

# Munich Cancer Registry



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## ICD-10 C71: Brain cancer

### Incidence and Mortality

Year of diagnosis	1998-2019
Patients	5,831
Diseases	5,833
Creation date	01/25/2021
Database export	01/07/2021
Population	4.92 m



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<https://www.tumorregister-muenchen.de/en>

[https://www.tumorregister-muenchen.de/en/facts/base/bC71\\_\\_E-ICD-10-C71-Brain-cancer-incidence-and-mortality.pdf](https://www.tumorregister-muenchen.de/en/facts/base/bC71__E-ICD-10-C71-Brain-cancer-incidence-and-mortality.pdf)

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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<sup>#</sup>, with a total of 4.69 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<sup>###</sup> 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](mailto:tumor@ibe.med.uni-muenchen.de).

Munich Cancer Registry, January 2021

<sup>#</sup> 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).

<sup>##</sup> 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.

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

Code	Description
C71.-	Malignant neoplasm of brain
C71.0	Cerebrum, except lobes and ventricles
C71.1	Frontal lobe
C71.2	Temporal lobe
C71.3	Parietal lobe
C71.4	Occipital lobe
C71.5	Cerebral ventricle
C71.6	Cerebellum
C71.7	Brain stem
C71.8	Overlapping lesion of brain
C71.9	Brain, 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	149	49	32.9	8.1	2.0	88.6	97.3
1999	147	58	39.5	9.8	1.9	94.6	98.0
2000	171	54	31.6	9.4	1.9	86.5	98.2
2001	195	59	30.3	9.1	1.9	89.2	96.9
2002	277	64	23.1	8.7	2.0	88.1	98.6 #
2003	323	73	22.6	8.7	1.9	86.4	98.5
2004	295	73	24.7	8.9	1.9	87.5	98.3
2005	330	65	19.7	9.4	1.8	84.8	97.6
2006	263	40	15.2	9.5	1.8	89.4	98.1
2007	303	50	16.5	9.6	1.8	82.5	95.7 #
2008	356	56	15.7	9.7	1.7	81.5	99.2
2009	405	55	13.6	9.9	1.4	84.9	98.3
2010	339	54	15.9	10.1	1.3	87.0	98.8
2011	361	46	12.7	10.4	1.2	77.8	99.2
2012	360	41	11.4	10.5	1.2	79.7	98.9
2013	340	40	11.8	10.8	1.3	83.5	99.1
2014	322	32	9.9	11.0	1.2	83.2	98.1
2015	307	39	12.7	11.0	0.7	80.8	98.7
2016	248	38	15.3	11.0	0.9	78.6	99.6
2017	170	37	21.8	11.3	0.9	74.1	100.0
2018	93	10	10.8	11.5	0.6	55.9	100.0
2019	79	3	3.8	11.6	0.0	46.8	83.5 ##
1998-2019	5833	1036	17.8	11.6	2.0	83.1	98.2

5,833 cases diagnosed 1998-2019 are related to a total of 5,831 patients. Currently, in 810 (13.9 %) of these 5,831 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 693 / 97 / 20 (11.9 % / 1.7 % / 0.3 %) 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 170 cases has been diagnosed, of which 11.3 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 0.9 % 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	76	51.0	24	31.6	7.9	1.8	89.5	97.4
1999	74	50.3	28	37.8	9.3	1.8	95.9	98.6
2000	89	52.0	23	25.8	9.2	1.8	84.3	97.8
2001	91	46.7	26	28.6	8.2	1.8	90.1	97.8
2002	134	48.4	24	17.9	8.2	1.8	86.6	97.8 #
2003	169	52.3	32	18.9	7.9	1.8	88.2	99.4
2004	146	49.5	28	19.2	8.5	1.8	92.5	99.3
2005	176	53.3	30	17.0	9.1	1.6	89.8	97.7
2006	153	58.2	17	11.1	9.4	1.7	88.9	98.0
2007	167	55.1	23	13.8	9.4	1.7	80.2	95.2 #
2008	199	55.9	25	12.6	9.7	1.6	84.4	99.5
2009	241	59.5	25	10.4	10.1	1.3	83.0	97.9
2010	188	55.5	25	13.3	10.2	1.2	86.2	98.4
2011	194	53.7	19	9.8	10.8	1.3	81.4	99.5
2012	188	52.2	19	10.1	10.8	1.2	80.9	99.5
2013	198	58.2	18	9.1	11.3	1.4	86.4	100.0
2014	185	57.5	12	6.5	11.4	1.3	82.7	98.9
2015	168	54.7	18	10.7	11.5	0.6	84.5	98.8
2016	132	53.2	16	12.1	11.4	0.9	76.5	99.2
2017	102	60.0	18	17.6	11.7	0.5	73.5	100.0
2018	58	62.4	7	12.1	12.0	0.0	63.8	100.0
2019	53	67.1	2	3.8	12.1	0.0	43.4	81.1 ##
1998–2019	3181	54.5	459	14.4	12.1	1.8	83.8	98.3

3,181 cases diagnosed 1998-2019 are related to a total of 3,179 patients. Currently, in 445 (14.0 %) of these 3,179 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 376 / 56 / 13 (11.8 % / 1.8 % / 0.4 %) 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 102 cases has been diagnosed, of which 11.7 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 0.5 % 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	73	49.0	25	34.2	8.2	2.2	87.7	97.3
1999	73	49.7	30	41.1	10.3	2.1	93.2	97.3
2000	82	48.0	31	37.8	9.6	2.1	89.0	98.8
2001	104	53.3	33	31.7	9.9	2.1	88.5	96.2
2002	143	51.6	40	28.0	9.3	2.2	89.5	99.3 #
2003	154	47.7	41	26.6	9.5	2.1	84.4	97.4
2004	149	50.5	45	30.2	9.3	2.1	82.6	97.3
2005	154	46.7	35	22.7	9.7	2.0	79.2	97.4
2006	110	41.8	23	20.9	9.6	1.9	90.0	98.2
2007	136	44.9	27	19.9	9.8	1.9	85.3	96.3 #
2008	157	44.1	31	19.7	9.7	1.8	77.7	98.7
2009	164	40.5	30	18.3	9.7	1.5	87.8	98.8
2010	151	44.5	29	19.2	9.9	1.4	88.1	99.3
2011	167	46.3	27	16.2	10.0	1.2	73.7	98.8
2012	172	47.8	22	12.8	10.2	1.2	78.5	98.3
2013	142	41.8	22	15.5	10.2	1.2	79.6	97.9
2014	137	42.5	20	14.6	10.5	1.0	83.9	97.1
2015	139	45.3	21	15.1	10.5	0.8	76.3	98.6
2016	116	46.8	22	19.0	10.5	0.8	81.0	100.0
2017	68	40.0	19	27.9	10.8	1.6	75.0	100.0
2018	35	37.6	3	8.6	10.9	1.7	42.9	100.0
2019	26	32.9	1	3.8	11.0	0.0	53.8	88.5 ##
1998-2019	2652	45.5	577	21.8	11.0	2.2	82.2	98.1

2,652 cases diagnosed 1998-2019 are related to a total of 2,652 patients. Currently, in 365 (13.8 %) of these 2,652 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 317 / 41 / 7 (12.0 % / 1.5 % / 0.3 %) 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 68 cases has been diagnosed, of which 10.8 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 1.6 % 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 4.92 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	76	73	6.9	6.2	4.8	4.1	6.2	5.0	7.1	5.7
1999	74	73	6.6	6.2	4.3	3.6	6.0	4.7	7.3	5.5
2000	89	82	7.8	6.8	5.5	4.0	7.1	5.2	8.5	5.9
2001	91	104	7.9	8.5	5.2	5.0	7.1	6.5	8.5	7.6
2002	134	143	7.2	7.3	5.2	4.1	6.4	5.4	7.2	6.5
2003	169	154	9.0	7.8	6.1	4.7	7.9	6.0	9.2	7.0
2004	146	149	7.8	7.5	5.0	4.8	6.7	5.8	7.9	6.5
2005	176	154	9.3	7.7	6.3	4.7	7.9	5.8	9.1	6.7
2006	153	110	8.0	5.5	5.3	3.1	6.7	4.0	7.7	4.6
2007	167	136	7.5	5.9	5.1	3.4	6.5	4.4	7.3	5.2
2008	199	157	8.9	6.8	5.7	4.4	7.5	5.2	8.9	5.8
2009	241	164	10.8	7.1	6.8	4.0	8.9	5.3	10.5	6.1
2010	188	151	8.3	6.5	5.2	3.7	6.8	4.7	8.0	5.4
2011	194	167	8.7	7.1	5.4	3.9	7.1	5.1	8.2	6.1
2012	188	172	8.3	7.3	5.4	4.5	6.7	5.5	7.7	6.2
2013	198	142	8.6	6.0	5.5	3.5	6.9	4.5	7.9	5.1
2014	185	137	7.9	5.7	5.0	3.0	6.4	4.0	7.3	4.6
2015	168	139	7.1	5.7	4.4	3.3	5.7	4.2	6.6	4.9
2016	132	116	5.5	4.7	3.2	2.4	4.2	3.2	5.1	3.8
2017	102	68	4.2	2.8	2.3	1.2	3.2	1.7	3.8	2.1
2018	58	35	2.4	1.4	1.4	0.8	1.8	1.0	2.2	1.2
2019	53	26	2.2	1.0	1.2	0.4	1.6	0.7	1.9	0.8
1998-2019	3181	2652	7.2	5.8	4.6	3.4	6.0	4.3	6.9	4.9

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	Std.		Median						
		Mean	dev.	Min.	Max.	10%	25%	50%	75%	90%
1998	149	58.0	18.6	1.8	90.2	32.4	47.5	60.1	72.4	79.7
1999	147	62.7	17.4	4.7	93.4	42.2	53.5	65.8	75.8	82.2
2000	171	60.3	17.9	2.9	93.8	36.2	48.7	63.8	72.5	80.3
2001	195	60.9	17.9	2.3	92.0	37.0	50.8	62.6	73.9	80.5
2002	277	60.6	18.8	0.8	91.2	32.1	52.0	63.7	74.2	81.1
2003	323	59.5	18.2	0.6	95.4	33.3	47.6	63.1	74.0	80.2
2004	295	60.3	19.2	0.0	92.8	34.1	51.6	63.2	74.3	82.3
2005	330	59.5	19.8	0.8	94.3	33.4	47.5	64.0	73.6	81.8
2006	263	60.7	18.6	3.0	97.0	35.0	48.3	64.2	73.5	81.6
2007	303	59.6	19.1	2.2	93.5	32.5	47.5	63.4	73.7	81.2
2008	356	60.1	19.6	0.1	94.1	31.6	48.7	64.8	73.8	81.0
2009	405	61.8	17.8	0.2	94.2	36.5	52.9	65.0	74.4	82.5
2010	339	61.8	19.3	0.6	91.6	36.2	51.5	67.2	75.2	82.6
2011	361	61.1	18.2	6.2	94.0	36.6	49.6	64.1	75.7	82.0
2012	360	60.2	20.3	0.0	96.0	32.8	47.9	65.0	74.1	83.1
2013	340	61.2	18.5	0.1	93.9	37.4	52.2	65.3	74.6	80.7
2014	322	62.2	18.3	2.6	93.6	36.9	52.2	65.7	75.0	82.7
2015	307	61.8	17.7	0.5	95.8	35.9	52.5	64.7	74.8	80.8
2016	248	64.2	17.4	0.4	94.5	41.1	54.1	67.5	77.4	83.5
2017	170	66.3	16.9	9.4	94.3	40.2	57.6	70.3	77.4	84.8
2018	93	63.3	18.1	1.9	88.2	40.7	54.7	68.3	76.9	82.7
2019	79	65.5	14.3	31.9	94.9	44.0	55.3	68.9	76.8	81.8
1998-2019	5833	61.1	18.6	0.0	97.0	35.2	50.9	64.7	74.8	81.8



Table 3a

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

Year of diagnosis	Cases n	Std.		Median						
		Mean	dev.	Min.	Max.	10%	25%	50%	75%	90%
1998	76	55.5	15.3	14.5	80.9	32.6	47.1	57.3	67.2	74.8
1999	74	62.6	14.3	10.4	89.2	43.9	54.4	63.4	72.6	78.8
2000	89	57.8	17.2	4.1	84.2	31.1	48.2	60.0	68.9	78.5
2001	91	59.7	16.3	10.0	91.2	37.7	50.8	60.9	72.4	77.4
2002	134	56.5	18.5	0.8	87.7	30.9	46.7	62.0	68.8	76.2
2003	169	57.8	18.3	6.2	89.4	30.8	45.5	61.5	71.9	77.6
2004	146	59.8	16.5	0.1	90.1	37.4	48.8	61.0	70.4	81.9
2005	176	58.4	19.9	0.8	94.3	33.1	47.0	62.7	71.8	80.4
2006	153	58.5	17.4	3.0	90.4	34.7	47.1	63.0	69.7	77.5
2007	167	57.9	18.4	2.2	92.6	32.5	47.5	60.7	70.7	79.2
2008	199	59.6	17.5	1.2	94.1	33.1	48.7	64.1	72.9	78.7
2009	241	60.6	18.3	5.0	90.3	34.3	51.0	64.4	74.0	81.9
2010	188	60.4	18.6	2.7	90.8	34.4	49.8	63.8	74.4	81.0
2011	194	59.0	17.9	6.2	91.9	36.6	45.3	60.0	73.7	80.5
2012	188	59.7	20.8	0.3	96.0	30.5	47.3	65.3	74.0	81.3
2013	198	60.4	18.3	0.1	93.9	38.6	51.9	63.5	73.7	78.8
2014	185	60.3	18.6	2.6	93.6	35.4	51.2	62.9	73.8	81.7
2015	168	62.0	17.0	0.5	95.1	38.5	55.7	64.5	73.4	79.5
2016	132	62.4	18.1	0.4	93.0	38.0	51.6	65.3	76.7	81.8
2017	102	64.8	16.1	9.4	90.4	46.8	57.3	67.6	76.2	80.0
2018	58	63.1	16.9	1.9	87.5	42.0	52.0	64.9	76.9	82.7
2019	53	64.1	13.8	31.9	86.3	46.2	55.7	66.2	73.4	81.7
1998-2019	3181	59.8	18.0	0.1	96.0	35.2	49.9	62.9	73.0	79.9

Table 3b

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

Year of diagnosis	Cases n	Std.		Median						
		Mean	dev.	Min.	Max.	10%	25%	50%	75%	90%
1998	73	60.5	21.3	1.8	90.2	30.9	49.6	64.7	77.9	83.4
1999	73	62.8	20.1	4.7	93.4	33.4	51.8	68.3	77.6	85.1
2000	82	63.0	18.2	2.9	93.8	36.8	55.5	66.7	75.3	81.7
2001	104	62.0	19.2	2.3	92.0	35.3	50.9	65.5	76.0	81.8
2002	143	64.4	18.3	2.6	91.2	34.9	54.2	69.3	78.7	83.2
2003	154	61.5	18.0	0.6	95.4	36.6	51.9	64.6	75.2	80.8
2004	149	60.7	21.5	0.0	92.8	29.6	51.9	65.7	77.3	82.6
2005	154	60.8	19.7	2.7	91.7	34.5	47.7	65.1	75.8	83.4
2006	110	63.7	19.9	7.3	97.0	36.8	54.1	67.3	78.9	85.9
2007	136	61.8	19.7	4.0	93.5	32.3	47.4	67.2	77.9	82.7
2008	157	60.7	21.9	0.1	92.9	28.1	48.7	66.5	77.1	86.1
2009	164	63.5	16.9	0.2	94.2	44.1	54.4	65.2	75.8	83.6
2010	151	63.5	20.0	0.6	91.6	42.3	54.6	69.0	76.6	83.5
2011	167	63.5	18.4	11.1	94.0	36.3	50.3	68.8	78.3	83.1
2012	172	60.8	19.8	0.0	90.4	34.9	48.9	64.4	74.4	83.7
2013	142	62.3	18.7	0.7	92.8	37.1	52.8	65.9	76.1	84.4
2014	137	64.6	17.6	3.2	92.7	42.6	53.9	69.7	77.1	84.2
2015	139	61.7	18.7	5.9	95.8	32.9	49.7	65.1	76.6	83.1
2016	116	66.2	16.3	7.1	94.5	44.9	57.1	69.3	78.0	84.5
2017	68	68.4	18.0	20.3	94.3	36.8	60.8	72.8	81.6	86.4
2018	35	63.6	20.3	6.1	88.2	37.3	55.2	70.7	77.0	84.0
2019	26	68.3	15.1	35.3	94.9	44.0	54.7	73.8	78.3	81.8
1998-2019	2652	62.7	19.2	0.0	97.0	35.7	52.3	66.7	77.0	83.5

Table 4

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

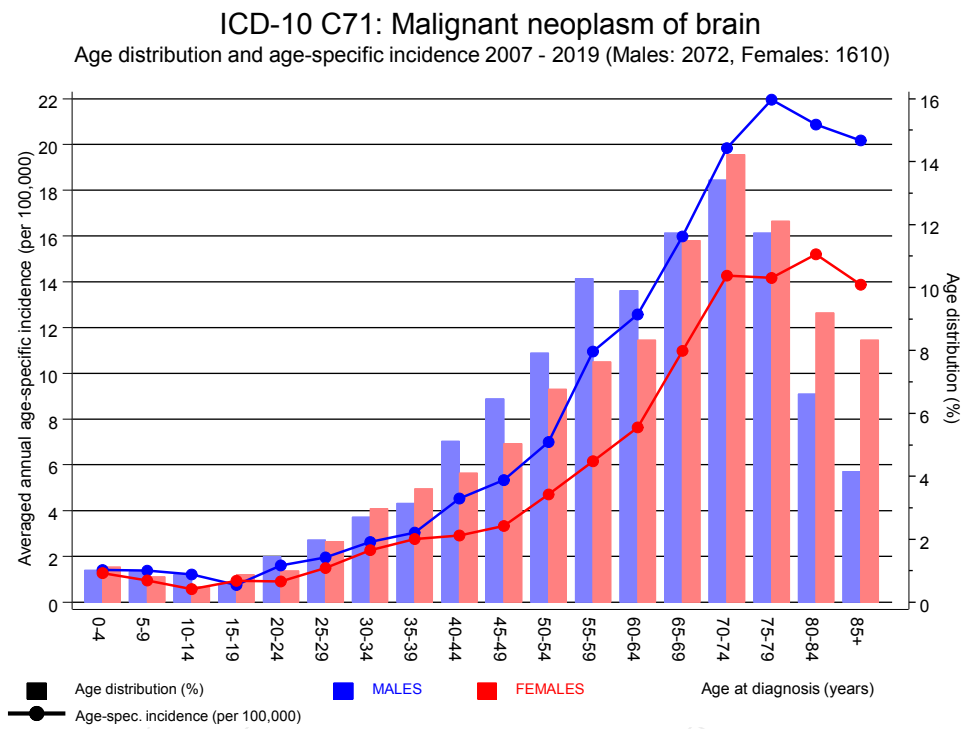
Age at diagnosis Years	Cases			Males			Females		
	n	%	Cum.%	n	%	Cum.%	n	%	Cum.%
0–4	39	1.1	1.1	21	1.0	1.0	18	1.1	1.1
5–9	33	0.9	2.0	20	1.0	2.0	13	0.8	1.9
10–14	26	0.7	2.7	18	0.9	2.8	8	0.5	2.4
15–19	26	0.7	3.4	12	0.6	3.4	14	0.9	3.3
20–24	46	1.2	4.6	30	1.4	4.9	16	1.0	4.3
25–29	72	2.0	6.6	41	2.0	6.8	31	1.9	6.2
30–34	104	2.8	9.4	56	2.7	9.6	48	3.0	9.2
35–39	123	3.3	12.7	65	3.1	12.7	58	3.6	12.8
40–44	172	4.7	17.4	106	5.1	17.8	66	4.1	16.9
45–49	215	5.8	23.2	134	6.5	24.3	81	5.0	21.9
50–54	273	7.4	30.7	164	7.9	32.2	109	6.8	28.7
55–59	336	9.1	39.8	213	10.3	42.5	123	7.6	36.3
60–64	339	9.2	49.0	205	9.9	52.3	134	8.3	44.7
65–69	429	11.6	60.6	244	11.8	64.1	185	11.5	56.1
70–74	507	13.8	74.4	278	13.4	77.5	229	14.2	70.4
75–79	438	11.9	86.3	243	11.7	89.2	195	12.1	82.5
80–84	285	7.7	94.0	137	6.6	95.9	148	9.2	91.7
85+	220	6.0	100.0	86	4.1	100.0	134	8.3	100.0
All ages	3683	100.0		2073	100.0		1610	100.0	

Table 5

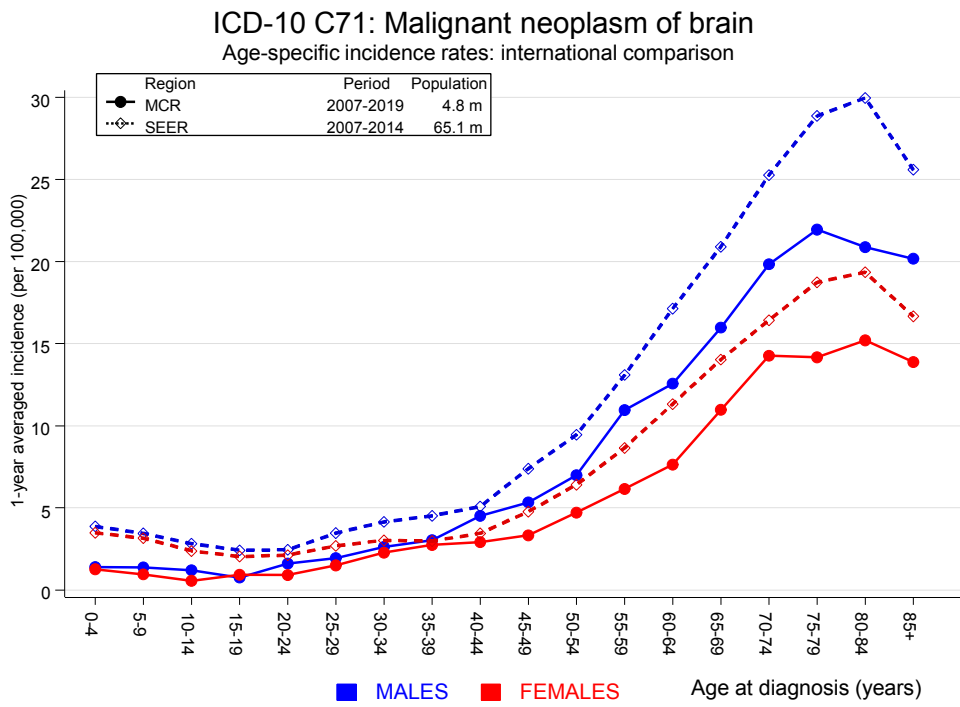
Age-specific incidence, DCO rate and proportion of all cancers  
for period 2007–2019

Age at diagnosis Years	Males n	Females n	Males Age- spec. incid.	Females Age- spec. incid.	Males DCO rate n=227 %	Females DCO rate n=274 %	Males	Females
							Prop.all cancers n=143063 %	Prop.all cancers n=144724 %
0- 4	21	18	1.4	1.3			10.0	11.2
5- 9	20	13	1.4	0.9	5.0		17.5	14.0
10-14	18	8	1.2	0.6			13.5	6.8
15-19	12	14	0.8	0.9	8.3		4.0	5.7
20-24	30	16	1.6	0.9	3.3		5.1	3.4
25-29	41	31	2.0	1.5	4.9		4.7	2.8
30-34	56	48	2.6	2.3		8.3	4.7	2.4
35-39	65	58	3.0	2.8	6.2		3.8	1.8
40-44	106	66	4.5	2.9	1.9	1.5	4.1	1.1
45-49	134	81	5.3	3.3	3.0	3.7	2.8	0.9
50-54	164	109	7.0	4.7	3.0	8.3	2.1	0.9
55-59	213	123	11.0	6.2	4.7	5.7	1.8	1.0
60-64	205	134	12.6	7.6	5.4	5.2	1.3	0.9
65-69	243	185	16.0	11.0	5.8	5.9	1.1	1.0
70-74	278	229	19.8	14.3	9.0	12.7	1.1	1.2
75-79	243	195	21.9	14.2	19.3	18.5	1.1	1.1
80-84	137	148	20.9	15.2	32.1	43.9	1.0	1.0
85+	86	134	20.2	13.9	65.1	76.1	0.9	0.9
All ages	2072	1610			11.0	17.0	1.4	1.1
Incidence								
Raw			6.9	5.2				
WS			4.3	2.9				
ES			5.5	3.8				
BRD-S			6.4	4.3				

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).



**Figure 6.** Age distribution (males: mean=60.6 yrs, median=63.8 yrs; females: mean=63.1 yrs, median=67.0 yrs) and age-specific incidence.



**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 2019, based on the November 2018 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 %
C07–C08 Salivary gland	1	0.1	10.9	0.3	60.6	1.6	
C17 Small intestine	1	0.3	3.6	0.1	20.1	1.2	100.0
C18 Colon	6	3.7	1.6	0.6	3.6	4.0	
C19–C20 Rectum	2	2.4	0.8	0.1	3.0	-0.7	50.0
C23–C24 Bile	1	0.4	2.5	0.1	14.1	1.0	100.0
C25 Pancreas	5	1.5	3.3	1.1	7.6 #	6.0	20.0
C30–C31 Sinuses	1	0.1	10.4	0.3	57.8	1.5	
C33–C34 Lung	5	5.1	1.0	0.3	2.3	-0.3	
C40–C41 Bone	1	0.1	18.8	0.5	104.8	1.6	
C43 Malign. melanoma	3	2.2	1.3	0.3	3.9	1.3	33.3
C46,C49 Soft tissue	3	0.3	11.2	2.3	32.8 #	4.7	
C61 Prostate	11	11.6	0.9	0.5	1.7	-1.0	
C64 Kidney	6	1.7	3.6	1.3	7.9 #	7.4	16.7
C67 Bladder	4	1.6	2.5	0.7	6.4	4.1	
C69 Eye melanoma	1	0.1	18.9	0.5	105.4	1.6	
C70–C72 CNS cancer	4	0.7	5.7	1.6	14.6 #	5.7	
C76–C79 CUP	1	0.7	1.5	0.0	8.3	0.6	
C81 Hodgkin lymphoma	1	0.2	5.5	0.1	30.5	1.4	
C82–C85 NHL	2	1.8	1.1	0.1	4.0	0.3	
C91–C96 Leukaemia	1	0.6	1.6	0.0	9.1	0.7	100.0
Not observed	0	8.7	0.0	0.0	0.4 #	-14.9	
All further malignancies	60	43.8	1.4	1.0	1.8 #	27.8	11.7
Patients		2855					
Median age at next malignancy (years)		64.3					
Person-years		5834					
Mean observation time (years)		2.0					
Median observation time (years)		0.9					

# 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

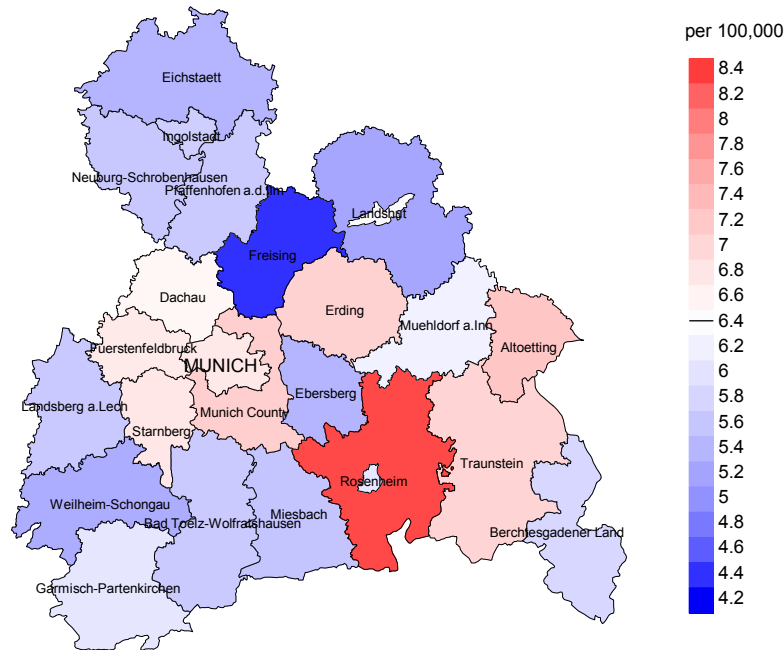
## FEMALES

Diagnosis	Observed n	Expected n	SIR	CI 95%	CI 95%	EAR	DCO %
C18 Colon	3	2.4	1.2	0.3	3.6	1.2	
C19-C20 Rectum	3	1.1	2.7	0.6	7.9	3.8	33.3
C23-C24 Bile	1	0.3	2.9	0.1	16.4	1.3	100.0
C25 Pancreas	1	1.1	0.9	0.0	4.9	-0.3	
C30-C31 Sinuses	1	0.0	22.6	0.6	125.9	1.9	
C33-C34 Lung	1	2.4	0.4	0.0	2.3	-2.8	
C40-C41 Bone	1	0.0	28.4	0.7	158.1	2.0	
C43 Malign. melanoma	3	1.5	2.1	0.4	6.0	3.1	
C46,C49 Soft tissue	1	0.2	5.5	0.1	30.9	1.7	
C50 Breast	19	11.1	1.7	1.0	2.7 #	16.0	15.8
C51 Vulva	1	0.3	3.6	0.1	19.9	1.5	
C53 Cervix uteri	1	0.7	1.5	0.0	8.3	0.7	
C54 Corpus uteri	4	1.8	2.3	0.6	5.8	4.5	
C56 Ovary	2	1.3	1.6	0.2	5.7	1.5	
C64 Kidney	1	0.7	1.5	0.0	8.4	0.7	
C73 Thyroid	2	0.9	2.3	0.3	8.1	2.3	
C82-C85 NHL	3	1.1	2.7	0.6	7.9	3.8	
C91-C96 Leukaemia	3	0.4	7.1	1.5	20.7 #	5.2	
Not observed	0	4.6	0.0	0.0	0.8 #	-9.4	
All further malignancies	51	31.9	1.6	1.2	2.1 #	38.6	9.8
Patients		2268					
Median age at next malignancy (years)		66.4					
Person-years		4944					
Mean observation time (years)		2.2					
Median observation time (years)		0.9					

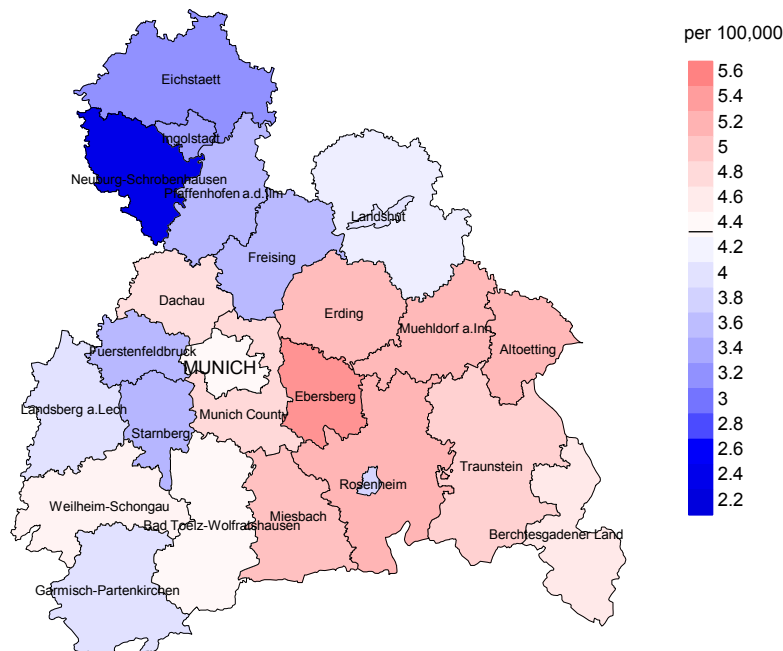
# The occurrence of further specified malignancy is statistically significant.



Average incidence (Germany 1987 standard population) 2007 - 2019: Males



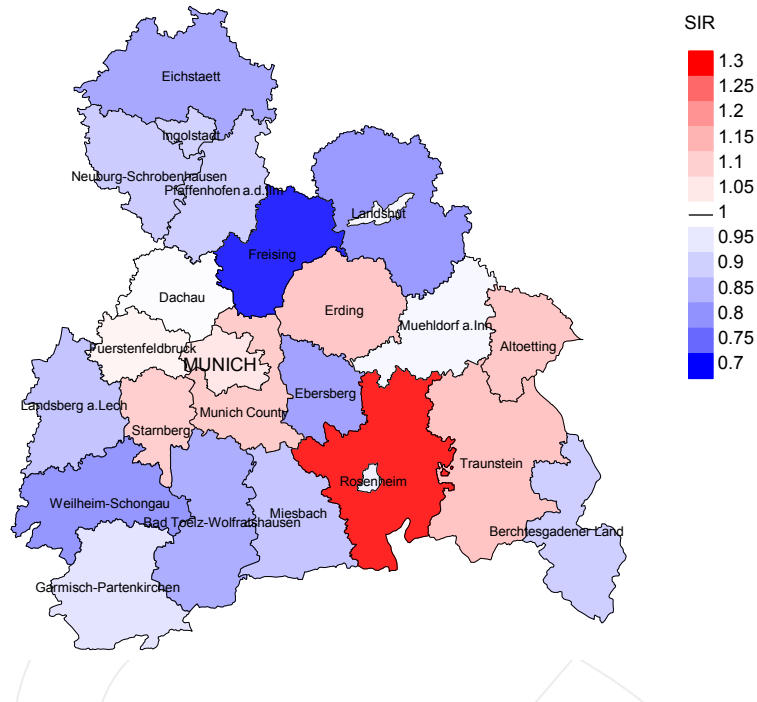
Average incidence (Germany 1987 standard population) 2007 - 2019: Females



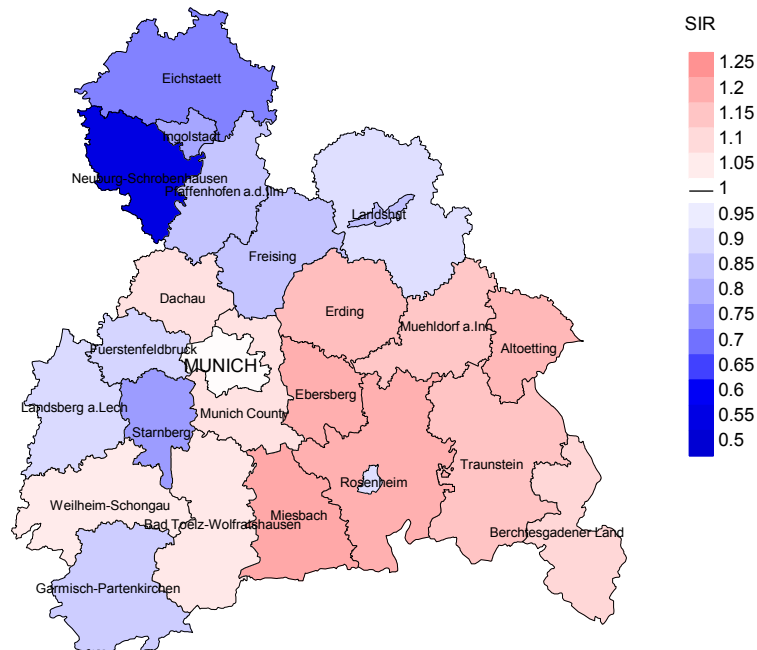
**Figure 8a.** Map of cancer incidence (german standard population, incl. DCO cases) by county averaged for period 2007 to 2019. According to their individual incidence rates, the counties are displayed in different red and blue hues, being the fine white color attributed to the population mean (males 6.4/100,000 WS N=2,072, females 4.3/100,000 WS N=1,610).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 67,462 female residents (averaged) in the period from 2007 to 2019 a total of 53 women were identified with newly diagnosed brain cancer. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 5.5/100,000 (german standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 3.7 and 7.8/100,000.

Standardized incidence ratio (SIR) 2007 - 2019: Males



Standardized incidence ratio (SIR) 2007 - 2019: Females



**Figure 8b.** Map of standardized incidence ratio (SIR, incl. DCO cases) by county averaged for period 2007 to 2019. 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=2,072, females N=1,610).

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 2019 a total of 53 women were identified with newly diagnosed brain cancer. Therefore, the mean standardized incidence ratio (SIR) for this cancer type in this area can be calculated at 1.20. Though, the value of this parameter may vary with an underlying probability of 99% between 0.81 and 1.69, 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 4.92 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	149	97.3	32.9	132	88.6	98.5
1999	147	98.0	39.5	139	94.6	95.7
2000	171	98.2	31.6	148	86.5	95.3
2001	195	96.9	30.3	174	89.2	93.1
2002	277	98.6	23.1	244	88.1	98.8
2003	323	98.5	22.6	279	86.4	95.0
2004	295	98.3	24.7	258	87.5	97.3
2005	330	97.6	19.7	280	84.8	96.8
2006	263	98.1	15.2	235	89.4	97.0
2007	303	95.7	16.5	250	82.5	95.6
2008	356	99.2	15.7	290	81.5	96.6
2009	405	98.3	13.6	344	84.9	95.9
2010	339	98.8	15.9	295	87.0	98.6
2011	361	99.2	12.7	281	77.8	97.2
2012	360	98.9	11.4	287	79.7	94.8
2013	340	99.1	11.8	284	83.5	93.0
2014	322	98.1	9.9	268	83.2	95.5
2015	307	98.7	12.7	248	80.8	95.6
2016	248	99.6	15.3	195	78.6	92.8
2017	170	100.0	21.8	126	74.1	79.4
2018	93	100.0	10.8	52	55.9	46.2
2019	79	83.5	3.8	37	46.8	86.5
1998-2019	5833	98.2	17.8	4846	83.1	94.9

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 4.92 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	149	106	99.1	63	42.3
1999	147	141	97.2	85	57.8
2000	171	131	94.7	77	45.0
2001	195	150	93.3	93	47.7
2002	277	195	96.9	107	38.6
2003	323	216	97.7	117	36.2
2004	295	236	97.0	114	38.6
2005	330	218	97.2	127	38.5
2006	263	238	95.8	103	39.2
2007	303	224	97.3	109	36.0
2008	356	230	97.0	112	31.5
2009	405	277	97.8	129	31.9
2010	339	318	98.1	129	38.1
2011	361	280	98.6	113	31.3
2012	360	284	96.8	119	33.1
2013	340	268	96.6	102	30.0
2014	322	292	98.3	106	32.9
2015	307	277	97.8	107	34.9
2016	248	302	99.3	111	44.8
2017	170	237	94.5	77	45.3
2018	93	117	36.8	23	24.7
2019	79	93	50.5	20	25.3
1998–2019	5833	4830	94.8	2143	36.7

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 4.92 m as of 2007, respectively)

Year of death	Deaths n	Prop. cancer- related %	Prop. non-cancer- related %	Prop. cancer recorded on death certificate %
1998	106	75.5	24.5	100.0
1999	141	75.9	24.1	97.8
2000	131	79.4	20.6	98.4
2001	150	84.0	16.0	99.3
2002	195	91.8	8.2	99.5
2003	216	94.4	5.6	98.6
2004	236	93.6	6.4	99.1
2005	218	89.9	10.1	97.6
2006	238	91.2	8.8	97.8
2007	224	95.5	4.5	98.6
2008	230	94.3	5.7	98.7
2009	277	91.0	9.0	97.4
2010	318	93.7	6.3	98.1
2011	280	94.6	5.4	98.2
2012	284	93.0	7.0	98.9
2013	268	92.9	7.1	98.1
2014	292	97.3	2.7	99.3
2015	277	94.6	5.4	98.2
2016	302	95.7	4.3	99.3
2017	237	93.7	6.3	98.2
2018	117	44.4	55.6	97.7
2019	93	53.8	46.2	97.9
1998–2019	4830	90.1	9.9	98.5

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	48	60.9	57.8	68.8	60.9
1999	76	64.1	66.5	63.5	64.1
2000	60	64.7	63.4	71.4	66.0
2001	80	65.5	64.9	69.8	65.5
2002	107	62.7	62.9	59.0	63.1
2003	99	67.1	67.0	72.0	67.1
2004	121	65.4	65.2	68.3	65.2
2005	128	64.4	63.0	73.3	63.5
2006	126	63.9	64.0	63.7	64.0
2007	127	66.0	66.1	57.8	66.2
2008	124	64.3	64.2	73.8	64.3
2009	166	68.6	67.7	70.0	66.6
2010	199	68.7	68.7	68.6	68.7
2011	152	67.4	67.4	65.1	67.4
2012	157	68.2	67.4	68.6	67.8
2013	149	66.9	67.0	61.7	67.0
2014	173	66.1	66.1	75.6	66.9
2015	165	67.4	67.4	61.6	68.6
2016	163	64.7	64.3	73.2	64.9
2017	132	64.7	64.6	69.2	64.5
2018	76	67.6	69.1	65.2	67.1
2019	57	67.7	63.9	69.5	65.4
1998-2019	2685	66.0	65.8	68.4	66.0

Deaths of patients are considered to be cancer-related, in case that fact was recorded on the death certificate, or patients had suffered from metastasis or recurrence.

Table 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	58	72.4	72.8	71.5	72.7
1999	65	71.4	68.2	78.6	72.5
2000	71	70.2	68.1	74.6	70.2
2001	70	70.6	69.2	75.0	71.0
2002	88	70.1	69.9	70.4	70.1
2003	117	67.6	66.7	75.4	67.6
2004	115	67.0	67.0	67.6	67.2
2005	90	69.0	69.0	74.2	68.9
2006	112	68.4	68.4	68.3	69.2
2007	97	68.4	67.8	77.9	68.4
2008	106	68.5	68.5	71.8	68.6
2009	111	69.2	68.9	77.4	69.2
2010	119	68.9	68.6	73.2	69.1
2011	128	70.4	70.0	74.2	70.6
2012	127	68.4	68.4	70.6	69.1
2013	119	66.8	66.6	74.9	66.6
2014	119	68.8	68.8	56.6	68.5
2015	112	70.5	69.2	75.8	70.7
2016	139	68.7	68.7	70.4	68.7
2017	105	70.3	69.8	78.0	70.8
2018	41	69.7	70.1	66.5	70.4
2019	36	70.7	69.1	72.4	71.5
1998-2019	2145	69.1	68.6	73.7	69.3

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	36	3.2	0.47	2.3	0.48	3.0	0.49	3.3	0.47
1999	60	5.4	0.81	3.5	0.82	4.9	0.81	6.1	0.83
2000	46	4.0	0.52	2.6	0.48	3.6	0.51	4.2	0.49
2001	67	5.8	0.74	3.4	0.65	5.1	0.72	6.5	0.76
2002	98	5.3	0.73	3.4	0.65	4.5	0.71	5.2	0.73
2003	95	5.1	0.56	2.9	0.47	4.2	0.53	5.3	0.57
2004	114	6.1	0.78	3.7	0.74	5.1	0.76	6.2	0.78
2005	114	6.0	0.65	3.7	0.59	5.0	0.64	5.9	0.65
2006	117	6.1	0.76	4.1	0.78	5.2	0.77	5.9	0.77
2007	122	5.5	0.73	3.1	0.61	4.4	0.68	5.3	0.73
2008	117	5.3	0.59	3.3	0.57	4.3	0.58	5.0	0.56
2009	146	6.5	0.61	3.6	0.53	5.1	0.57	6.4	0.61
2010	190	8.4	1.01	4.7	0.91	6.5	0.96	8.0	1.00
2011	145	6.5	0.75	3.6	0.66	5.1	0.72	6.1	0.75
2012	149	6.6	0.79	3.8	0.70	5.0	0.75	6.1	0.79
2013	137	6.0	0.69	3.4	0.62	4.5	0.65	5.4	0.69
2014	167	7.2	0.90	4.2	0.85	5.6	0.88	6.5	0.89
2015	159	6.7	0.95	3.8	0.88	5.1	0.90	6.0	0.92
2016	151	6.3	1.14	3.5	1.09	4.8	1.14	5.7	1.13
2017	126	5.2	1.24	3.0	1.28	4.1	1.27	4.8	1.25
2018	32	1.3	0.55	0.7	0.53	1.0	0.55	1.2	0.55
2019	32	1.3	0.62	0.8	0.70	1.0	0.65	1.2	0.64
1998-2019	2420	5.5	0.76	3.2	0.70	4.4	0.74	5.2	0.76



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	44	3.7	0.60	1.8	0.45	2.6	0.53	3.4	0.59
1999	47	4.0	0.64	2.3	0.63	3.0	0.64	3.5	0.63
2000	58	4.8	0.71	2.7	0.69	3.6	0.71	4.2	0.71
2001	59	4.9	0.57	2.8	0.55	3.6	0.55	4.3	0.56
2002	81	4.1	0.57	2.1	0.53	2.9	0.54	3.6	0.55
2003	109	5.5	0.71	3.1	0.67	4.2	0.70	4.9	0.70
2004	107	5.4	0.72	3.2	0.66	4.0	0.70	4.8	0.73
2005	82	4.1	0.53	2.2	0.48	2.9	0.50	3.5	0.53
2006	100	5.0	0.91	2.6	0.83	3.5	0.87	4.2	0.90
2007	92	4.0	0.68	2.0	0.58	2.8	0.63	3.4	0.65
2008	100	4.3	0.64	2.5	0.58	3.2	0.61	3.6	0.63
2009	106	4.6	0.65	2.1	0.53	3.0	0.57	3.6	0.60
2010	108	4.6	0.72	2.4	0.65	3.2	0.70	3.9	0.72
2011	120	5.1	0.72	2.7	0.70	3.5	0.70	4.2	0.69
2012	115	4.9	0.67	2.5	0.56	3.4	0.61	4.0	0.65
2013	112	4.7	0.79	2.6	0.73	3.4	0.77	3.9	0.76
2014	117	4.9	0.85	2.5	0.84	3.4	0.84	4.0	0.86
2015	103	4.2	0.74	1.9	0.59	2.8	0.66	3.4	0.70
2016	138	5.6	1.19	2.9	1.21	3.9	1.20	4.7	1.23
2017	96	3.9	1.41	1.9	1.54	2.6	1.51	3.1	1.45
2018	20	0.8	0.57	0.4	0.50	0.6	0.55	0.7	0.58
2019	18	0.7	0.69	0.4	0.85	0.5	0.75	0.5	0.68
1998-2019	1932	4.2	0.73	2.2	0.66	3.0	0.70	3.5	0.71

Table 12

Age distribution of age at death (cancer-related) for period 2007-2019  
(incl. multiple malignancies)

Age at death Years	Cases			Males			Females		
	n	%	Cum.%	n	%	Cum.%	n	%	Cum.%
0-4	11	0.4	0.4	7	0.4	0.4	4	0.3	0.3
5-9	20	0.7	1.1	7	0.4	0.8	13	1.0	1.4
10-14	13	0.4	1.5	8	0.5	1.3	5	0.4	1.8
15-19	14	0.5	2.0	9	0.5	1.9	5	0.4	2.2
20-24	9	0.3	2.3	5	0.3	2.2	4	0.3	2.5
25-29	28	1.0	3.3	20	1.2	3.3	8	0.6	3.1
30-34	27	0.9	4.2	16	1.0	4.3	11	0.9	4.0
35-39	51	1.7	5.9	37	2.2	6.5	14	1.1	5.1
40-44	119	4.1	10.0	76	4.5	11.1	43	3.5	8.6
45-49	192	6.6	16.6	117	7.0	18.1	75	6.0	14.6
50-54	197	6.8	23.3	120	7.2	25.2	77	6.2	20.8
55-59	257	8.8	32.1	161	9.6	34.8	96	7.7	28.5
60-64	323	11.1	43.2	195	11.7	46.5	128	10.3	38.8
65-69	397	13.6	56.8	213	12.7	59.2	184	14.8	53.6
70-74	461	15.8	72.6	271	16.2	75.4	190	15.3	68.8
75-79	394	13.5	86.1	213	12.7	88.2	181	14.5	83.4
80-84	237	8.1	94.2	127	7.6	95.8	110	8.8	92.2
85+	168	5.8	100.0	71	4.2	100.0	97	7.8	100.0
All ages	2918	100.0		1673	100.0		1245	100.0	

Table 13

Age-specific mortality (cancer-related) and proportion of all cancers  
for period 2007–2019  
(incl. multiple malignancies)

Age at death Years	Males		Females		Males		Females	
	n	n	Age- spec. mortal.	MI-index	Age- spec. mortal.	MI-index	Prop.all cancers %	Prop.all cancers %
0– 4	7	4	0.5	0.33	0.3	0.22	36.8	25.0
5– 9	7	13	0.5	0.35	0.9	1.00	28.0	56.5
10–14	8	5	0.5	0.44	0.4	0.63	29.6	21.7
15–19	9	5	0.6	0.75	0.3	0.36	19.1	20.0
20–24	5	4	0.3	0.17	0.2	0.25	7.5	10.3
25–29	20	8	1.0	0.49	0.4	0.26	23.5	8.6
30–34	16	11	0.8	0.29	0.5	0.23	12.5	6.9
35–39	37	14	1.7	0.57	0.7	0.24	15.2	3.8
40–44	76	43	3.2	0.72	1.9	0.65	13.3	5.4
45–49	117	75	4.7	0.87	3.1	0.93	8.7	4.7
50–54	120	77	5.1	0.73	3.3	0.71	4.8	3.1
55–59	161	96	8.3	0.76	4.8	0.78	3.9	2.7
60–64	195	128	12.0	0.95	7.3	0.96	3.3	2.8
65–69	213	184	14.0	0.88	10.9	0.99	2.5	2.8
70–74	271	190	19.3	0.97	11.8	0.83	2.4	2.3
75–79	213	181	19.2	0.88	13.1	0.93	1.9	2.0
80–84	127	110	19.3	0.93	11.3	0.74	1.3	1.3
85+	71	97	16.7	0.83	10.0	0.72	0.9	0.9
All ages	1673	1245					2.6	2.2
Mortality								
Raw			5.6	0.81	4.0	0.77		
WS			3.2	0.74	2.1	0.70		
ES			4.3	0.78	2.8	0.74		
BRD–S			5.1	0.80	3.3	0.76		
PYLL–70								
per 100,000			58.6		37.7			
ES			54.3		35.6			
AYLL–70			15.7		14.8			

Table 14a

Further malignancies in deaths in period 1998-2019  
MALES

Diagnosis	Total n	Total %↓	Pre n	Pre ←%	Syn- chron ±30d n	Syn- chron ±30d ←%	Post n	Post ←%
C03-C06 Oral cavity	1	0.3	1	100.0				
C07-C08 Salivary gland	2	0.5	2	100.0				
C09-C10 Oropharynx	3	0.8	3	100.0				
C11 Nasopharynx	1	0.3	1	100.0				
C15 Oesophagus	1	0.3					1	100.0
C16 Stomach	7	1.9	7	100.0				
C17 Small intestine	3	0.8	1	33.3	1	33.3	1	33.3
C18 Colon	28	7.7	25	89.3	3	10.7		
C19-C20 Rectum	15	4.1	14	93.3			1	6.7
C21 Anus/canal	1	0.3	1	100.0				
C22 Liver	2	0.5	1	50.0			1	50.0
C23-C24 Bile	2	0.5					2	100.0
C25 Pancreas	7	1.9	1	14.3	2	28.6	4	57.1
C32 Larynx	2	0.5	1	50.0			1	50.0
C33-C34 Lung	14	3.8	7	50.0	3	21.4	4	28.6
C38,C45 Mesothelioma	1	0.3	1	100.0				
C40-C41 Bone	4	1.1	1	25.0	1	25.0	2	50.0
C43 Malign. melanoma	22	6.0	20	90.9			2	9.1
C44 Skin others	23	6.3	12	52.2	5	21.7	6	26.1
C46,C49 Soft tissue	4	1.1	2	50.0			2	50.0
C60 Penis	2	0.5	2	100.0				
C61 Prostate	123	33.6	111	90.2	7	5.7	5	4.1
C62 Testis	8	2.2	6	75.0	1	12.5	1	12.5
C64 Kidney	18	4.9	13	72.2	2	11.1	3	16.7
C66 Ureter	1	0.3	1	100.0				
C67 Bladder	15	4.1	11	73.3	2	13.3	2	13.3
C68 Urinary org.	1	0.3	1	100.0				
C69 Eye melanoma	1	0.3					1	100.0
C70-C72 CNS cancer	21	5.7			5	23.8	16	76.2
C73 Thyroid	5	1.4	5	100.0				
C76-C79 CUP	5	1.4	3	60.0			2	40.0
C81 Hodgkin lymphoma	1	0.3	1	100.0				
C82-C85 NHL	13	3.6	12	92.3	1	7.7		
C90 Mult. myeloma	3	0.8	2	66.7	1	33.3		
C91-C96 Leukaemia	5	1.4	2	40.0	1	20.0	2	40.0
C96 Systemic	1	0.3			1	100.0		
All further malignancies	366	100.0	271	74.0	36	9.8	59	16.1

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 further malignancy.

Table 14b

Further malignancies in deaths in period 1998-2019  
FEMALES

Diagnosis	Total n	Total %↓	Pre n	Pre ←%	Syn- chron ±30d n	Syn- chron ±30d ←%	Post n	Post ←%
C03-C06 Oral cavity	1	0.4	1	100.0				
C09-C10 Oropharynx	1	0.4	1	100.0				
C16 Stomach	2	0.7	2	100.0				
C18 Colon	17	6.3	13	76.5	1	5.9	3	17.6
C19-C20 Rectum	7	2.6	3	42.9	2	28.6	2	28.6
C21 Anus/canal	1	0.4	1	100.0				
C22 Liver	1	0.4	1	100.0				
C23-C24 Bile	1	0.4					1	100.0
C25 Pancreas	1	0.4					1	100.0
C26 GI cancer	1	0.4			1	100.0		
C30-C31 Sinuses	1	0.4	1	100.0				
C32 Larynx	1	0.4	1	100.0				
C33-C34 Lung	3	1.1	2	66.7			1	33.3
C38,C45 Mesothelioma	1	0.4					1	100.0
C40-C41 Bone	1	0.4					1	100.0
C43 Malign. melanoma	18	6.7	15	83.3			3	16.7
C44 Skin others	15	5.6	9	60.0	2	13.3	4	26.7
C46,C49 Soft tissue	4	1.5	2	50.0	1	25.0	1	25.0
C50 Breast	95	35.4	80	84.2	5	5.3	10	10.5
C52 Vagina	1	0.4	1	100.0				
C53 Cervix uteri	8	3.0	8	100.0				
C54 Corpus uteri	21	7.8	15	71.4			6	28.6
C55,C57 Fem. genitals un	1	0.4	1	100.0				
C56 Ovary	11	4.1	8	72.7	2	18.2	1	9.1
C64 Kidney	7	2.6	7	100.0				
C65 Renal pelvis	1	0.4	1	100.0				
C67 Bladder	3	1.1	1	33.3			2	66.7
C69 Eye melanoma	3	1.1	3	100.0				
C70-C72 CNS cancer	15	5.6			1	6.7	14	93.3
C73 Thyroid	9	3.4	9	100.0				
C76-C79 CUP	1	0.4	1	100.0				
C81 Hodgkin lymphoma	1	0.4	1	100.0				
C82-C85 NHL	8	3.0	5	62.5	2	25.0	1	12.5
C90 Mult. myeloma	1	0.4	1	100.0				
C91-C96 Leukaemia	5	1.9	2	40.0			3	60.0
All further malignancies	268	100.0	196	73.1	17	6.3	55	20.5

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 2007-2019  
(First primaries only \*)

Age at death Years	Males		Males		Females		Females	
	n	n	Age- spec. mortal.	MI-index	Age- spec. mortal.	MI-index	Prop.all cancers %	Prop.all cancers %
0- 4	7	4	0.5	0.35	0.3	0.22	36.8	26.7
5- 9	6	13	0.4	0.30	0.9	1.00	25.0	56.5
10-14	8	5	0.5	0.44	0.4	0.63	29.6	26.3
15-19	8	5	0.5	0.67	0.3	0.36	17.8	21.7
20-24	5	4	0.3	0.17	0.2	0.25	8.3	10.8
25-29	19	8	0.9	0.48	0.4	0.28	24.7	9.3
30-34	16	10	0.8	0.29	0.5	0.21	12.9	7.2
35-39	37	14	1.7	0.57	0.7	0.25	16.3	4.2
40-44	73	40	3.1	0.72	1.8	0.70	13.8	5.7
45-49	114	72	4.5	0.90	3.0	0.95	9.3	5.3
50-54	113	71	4.8	0.72	3.1	0.70	5.1	3.4
55-59	155	85	8.0	0.78	4.3	0.77	4.3	2.9
60-64	175	116	10.7	0.99	6.6	0.96	3.5	3.1
65-69	187	161	12.3	0.93	9.6	1.03	2.7	3.1
70-74	217	156	15.5	1.01	9.7	0.89	2.6	2.5
75-79	162	143	14.6	0.93	10.4	0.90	1.9	2.1
80-84	101	97	15.4	0.94	10.0	0.78	1.5	1.5
85+	46	84	10.8	0.75	8.7	0.73	0.8	1.0
All ages	1449	1088					2.9	2.4
Mortality								
Raw			4.8	0.81	3.5	0.78		
WS			2.8	0.74	1.9	0.70		
ES			3.8	0.78	2.5	0.74		
BRD-S			4.4	0.80	2.9	0.76		
PYLL-70								
per 100,000			55.9		35.5			
ES			51.8		33.8			
AYLL-70			16.1		15.3			

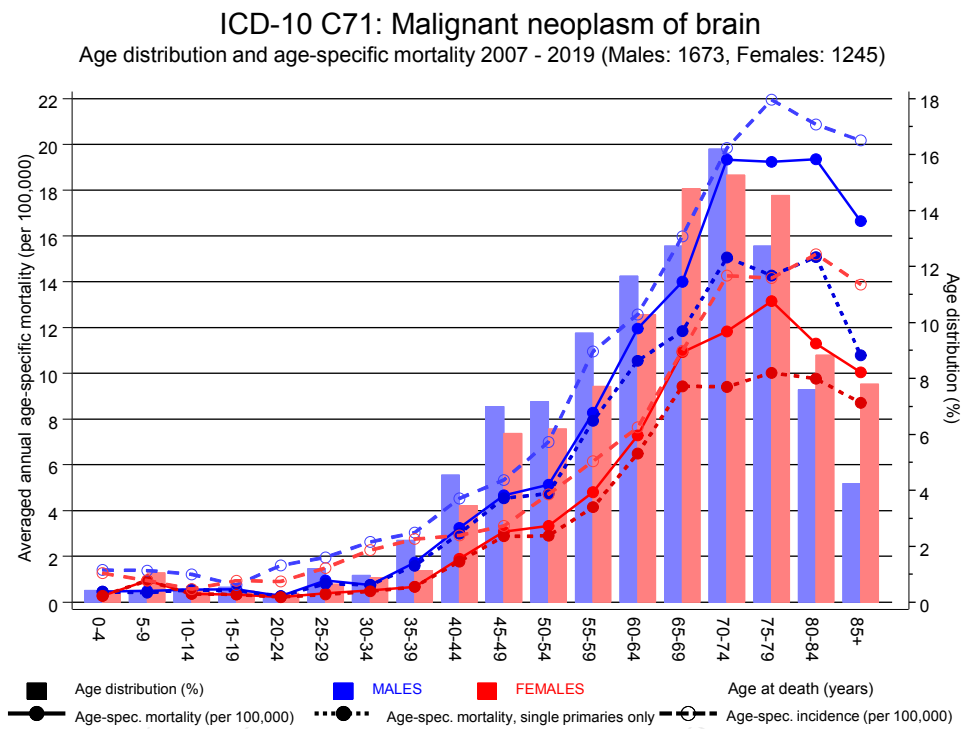
\* See corresponding tables with multiple malignancies.

Table 16

Age-specific mortality (cancer-related) and proportion of all cancers  
for period 2007-2019  
(**Single primaries only \***)

Age at death Years	Males		Males		Females		Females	
	n	n	Age- spec. mortal.	MI-index	Age- spec. mortal.	MI-index	Prop.all cancers %	Prop.all cancers %
0- 4	7	4	0.5	0.35	0.3	0.24	36.8	26.7
5- 9	6	13	0.4	0.30	0.9	1.00	25.0	56.5
10-14	8	5	0.5	0.44	0.4	0.63	29.6	26.3
15-19	8	5	0.5	0.67	0.3	0.36	17.8	22.7
20-24	5	4	0.3	0.17	0.2	0.25	8.3	11.1
25-29	17	7	0.8	0.43	0.3	0.24	22.1	8.3
30-34	16	10	0.8	0.30	0.5	0.22	13.0	7.3
35-39	34	14	1.6	0.54	0.7	0.27	15.1	4.3
40-44	70	40	3.0	0.70	1.8	0.71	13.3	5.7
45-49	114	70	4.5	0.91	2.9	0.95	9.4	5.2
50-54	111	67	4.7	0.72	2.9	0.69	5.1	3.3
55-59	154	83	7.9	0.79	4.2	0.75	4.3	2.8
60-64	172	114	10.5	1.01	6.5	0.95	3.5	3.1
65-69	180	159	11.8	0.91	9.4	1.03	2.7	3.2
70-74	211	151	15.1	1.00	9.4	0.88	2.6	2.5
75-79	158	138	14.3	0.92	10.0	0.87	2.0	2.1
80-84	99	95	15.1	0.93	9.8	0.77	1.6	1.5
85+	46	84	10.8	0.75	8.7	0.73	0.8	1.0
All ages	1416	1063					3.0	2.4
Mortality								
Raw			4.7	0.81	3.4	0.77		
WS			2.8	0.73	1.8	0.70		
ES			3.7	0.77	2.4	0.74		
BRD-S			4.3	0.80	2.8	0.75		
PYLL-70								
per 100,000			54.6		34.7			
ES			50.6		33.1			
AYLL-70			16.1		15.3			

\* See corresponding tables with multiple malignancies.

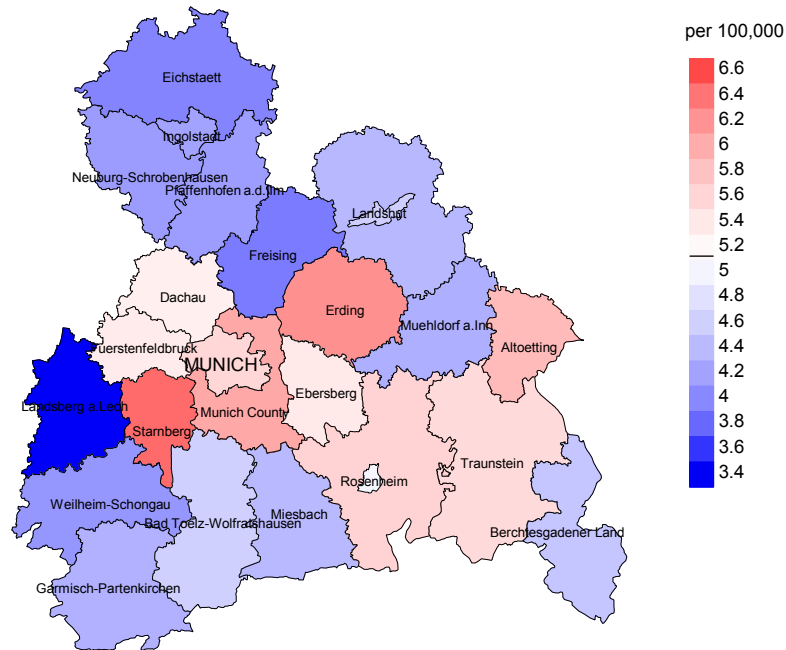


**Figure 17.** Distribution of age at death (bars; males: mean=61.6 yrs, median=64.7 yrs; females: mean=63.8 yrs, median=66.9 yrs) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

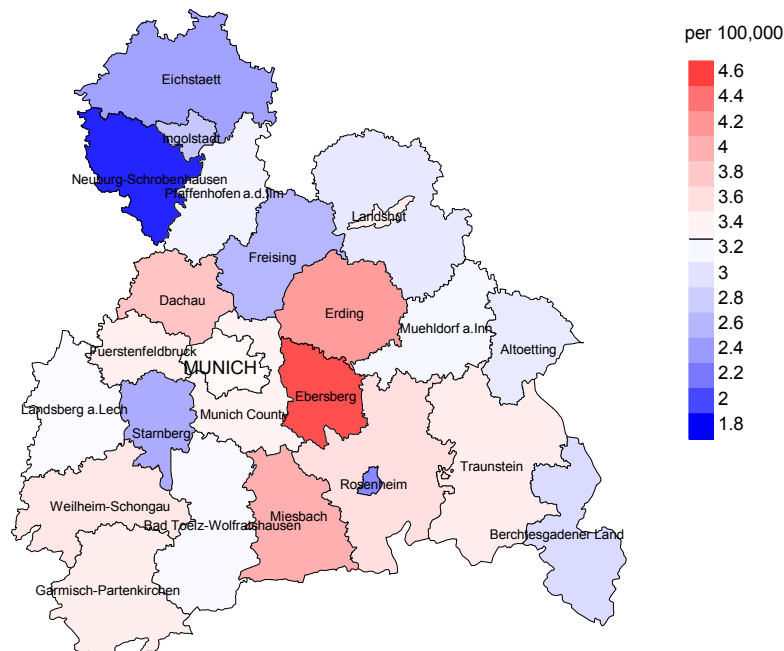
The difference between age at diagnosis (Table 3) and age at brain cancer-related death (see Table 10) should be considered.



Average mortality (Germany 1987 standard population) 2007 - 2019: Males



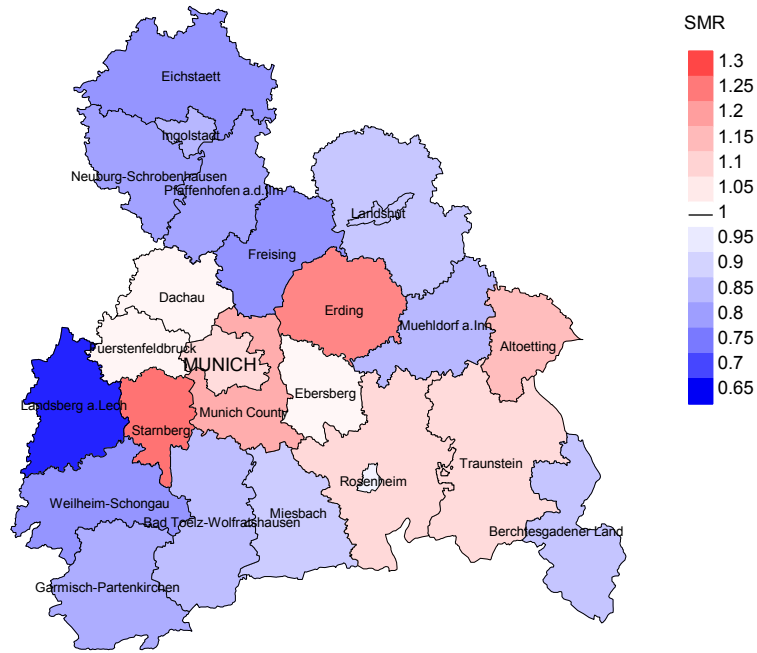
Average mortality (Germany 1987 standard population) 2007 - 2019: Females



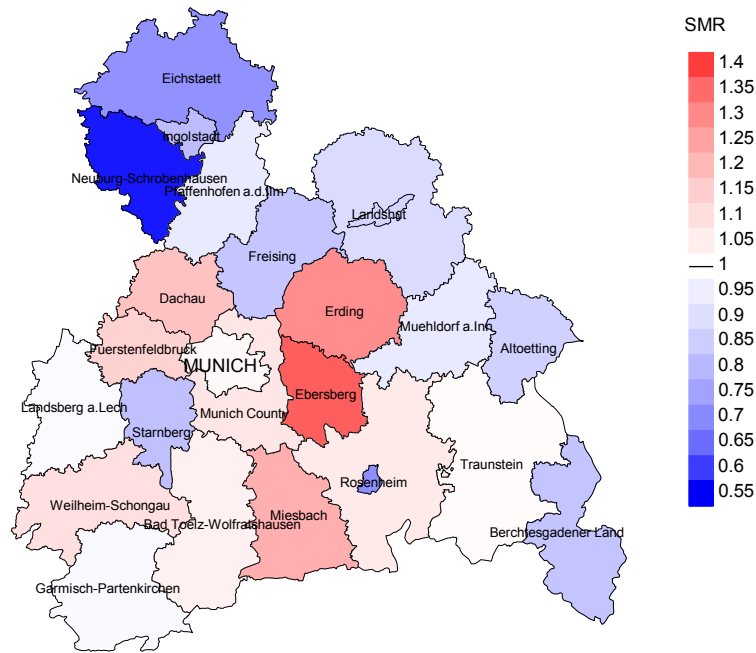
**Figure 18a.** Map of cancer mortality (german standard population) by county averaged for period 2007 to 2019. According to their individual mortality rates, the counties are displayed in different red and blue hues, being the fine white color attributed to the population mean (males 5.1/100,000 WS N=1,673, females 3.3/100,000 WS N=1,245).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 67,462 female residents (averaged) in the period from 2007 to 2019 a total of 47 women died from brain cancer. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 4.5/100,000 (german standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 3.0 and 6.6/100,000.

Standardized mortality ratio (SMR) 2007 - 2019: Males



Standardized mortality ratio (SMR) 2007 - 2019: Females



**Figure 18b.** Map of standardized mortality ratio (SMR, incl. DCO cases) by county averaged for period 2007 to 2019. 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=1,673, females N=1,245).

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 2019 a total of 47 women died from brain cancer. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 1.37. Though, the value of this parameter may vary with an underlying probability of 99% between 0.91 and 1.97, 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

**Recommended Citation**

Munich Cancer Registry. ICD-10 C71: Brain cancer - Incidence and Mortality [Internet]. 2021 [updated 2021 Jan 25; cited 2021 Mar 1]. Available from: [https://www.tumorregister-muenchen.de/en/facts/base/bC71\\_\\_E-ICD-10-C71-Brain-cancer-incidence-and-mortality.pdf](https://www.tumorregister-muenchen.de/en/facts/base/bC71__E-ICD-10-C71-Brain-cancer-incidence-and-mortality.pdf)

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