-79	1	1	0.1	1.32	0.1	0.26	0.0	0.0
80-84	2	2	0.4	1.36	0.3	0.90	0.0	0.0
85+		1			0.1	0.65		0.0
All ages	6	8					0.0	0.0
Mortality								
Raw			0.0	0.28	0.0	0.29		
WS			0.0	0.16	0.0	0.23		
ES			0.0	0.21	0.0	0.24		
BRD-S			0.0	0.28	0.0	0.27		
PYLL-70								
per 100,000			0.1		0.3			
ES			0.1		0.3			
AYLL-70			12.5		17.5			

* See corresponding tables with multiple malignancies.

ICD-10 C70: Malignant neoplasm of meninges
Age distribution and age-specific mortality 2008 - 2017 (Males: 13, Females: 16)
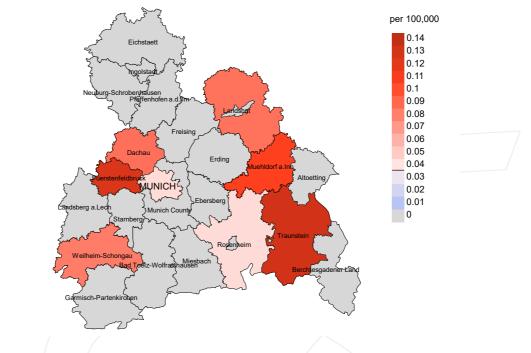
Figure 17. Distribution of age at death (bars; males: mean=68.6 yrs, median=73.6 yrs; females: mean=63.8 yrs, median=68.7 yrs) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

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

Average mortality (Germany 1987 standard population) 2007 - 2020: Males

Average mortality (Germany 1987 standard population) 2007 - 2020: Females
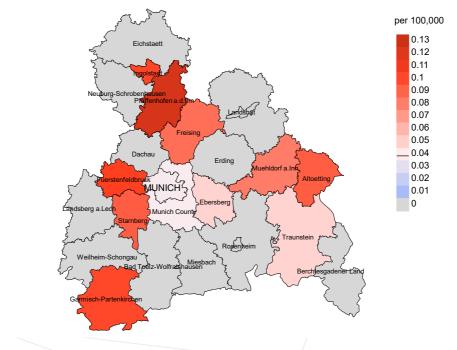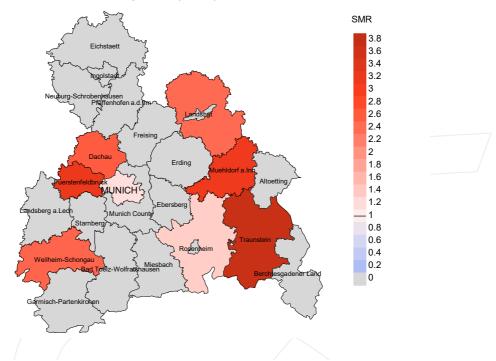
Figure 18a. Map of cancer mortality (german standard population) by county averaged for period 2007 to 2020. According to their individual mortality rates, the counties are displayed in different red and blue hues, being the fine white color attributed to the population mean (males 0.0/100,000 WS N=13, females 0.0/100,000 WS N=16).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 67,727 female residents (averaged) in the period from 2007 to 2020 a total of 1 women died from meninges cancer. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 0.0/100,000 (german 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) 2007 - 2020: Males

Standardized mortality ratio (SMR) 2007 - 2020: Females
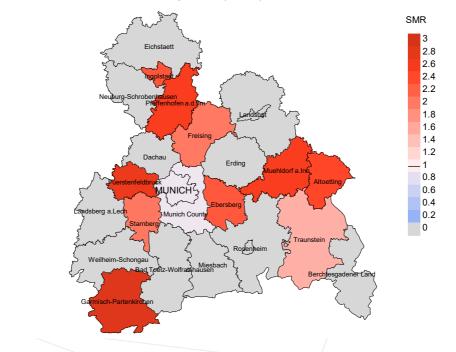
Figure 18b. Map of standardized mortality ratio (SMR, incl. DCO cases) by county averaged for period 2007 to 2020. According to their individual SMR values, the counties are displayed in different red and blue hues, being the fine white color attributed to the population overall of 1.0 (males N=13, females N=16).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 67,153 female residents (averaged) in the period from 2007 to 2020 a total of 1 women died from meninges cancer. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 2.28. Though, the value of this parameter may vary with an underlying probability of 99% between 0.01 and 16.91, 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 ratio of mortality and incidence (mortality-to-incidence ratio, **MIR**, **MI-Index**) is a statistical index 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 MIR. 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

MCR   Munich Cancer Registry (Tumorregister München)

GEKID   Association of Population-based Cancer Registries in Germany
                 (Gesellschaft der epidemiologischen Krebsregister in Deutschland e.V.)

SEER   Surveillance, Epidemiology, and End Results (USA)

DCO   Death certificate only

BRD-S   German (FRG) standard population
ES   European standard population (old)
WS   World standard population

SIR   Standardized incidence ratio
CI   Confidence interval
EAR   Excess absolute risk
                 = excess cancer cases (O - E) per 10,000 person-years

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

SMR   Standardized mortality ratio
MI-index   Ratio of mortality to incidence, MIR

FRG   Federal Republic of Germany

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