Munich Cancer Registry

- Survival
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- *Deutsch*

MCC: Merkel cell carcinoma

Incidence and Mortality

Year of diagnosis	1998-2020
Patients	419
Diseases	426
Creation date	12/21/2021
Database export	12/20/2021
Population	4.95 m

Munich Cancer Registry
Cancer Registry Bavaria - Upper Bavaria Regional Center
at Klinikum Grosshadern/IBE
Marchioninistr. 15
Munich, 81377
Germany

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

https://www.tumorregister-muenchen.de/en/facts/base/bMCC__E-MCC-Merkel-cell-carcinoma-incidence-and-mortality.pdf

Index of figures and tables

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 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, 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 2016) used for specifying cancer site

ICD-10	Description
C44.-	Other malignant neoplasms of skin

ICD-O-3 codes (morphology) used for specifying cancer site

Code	Description
8247/3	Merkel cell carcinoma

INCIDENCE

Table 1

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

Year of diagnosis	All cases n	Prop. at least 1 further malign. prior + synchron. %	Prop. at least 1 further malign. after %	Prop. deaths %	Prop. actively followed %
1998	7	0.0	16.2	85.7	100.0
1999	6	7.7	16.5	66.7	100.0
2000	5	5.6	16.2	60.0	100.0
2001	4	4.5	16.1	100.0	100.0
2002	16	15.8	16.0	87.5	93.8 #
2003	13	15.7	15.5	84.6	100.0
2004	19	17.1	15.2	63.2	100.0
2005	12	19.5	14.2	100.0	100.0
2006	14	17.7	13.2	78.6	100.0
2007	34	19.2	12.5	82.4	91.2 #
2008	12	19.7	12.4	58.3	100.0
2009	25	23.4	12.8	72.0	100.0
2010	25	23.4	12.0	60.0	96.0
2011	27	26.0	10.5	70.4	92.6
2012	28	26.7	8.9	67.9	96.4
2013	22	29.4	9.6	86.4	100.0
2014	34	29.7	8.9	55.9	100.0
2015	34	31.5	9.4	55.9	100.0
2016	23	31.4	9.4	60.9	100.0
2017	21	33.1	11.1	61.9	100.0
2018	17	33.7	13.6	29.4	94.1
2019	16	34.8	11.1	56.3	100.0
2020	12	35.2	9.1	8.3	100.0 ##
1998-2020	426	35.2	16.2	66.2	97.9

426 cases diagnosed 1998-2020 are related to a total of 419 patients. Currently, in 200 (47.7 %) of these 419 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 114 / 52 / 34 (27.2 % / 12.4 % / 8.1 %) 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 2018, a subgroup of 17 cases has been diagnosed, of which 33.7 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 13.6 % 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 1a

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

Year of diagnosis	Males n	Males %	Prop. at least 1 further malign. prior + synchron. %	Prop. at least 1 further malign. after %	Prop. deaths %	Prop. actively followed %	
1998	3	42.9	0.0	16.4	100.0	100.0	
1999	3	50.0	16.7	16.7	66.7	100.0	
2000	2	40.0	12.5	16.3	50.0	100.0	
2001	1	25.0	11.1	15.9	100.0	100.0	
2002	6	37.5	20.0	16.0	100.0	100.0	#
2003	5	38.5	15.0	15.7	80.0	100.0	
2004	5	26.3	20.0	15.6	60.0	100.0	
2005	3	25.0	25.0	14.2	100.0	100.0	
2006	4	28.6	21.9	13.8	75.0	100.0	
2007	16	47.1	20.8	13.5	87.5	93.8	#
2008	6	50.0	24.1	12.1	66.7	100.0	
2009	14	56.0	29.4	12.4	71.4	100.0	
2010	12	48.0	28.8	12.1	66.7	100.0	
2011	11	40.7	31.9	10.5	72.7	90.9	
2012	15	53.6	32.1	7.8	60.0	93.3	
2013	9	40.9	35.7	9.0	88.9	100.0	
2014	17	50.0	36.4	9.9	52.9	100.0	
2015	20	58.8	37.5	10.4	65.0	100.0	
2016	12	52.2	37.2	10.4	75.0	100.0	
2017	15	71.4	39.7	10.8	60.0	100.0	
2018	8	47.1	40.1	12.5	37.5	100.0	
2019	11	68.8	40.9	12.5	54.5	100.0	
2020	5	41.7	41.4	20.0		100.0	##
1998-2020	203	47.7	41.4	16.4	67.0	98.5	

203 cases diagnosed 1998-2020 are related to a total of 198 patients. Currently, in 106 (53.5 %) of these 198 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 62 / 20 / 24 (31.3 % / 10.1 % / 12.1 %) 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 2018, a subgroup of 8 cases has been diagnosed, of which 40.1 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 12.5 % 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 further malignancies, deaths, and active follow-up (FEMALES)

Year of diagnosis	Females n	Females %	Prop. at least 1 further malign. prior + synchron. %	Prop. at least 1 further malign. after %	Prop. deaths %	Prop. actively followed %	
1998	4	57.1	0.0	16.0	75.0	100.0	
1999	3	50.0	0.0	16.3	66.7	100.0	
2000	3	60.0	0.0	16.1	66.7	100.0	
2001	3	75.0	0.0	16.3	100.0	100.0	
2002	10	62.5	13.0	16.1	80.0	90.0	#
2003	8	61.5	16.1	15.3	87.5	100.0	
2004	14	73.7	15.6	14.9	64.3	100.0	
2005	9	75.0	16.7	14.3	100.0	100.0	
2006	10	71.4	15.6	12.6	80.0	100.0	
2007	18	52.9	18.3	11.3	77.8	88.9	#
2008	6	50.0	17.0	12.8	50.0	100.0	
2009	11	44.0	19.2	13.3	72.7	100.0	
2010	13	52.0	19.6	11.9	53.8	92.3	
2011	16	59.3	21.9	10.5	68.8	93.8	
2012	13	46.4	22.7	10.1	76.9	100.0	
2013	13	59.1	24.7	10.3	84.6	100.0	
2014	17	50.0	24.6	7.7	58.8	100.0	
2015	14	41.2	26.5	8.0	42.9	100.0	
2016	11	47.8	26.5	8.1	45.5	100.0	
2017	6	28.6	27.2	11.5	66.7	100.0	
2018	9	52.9	28.0	15.0	22.2	88.9	
2019	5	31.3	29.2	9.1	60.0	100.0	
2020	7	58.3	29.6	0.0	14.3	100.0	##
1998-2020	223	52.3	29.6	16.0	65.5	97.3	

223 cases diagnosed 1998-2020 are related to a total of 221 patients. Currently, in 94 (42.5 %) of these 221 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 52 / 32 / 10 (23.5 % / 14.5 % / 4.5 %) 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 2018, a subgroup of 9 cases has been diagnosed, of which 28.0 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 15.0 % 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
(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	3	4	0.3	0.3	0.2	0.1	0.3	0.2	0.4	0.3
1999	3	3	0.3	0.3	0.2	0.1	0.2	0.2	0.2	0.2
2000	2	3	0.2	0.2	0.1	0.1	0.1	0.2	0.2	0.2
2001	1	3	0.1	0.2	0.0	0.1	0.1	0.1	0.1	0.2
2002	6	10	0.3	0.5	0.1	0.2	0.3	0.3	0.4	0.4
2003	5	8	0.3	0.4	0.2	0.1	0.2	0.2	0.2	0.3
2004	5	14	0.3	0.7	0.1	0.2	0.2	0.4	0.3	0.5
2005	3	9	0.2	0.5	0.1	0.1	0.1	0.2	0.2	0.4
2006	4	10	0.2	0.5	0.1	0.2	0.2	0.2	0.3	0.4
2007	16	18	0.7	0.8	0.3	0.2	0.6	0.4	0.8	0.5
2008	6	6	0.3	0.3	0.1	0.1	0.2	0.2	0.3	0.2
2009	14	11	0.6	0.5	0.3	0.2	0.4	0.2	0.6	0.4
2010	12	13	0.5	0.6	0.2	0.2	0.4	0.3	0.5	0.4
2011	11	16	0.5	0.7	0.2	0.2	0.3	0.3	0.5	0.4
2012	15	13	0.7	0.6	0.3	0.1	0.5	0.2	0.6	0.3
2013	9	13	0.4	0.5	0.2	0.2	0.3	0.3	0.4	0.4
2014	17	17	0.7	0.7	0.3	0.2	0.5	0.3	0.7	0.5
2015	20	14	0.8	0.6	0.3	0.2	0.5	0.3	0.7	0.4
2016	12	11	0.5	0.4	0.2	0.1	0.3	0.2	0.5	0.3
2017	15	6	0.6	0.2	0.3	0.1	0.4	0.1	0.6	0.2
2018	8	9	0.3	0.4	0.1	0.1	0.2	0.2	0.3	0.2
2019	11	5	0.5	0.2	0.2	0.0	0.3	0.1	0.4	0.1
2020	5	7	0.2	0.3	0.1	0.1	0.1	0.1	0.2	0.2
1998-2020	203	223	0.4	0.5	0.2	0.1	0.3	0.2	0.4	0.3

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)

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	7	76.0	5.9	69.8	87.0	69.8	71.3	76.2	78.8	87.0
1999	6	65.2	12.6	43.8	81.0	43.8	60.7	66.4	72.9	81.0
2000	5	70.9	7.9	60.2	79.9	60.2	65.4	73.8	75.1	79.9
2001	4	80.3	6.8	74.0	90.0	74.0	76.3	78.6	84.3	90.0
2002	16	79.9	8.6	63.6	95.4	69.5	73.0	80.4	85.6	92.4
2003	13	70.9	14.9	33.8	90.0	57.3	64.1	73.1	82.2	85.1
2004	19	78.1	9.5	64.1	95.8	65.6	70.7	76.7	85.2	91.4
2005	12	75.8	8.0	60.5	86.5	67.4	68.0	78.2	81.1	84.7
2006	14	77.3	11.8	46.9	93.1	67.3	71.1	79.9	84.6	91.8
2007	34	78.7	10.5	50.1	93.1	60.9	73.3	81.6	86.2	88.1
2008	12	75.7	10.1	57.7	94.7	64.4	69.0	76.8	81.5	86.2
2009	25	75.4	8.3	59.7	88.9	65.6	69.1	74.7	82.1	87.7
2010	25	76.5	11.7	49.1	96.5	60.3	68.3	76.5	85.6	87.7
2011	27	77.5	11.2	41.3	93.3	67.3	71.9	78.3	86.5	89.3
2012	28	76.3	11.1	56.9	96.9	57.6	68.2	76.1	85.1	89.9
2013	22	75.5	15.3	29.8	91.7	54.9	73.1	81.1	85.4	88.2
2014	34	77.9	10.3	56.4	99.5	62.5	73.1	77.4	84.7	92.3
2015	34	77.6	11.1	51.3	99.9	59.8	73.9	78.4	85.7	89.0
2016	23	76.7	9.1	55.9	90.3	64.9	71.4	77.4	84.7	87.0
2017	21	77.6	9.6	64.1	93.8	65.3	70.0	78.2	86.6	91.5
2018	17	79.3	8.5	62.0	92.2	64.6	75.7	80.0	83.7	88.7
2019	16	80.0	6.9	70.4	89.9	71.8	72.2	79.8	86.7	89.8
2020	12	76.7	10.4	53.7	93.1	62.2	73.8	78.3	82.7	85.0
1998-2020	426	76.9	10.5	29.8	99.9	63.3	71.3	78.3	84.7	89.0

Table 3a

Age distribution parameters by year of diagnosis (MALES)

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	3	72.9	4.1	69.8	77.6	69.8	69.8	71.3	77.6	77.6
1999	3	56.4	11.1	43.8	64.7	43.8	43.8	60.7	64.7	64.7
2000	2	70.1	14.0	60.2	79.9	60.2	60.2	70.1	79.9	79.9
2001	1	90.0		90.0	90.0	90.0	90.0	90.0	90.0	90.0
2002	6	81.8	5.9	73.0	89.5	73.0	78.7	81.4	86.9	89.5
2003	5	57.7	14.2	33.8	70.8	33.8	57.3	62.6	64.1	70.8
2004	5	78.6	6.9	69.9	85.2	69.9	73.5	79.0	85.2	85.2
2005	3	75.7	7.3	67.4	80.7	67.4	67.4	79.1	80.7	80.7
2006	4	75.8	19.8	46.9	91.8	46.9	64.3	82.3	87.3	91.8
2007	16	78.0	12.0	50.1	93.1	58.0	70.7	82.1	86.9	87.5
2008	6	75.7	10.1	57.7	86.2	57.7	72.6	77.3	83.3	86.2
2009	14	74.8	9.1	59.7	88.9	61.3	69.1	74.1	82.4	87.7
2010	12	73.1	12.1	49.1	87.5	58.6	65.1	74.9	83.5	87.4
2011	11	72.6	13.6	41.3	89.3	57.8	67.7	74.1	79.9	87.2
2012	15	69.6	9.4	56.9	87.0	57.6	61.2	68.3	76.2	82.9
2013	9	77.1	12.0	53.1	90.2	53.1	73.1	83.0	84.8	90.2
2014	17	73.8	10.2	56.4	92.3	60.8	67.6	74.1	77.2	92.2
2015	20	76.6	9.4	53.0	91.4	61.1	74.2	77.4	82.0	87.5
2016	12	73.4	9.4	55.9	86.1	61.6	66.8	73.8	80.7	84.7
2017	15	75.9	8.1	64.8	87.1	65.3	69.8	74.3	82.8	87.1
2018	8	79.1	7.6	64.6	88.7	64.6	75.8	79.0	84.9	88.7
2019	11	78.3	5.8	71.8	88.5	72.0	72.1	79.5	81.6	86.2
2020	5	77.5	4.0	73.5	83.4	73.5	74.1	78.3	78.3	83.4
1998-2020	203	74.7	10.6	33.8	93.1	60.2	68.3	76.0	82.8	87.1

Table 3b

Age distribution parameters by year of diagnosis (FEMALES)

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	4	78.4	6.5	71.5	87.0	71.5	73.8	77.5	82.9	87.0
1999	3	74.0	6.5	68.1	81.0	68.1	68.1	72.9	81.0	81.0
2000	3	71.4	5.3	65.4	75.1	65.4	65.4	73.8	75.1	75.1
2001	3	77.1	2.6	74.0	78.6	74.0	74.0	78.6	78.6	78.6
2002	10	78.8	10.0	63.6	95.4	66.6	72.1	78.3	84.4	93.9
2003	8	79.2	8.0	64.6	90.0	64.6	74.5	80.0	84.8	90.0
2004	14	77.9	10.5	64.1	95.8	65.6	70.7	75.0	88.4	91.4
2005	9	75.8	8.6	60.5	86.5	60.5	68.6	77.8	81.5	86.5
2006	10	77.9	8.4	67.3	93.1	67.9	71.1	77.3	84.6	89.5
2007	18	79.4	9.2	58.6	92.4	60.9	74.2	81.1	85.6	88.6
2008	6	75.7	11.0	64.4	94.7	64.4	67.0	74.3	79.8	94.7
2009	11	76.1	7.6	65.6	88.5	67.1	68.9	76.8	82.1	85.2
2010	13	79.7	10.8	60.3	96.5	67.0	73.7	78.7	87.1	95.5
2011	16	80.8	8.0	67.3	93.3	71.3	74.7	80.6	86.9	93.1
2012	13	84.0	7.5	71.1	96.9	74.6	80.6	83.3	89.4	90.6
2013	13	74.5	17.6	29.8	91.7	54.9	74.2	80.8	85.4	88.2
2014	17	82.0	9.0	63.3	99.5	72.7	77.5	81.1	86.0	94.8
2015	14	79.1	13.5	51.3	99.9	59.8	72.7	82.7	86.9	94.9
2016	11	80.4	7.6	70.1	90.3	71.4	72.7	82.1	87.0	89.3
2017	6	81.9	12.4	64.1	93.8	64.1	71.8	84.8	91.9	93.8
2018	9	79.5	9.7	62.0	92.2	62.0	74.8	82.5	83.7	92.2
2019	5	83.9	8.2	70.4	89.9	70.4	82.2	87.1	89.8	89.9
2020	7	76.2	13.6	53.7	93.1	53.7	62.2	80.7	85.0	93.1
1998-2020	223	79.0	10.0	29.8	99.9	66.0	72.8	80.3	86.0	91.4

Table 4

Age distribution by 5-year age group and sex for period 2007-2020

Age at diagnosis Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
0-4									
5-9									
10-14									
15-19									
20-24									
25-29	1	0.3	0.3			0.0	1	0.6	0.6
30-34	0	0.0	0.3			0.0			0.6
35-39	0	0.0	0.3			0.0			0.6
40-44	1	0.3	0.6	1	0.6	0.6			0.6
45-49	1	0.3	0.9	1	0.6	1.2			0.6
50-54	7	2.1	3.0	3	1.8	2.9	4	2.5	3.1
55-59	13	3.9	7.0	11	6.4	9.4	2	1.3	4.4
60-64	21	6.4	13.3	14	8.2	17.5	7	4.4	8.8
65-69	23	7.0	20.3	15	8.8	26.3	8	5.0	13.8
70-74	60	18.2	38.5	33	19.3	45.6	27	17.0	30.8
75-79	61	18.5	57.0	39	22.8	68.4	22	13.8	44.7
80-84	58	17.6	74.5	26	15.2	83.6	32	20.1	64.8
85+	84	25.5	100.0	28	16.4	100.0	56	35.2	100.0
All ages	330	100.0		171	100.0		159	100.0	

Table 5

Age-specific incidence and proportion of all cancers
for period 2007-2020

Age at diagnosis Years	Males n	Females n	Males Age-spec. incid.	Females Age-spec. incid.	Males Prop.all cancers n=153686 %	Females Prop.all cancers n=155051 %
0- 4						
5- 9						
10-14						
15-19						
20-24						
25-29		1		0.0		0.1
30-34						
35-39						
40-44	1		0.0		0.0	
45-49	1		0.0		0.0	
50-54	3	4	0.1	0.2	0.0	0.0
55-59	10	2	0.5	0.1	0.1	0.0
60-64	13	7	0.7	0.4	0.1	0.0
65-69	15	8	0.9	0.4	0.1	0.0
70-74	32	26	2.1	1.5	0.1	0.1
75-79	39	22	3.2	1.5	0.2	0.1
80-84	26	32	3.6	3.0	0.2	0.2
85+	26	56	5.6	5.4	0.2	0.3
All ages	166	158			0.1	0.1
Incidence						
Raw			0.5	0.5		
WS			0.2	0.1		
ES			0.3	0.2		
BRD-S			0.5	0.3		

The age-specific incidence characterizes the disease risk in a particular age group. The age distribution depends on the patient population frequency in each age group and reflects the tangible clinical picture of everyday patients care (see following chart).

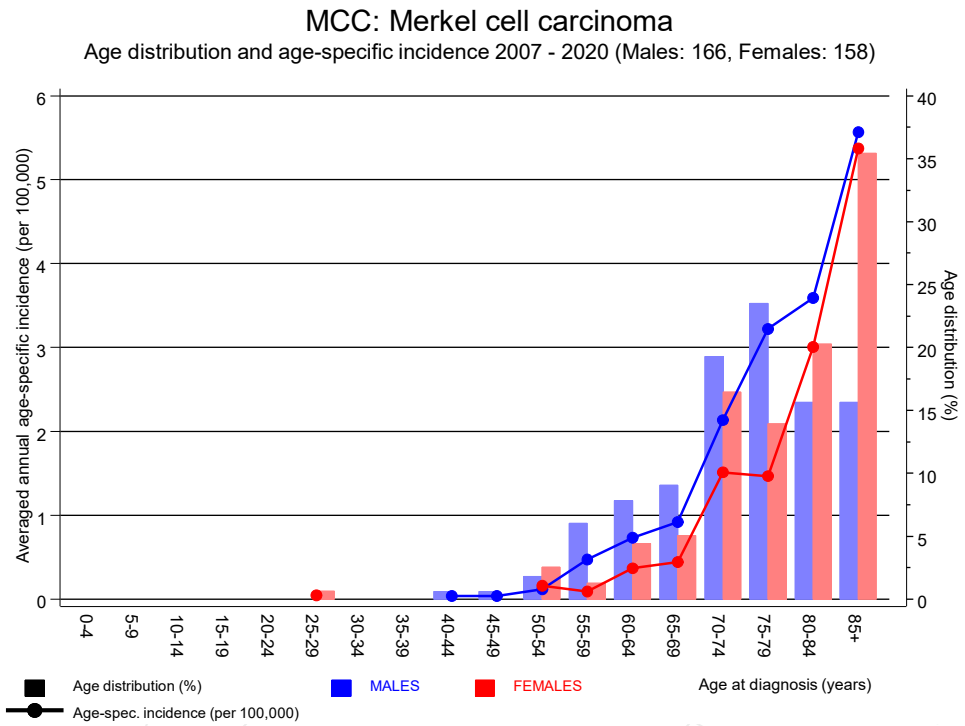


Figure 6. Age distribution (males: mean=75.2 yrs, median=76.0 yrs; females: mean=79.6 yrs, median=81.0 yrs) and age-specific incidence.

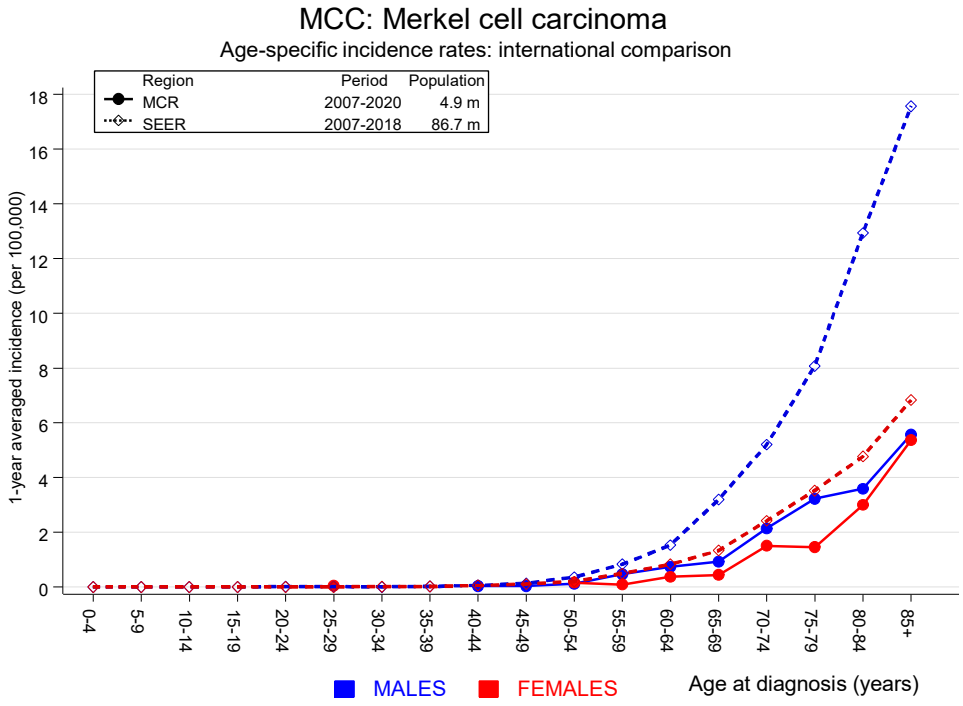


Figure 6a. Age-specific incidence in MCR registry areas compared to SEER (Surveillance, Epidemiology, and End Results, USA).

Reference:
Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Incidence - SEER 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 1998–2020

MALES

Diagnosis		Observed n	Expected n	SIR	CI 95%	CI 95%		EAR	DCO %
C18	Colon	3	1.0	2.9	0.6	8.4		40.7	
C19–C20	Rectum	1	0.5	2.1	0.1	11.7		11.0	
C25	Pancreas	1	0.4	2.4	0.1	13.1		12.0	
C32	Larynx	1	0.1	13.5	0.3	75.4		19.3	100.0
C33–C34	Lung	6	1.1	5.5	2.0	12.1	#	102.6	
C43	Malign. melanoma	1	0.4	2.3	0.1	13.0		12.0	100.0
C61	Prostate	3	2.6	1.2	0.2	3.4		9.2	33.3
C67	Bladder	1	0.6	1.8	0.0	9.9		9.1	
C73	Thyroid	1	0.0	23.0	0.6	128.4		20.0	
C74–C80	Cancer others	1	0.0	35.6	0.9	198.1		20.3	100.0
C76–C79	CUP	1	0.2	5.4	0.1	30.2		17.0	
C82–C85	NHL	5	0.4	11.3	3.7	26.4	#	95.1	
C91–C96	Leukaemia	1	0.2	5.8	0.1	32.1		17.2	
Not observed		0	2.2	0.0	0.0	1.7		-46.3	
All further malignancies		26	9.7	2.7	1.7	3.9	#	339.2	15.4

Patients	195
Median age at next malignancy (years)	79.6
Person-years	479
Mean observation time (years)	2.5
Median observation time (years)	1.2

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 1998–2020
FEMALES

Diagnosis		Observed n	Expected n	SIR	CI 95%	CI 95%		EAR	DCO %
C03–C06	Oral cavity	1	0.1	15.5	0.4	86.3		11.0	
C17	Small intestine	1	0.1	16.4	0.4	91.6		11.0	100.0
C18	Colon	3	1.5	2.0	0.4	5.8		17.5	33.3
C19–C20	Rectum	2	0.6	3.6	0.4	13.0		16.9	50.0
C22	Liver	1	0.2	5.6	0.1	31.1		9.6	
C23–C24	Bile	1	0.2	4.4	0.1	24.8		9.1	
C33–C34	Lung	1	0.9	1.2	0.0	6.4		1.5	
C43	Malign. melanoma	2	0.4	4.6	0.6	16.6		18.3	50.0
C50	Breast	6	3.3	1.8	0.7	4.0		31.9	
C54	Corpus uteri	2	0.6	3.2	0.4	11.4		16.0	
C56	Ovary	1	0.5	2.0	0.1	11.4		6.0	
C64	Kidney	1	0.3	3.2	0.1	17.9		8.1	
C73	Thyroid	1	0.1	8.4	0.2	46.6		10.3	
C74–C80	Cancer others	1	0.1	14.9	0.4	83.2		10.9	
C76–C79	CUP	1	0.3	3.3	0.1	18.6		8.2	
C82–C85	NHL	6	0.5	11.0	4.0	24.0	#	63.9	16.7
C90	Mult. myeloma	1	0.2	5.7	0.1	31.9		9.7	
Not observed		0	2.9	0.0	0.0	1.3		-34.2	
All further malignancies		32	12.7	2.5	1.7	3.6	#	225.7	15.6

Patients	220
Median age at next malignancy (years)	80.3
Person-years	854
Mean observation time (years)	3.9
Median observation time (years)	2.0

The occurrence of further specified malignancy is statistically significant.

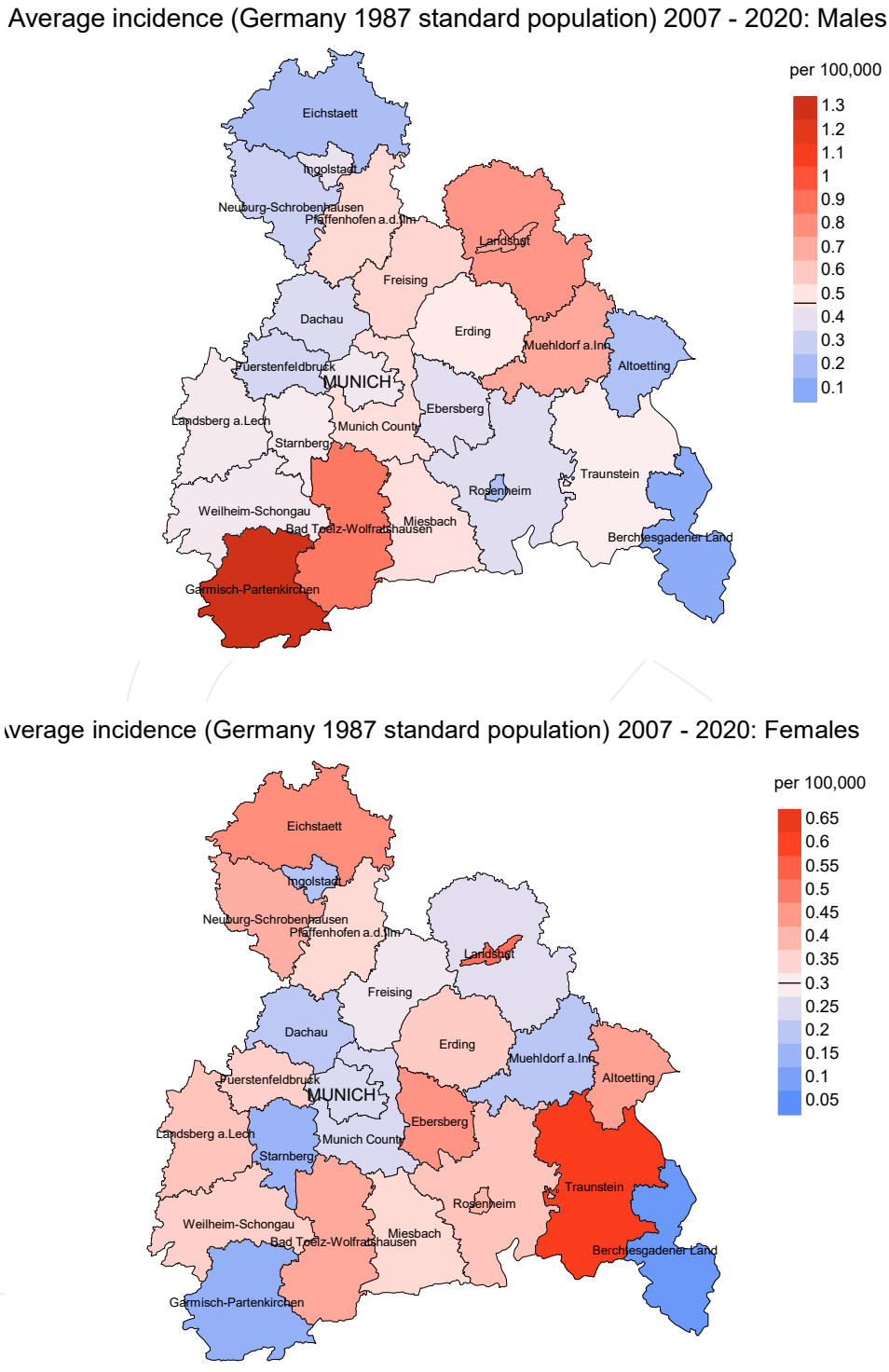
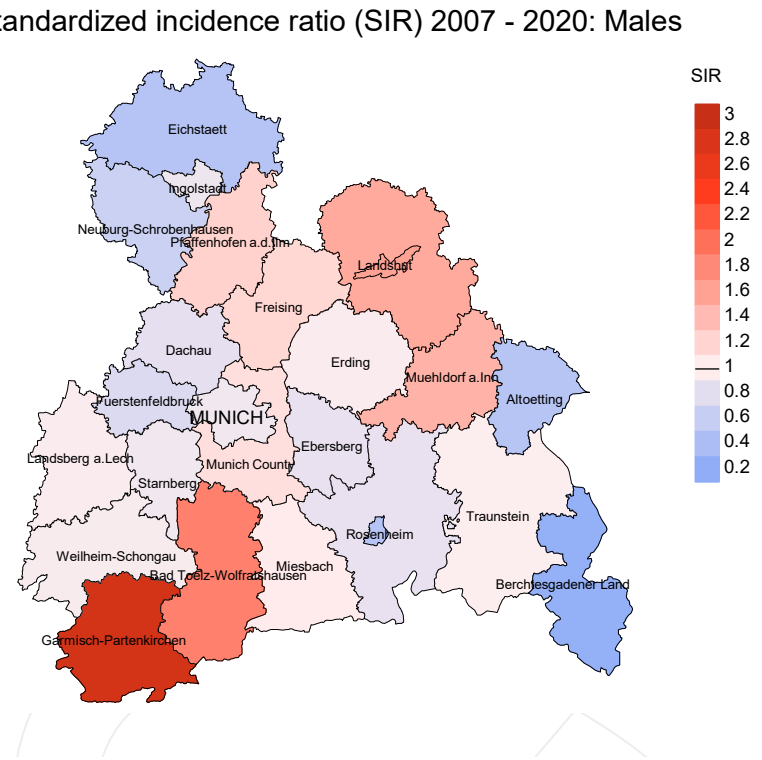


Figure 8a. Map of cancer incidence (german standard population) by county averaged for period 2007 to 2020. According to their individual incidence rates, the counties are displayed in different red and blue hues, being the fine white color attributed to the population mean (males 0.5/100,000 WS N=166, females 0.3/100,000 WS N=158).

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 6 women were identified with newly diagnosed merkel cell carcinoma. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 0.5/100,000 (german standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.1 and 1.3/100,000.



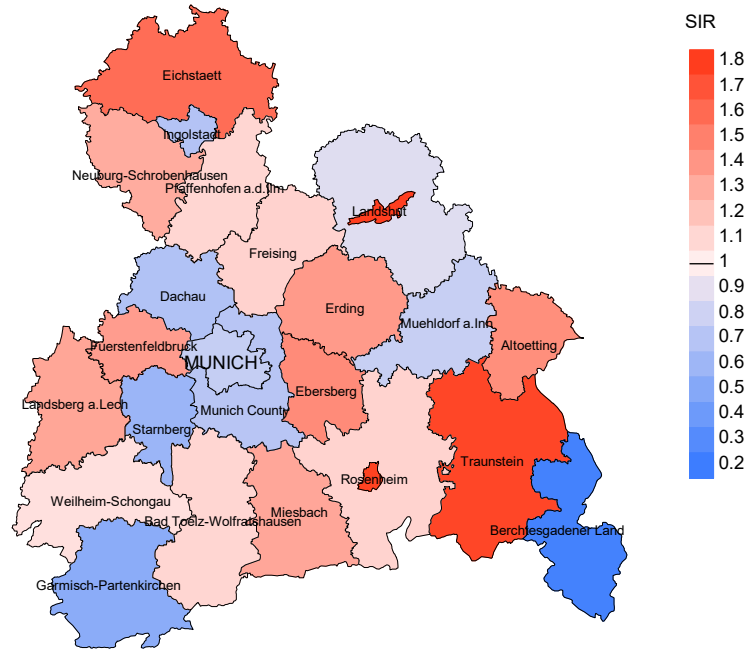


Figure 8b. Map of standardized incidence ratio (SIR) by county averaged for period 2007 to 2020. According to their individual SIR values, the counties are displayed in different red and blue hues, being the fine white color attributed to the population overall of 1.0 (males N=166, females N=158).

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 6 women were identified with newly diagnosed merkel cell carcinoma. 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 0.37 and 3.78, and is therefore not statistically striking.

MORTALITY

Table 9a

Annual cohorts: Incident cancers, follow-up status,
and deaths among the annual cohorts

(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 %	Deaths n	Prop. deaths %	Prop. deaths with death certific. %
1998	7	100.0	6	85.7	100.0
1999	6	100.0	4	66.7	100.0
2000	5	100.0	3	60.0	100.0
2001	4	100.0	4	100.0	100.0
2002	16	93.8	14	87.5	92.9
2003	13	100.0	11	84.6	81.8
2004	19	100.0	12	63.2	100.0
2005	12	100.0	12	100.0	91.7
2006	14	100.0	11	78.6	100.0
2007	34	91.2	28	82.4	96.4
2008	12	100.0	7	58.3	100.0
2009	25	100.0	18	72.0	100.0
2010	25	96.0	15	60.0	86.7
2011	27	92.6	19	70.4	94.7
2012	28	96.4	19	67.9	94.7
2013	22	100.0	19	86.4	100.0
2014	34	100.0	19	55.9	100.0
2015	34	100.0	19	55.9	94.7
2016	23	100.0	14	60.9	100.0
2017	21	100.0	13	61.9	69.2
2018	17	94.1	5	29.4	60.0
2019	16	100.0	9	56.3	88.9
2020	12	100.0	1	8.3	100.0
1998–2020	426	97.9	282	66.2	94.0

Table 9b

Annual cohorts of incident cancers and deaths,
and cases deceased within the same year of being diagnosed with cancer

(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	Deaths in same year n	Prop. deaths in same year %
1998	7	4	1	14.3
1999	6	2		
2000	5	1		
2001	4	6	1	25.0
2002	16	8	4	25.0
2003	13	7	2	15.4
2004	19	4	1	5.3
2005	12	5		
2006	14	8	1	7.1
2007	34	15	7	20.6
2008	12	19	3	25.0
2009	25	12	2	8.0
2010	25	13	1	4.0
2011	27	15	5	18.5
2012	28	19	1	3.6
2013	22	25	6	27.3
2014	34	25	6	17.6
2015	34	25	6	17.6
2016	23	20	3	13.0
2017	21	27	3	14.3
2018	17	12	1	5.9
2019	16	8		
2020	12	16	1	8.3
1998–2020	426	296	55	12.9

Table 9c

Annual cohorts of deaths, and proportion of cancer-related and non-cancer-related deaths

(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	4	100.0		100.0
1999	2	100.0		100.0
2000	1	100.0		
2001	6	66.7	33.3	83.3
2002	8	75.0	25.0	85.7
2003	7	85.7	14.3	85.7
2004	4	100.0		100.0
2005	5	80.0	20.0	80.0
2006	8	75.0	25.0	87.5
2007	15	53.3	46.7	64.3
2008	19	73.7	26.3	78.9
2009	12	91.7	8.3	83.3
2010	13	38.5	61.5	41.7
2011	15	46.7	53.3	46.7
2012	19	52.6	47.4	61.1
2013	25	68.0	32.0	68.0
2014	25	64.0	36.0	84.0
2015	25	64.0	36.0	72.0
2016	20	65.0	35.0	75.0
2017	27	59.3	40.7	64.0
2018	12	58.3	41.7	50.0
2019	8	50.0	50.0	66.7
2020	16	50.0	50.0	68.8
1998-2020	296	63.9	36.1	70.8

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	2	73.2	73.2		73.2
1999	2	72.5	72.5		72.5
2000					
2001	4	70.7	66.9	90.3	70.7
2002	4	84.4	84.4		84.4
2003	2	70.3	70.3		70.3
2004	4	76.8	76.8		76.8
2005	1	86.1	86.1		86.1
2006	5	82.9	77.2	91.8	82.9
2007	6	82.2	75.7	82.3	82.9
2008	10	85.6	85.6	76.5	87.8
2009	5	73.2	65.8	76.7	73.2
2010	6	87.6	87.7	75.6	82.9
2011	3	74.7	75.5	74.7	67.1
2012	8	82.1	79.8	86.5	80.6
2013	8	84.0	80.7	88.6	80.7
2014	13	79.6	78.6	86.4	79.1
2015	11	86.0	68.9	87.5	80.1
2016	14	83.3	81.5	84.0	83.3
2017	12	79.9	77.4	83.0	77.0
2018	8	79.9	77.9	84.0	77.9
2019	3	83.4	80.7	90.5	
2020	9	82.6	81.4	85.0	80.2
1998–2020	140	82.0	79.3	86.0	79.6

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	2	63.8	63.8		63.8
1999					
2000	1	89.1	89.1		
2001	2	76.8	74.0	79.6	74.0
2002	4	83.0	72.8	89.4	72.8
2003	5	84.9	82.0	95.6	89.3
2004					
2005	4	87.2	83.1	96.8	83.1
2006	3	81.9	81.4	98.0	81.4
2007	9	86.6	82.2	92.2	82.2
2008	9	83.8	79.5	86.3	79.5
2009	7	85.9	85.9		85.9
2010	7	84.7	83.1	86.0	83.1
2011	12	88.8	81.9	93.5	83.5
2012	11	81.1	78.5	86.5	78.9
2013	17	87.8	78.9	92.6	78.9
2014	12	85.6	76.8	88.3	81.9
2015	14	88.9	85.7	91.0	85.7
2016	6	94.5	89.1	100.2	92.0
2017	15	88.1	86.8	90.2	88.1
2018	4	85.6	80.5	90.7	
2019	5	92.4	91.6	92.4	92.4
2020	7	87.4	88.5	87.4	86.7
1998-2020	156	86.7	81.9	90.1	83.1

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	2	0.2	0.67	0.1	0.65	0.2	0.66	0.2	0.69
1999	2	0.2	0.67	0.1	0.62	0.2	0.76	0.2	0.95
2000									
2001	3	0.3	3.00	0.2	3.50	0.2	2.39	0.2	2.16
2002	4	0.2	0.67	0.1	0.73	0.2	0.69	0.3	0.61
2003	2	0.1	0.40	0.1	0.31	0.1	0.39	0.1	0.54
2004	4	0.2	0.80	0.1	0.79	0.2	0.72	0.2	0.74
2005	1	0.1	0.33	0.0	0.41	0.1	0.48	0.1	0.36
2006	4	0.2	1.00	0.1	0.87	0.1	0.87	0.2	0.89
2007	4	0.2	0.25	0.1	0.25	0.1	0.22	0.2	0.24
2008	8	0.4	1.33	0.1	1.22	0.3	1.30	0.4	1.30
2009	4	0.2	0.29	0.1	0.36	0.2	0.35	0.2	0.28
2010	4	0.2	0.33	0.1	0.27	0.1	0.34	0.2	0.35
2011	2	0.1	0.18	0.0	0.18	0.1	0.17	0.1	0.20
2012	6	0.3	0.43	0.1	0.36	0.2	0.40	0.3	0.43
2013	6	0.3	0.67	0.1	0.59	0.2	0.62	0.2	0.68
2014	11	0.5	0.73	0.2	0.56	0.3	0.66	0.4	0.74
2015	6	0.3	0.30	0.1	0.43	0.2	0.37	0.2	0.32
2016	10	0.4	0.83	0.1	0.58	0.2	0.69	0.4	0.79
2017	8	0.3	0.57	0.1	0.45	0.2	0.51	0.3	0.54
2018	6	0.2	0.75	0.1	0.80	0.1	0.78	0.2	0.77
2019	2	0.1	0.20	0.0	0.13	0.0	0.15	0.1	0.20
2020	6	0.2	1.20	0.1	1.03	0.1	1.12	0.2	1.12
1998-2020	105	0.2	0.53	0.1	0.49	0.2	0.52	0.2	0.54

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	0.50	0.1	0.87	0.1	0.75	0.2	0.60
1999									
2000	1	0.1	0.33	0.0	0.13	0.0	0.17	0.0	0.16
2001	1	0.1	0.33	0.0	0.49	0.1	0.42	0.1	0.33
2002	2	0.1	0.20	0.0	0.26	0.1	0.25	0.1	0.23
2003	4	0.2	0.50	0.0	0.38	0.1	0.44	0.2	0.51
2004									
2005	3	0.2	0.33	0.0	0.21	0.1	0.26	0.1	0.30
2006	2	0.1	0.20	0.0	0.10	0.0	0.12	0.1	0.19
2007	4	0.2	0.22	0.0	0.22	0.1	0.22	0.1	0.20
2008	6	0.3	1.00	0.1	0.72	0.1	0.83	0.2	0.90
2009	7	0.3	0.64	0.1	0.35	0.1	0.44	0.2	0.47
2010	1	0.0	0.08	0.0	0.04	0.0	0.05	0.0	0.09
2011	5	0.2	0.31	0.0	0.24	0.1	0.27	0.1	0.32
2012	4	0.2	0.31	0.0	0.41	0.1	0.41	0.1	0.42
2013	11	0.5	0.85	0.1	0.53	0.2	0.66	0.3	0.71
2014	5	0.2	0.29	0.1	0.34	0.1	0.33	0.2	0.36
2015	10	0.4	0.77	0.1	0.58	0.2	0.65	0.2	0.74
2016	3	0.1	0.27	0.0	0.26	0.1	0.26	0.1	0.23
2017	8	0.3	1.33	0.1	1.15	0.1	1.19	0.2	1.21
2018	1	0.0	0.11	0.0	0.05	0.0	0.07	0.0	0.10
2019	2	0.1	0.40	0.0	0.30	0.0	0.34	0.0	0.31
2020	2	0.1	0.29	0.0	0.14	0.0	0.18	0.0	0.23
1998-2020	84	0.2	0.38	0.0	0.31	0.1	0.34	0.1	0.36

Table 12

Age distribution of age at death (cancer-related) for period 2007-2020
(**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									
40-44									
45-49									
50-54	3	2.0	2.0	3	3.6	3.6			0.0
55-59	4	2.6	4.6	3	3.6	7.2	1	1.4	1.4
60-64	4	2.6	7.2	3	3.6	10.8	1	1.4	2.9
65-69	10	6.6	13.8	8	9.6	20.5	2	2.9	5.8
70-74	13	8.6	22.4	6	7.2	27.7	7	10.1	15.9
75-79	37	24.3	46.7	21	25.3	53.0	16	23.2	39.1
80-84	28	18.4	65.1	17	20.5	73.5	11	15.9	55.1
85+	53	34.9	100.0	22	26.5	100.0	31	44.9	100.0
All ages	152	100.0		83	100.0		69	100.0	

Table 13

Age-specific mortality (cancer-related) and proportion of all cancers
for period 2007-2020
(**incl. multiple malignancies**)

Age at death Years	Males n	Females n	Males Age-spec. mortal.	Males MI-index	Females Age-spec. mortal.	Females 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								
40-44								
45-49								
50-54	3		0.1	1.00			0.1	
55-59	3	1	0.1	0.30	0.0	0.50	0.1	0.0
60-64	3	1	0.2	0.23	0.1	0.14	0.0	0.0
65-69	8	2	0.5	0.53	0.1	0.25	0.1	0.0
70-74	6	7	0.4	0.19	0.4	0.27	0.1	0.1
75-79	21	16	1.7	0.54	1.1	0.73	0.2	0.2
80-84	17	11	2.3	0.65	1.0	0.34	0.2	0.1
85+	22	31	4.7	0.85	3.0	0.55	0.2	0.3
All ages	83	69					0.1	0.1
Mortality								
Raw			0.3	0.50	0.2	0.44		
WS			0.1	0.45	0.0	0.35		
ES			0.2	0.48	0.1	0.39		
BRD-S			0.2	0.50	0.1	0.41		
PYLL-70								
per 100,000			0.5		0.1			
ES			0.4		0.1			
AYLL-70			7.8		6.3			

Table 14a

Further malignancies in deaths in period 1998–2020
MALES

Diagnosis		Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C07–C08	Salivary gland	1	0.8	1	100.0				
C15	Oesophagus	1	0.8	1	100.0				
C16	Stomach	2	1.7	1	50.0			1	50.0
C18	Colon	5	4.2	4	80.0			1	20.0
C19–C20	Rectum	4	3.4	2	50.0			2	50.0
C25	Pancreas	1	0.8					1	100.0
C32	Larynx	2	1.7	1	50.0			1	50.0
C33–C34	Lung	10	8.4	4	40.0	3	30.0	3	30.0
C43	Malign. melanoma	2	1.7	1	50.0			1	50.0
C44	Skin others	51	42.9			9	17.6	42	82.4
C46,C49	Soft tissue	1	0.8	1	100.0				
C61	Prostate	14	11.8	8	57.1	1	7.1	5	35.7
C62	Testis	1	0.8	1	100.0				
C64	Kidney	4	3.4	3	75.0	1	25.0		
C67	Bladder	2	1.7					2	100.0
C74–C80	Cancer others	1	0.8					1	100.0
C76–C79	CUP	2	1.7	1	50.0			1	50.0
C81	Hodgkin lymphoma	2	1.7	2	100.0				
C82–C85	NHL	12	10.1	8	66.7	2	16.7	2	16.7
C91–C96	Leukaemia	1	0.8					1	100.0
All further malignancies		119	100.0	39	32.8	16	13.4	64	53.8

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 14b

Further malignancies in deaths in period 1998–2020
FEMALES

Diagnosis	Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C03–C06 Oral cavity	1	1.6					1	100.0
C16 Stomach	1	1.6	1	100.0				
C17 Small intestine	2	3.2	1	50.0			1	50.0
C18 Colon	2	3.2	1	50.0			1	50.0
C19–C20 Rectum	2	3.2	1	50.0			1	50.0
C22 Liver	2	3.2					2	100.0
C23–C24 Bile	2	3.2			1	50.0	1	50.0
C43 Malign. melanoma	2	3.2					2	100.0
C44 Skin others	15	24.2			1	6.7	14	93.3
C50 Breast	8	12.9	5	62.5	1	12.5	2	25.0
C54 Corpus uteri	3	4.8	2	66.7			1	33.3
C56 Ovary	1	1.6					1	100.0
C64 Kidney	2	3.2	1	50.0			1	50.0
C65 Renal pelvis	1	1.6			1	100.0		
C67 Bladder	2	3.2	2	100.0				
C74–C80 Cancer others	2	3.2	1	50.0			1	50.0
C76–C79 CUP	1	1.6					1	100.0
C82–C85 NHL	13	21.0	8	61.5	2	15.4	3	23.1
All further malignancies	62	100.0	23	37.1	6	9.7	33	53.2

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 2007-2020
(**First primaries only** *)

Age at death Years	Males n	Females n	Males Age-spec. mortal.	Males MI-index	Females Age-spec. mortal.	Females 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								
40-44								
45-49								
50-54	2		0.1	1.00			0.1	
55-59	2		0.1	0.25			0.1	
60-64	1		0.1	0.11			0.0	
65-69	4	2	0.2	0.44	0.1	0.50	0.1	0.0
70-74	1	3	0.1	0.05	0.2	0.18	0.0	0.0
75-79	11	7	0.9	0.65	0.5	0.70	0.1	0.1
80-84	6	7	0.8	0.50	0.7	0.30	0.1	0.1
85+	8	18	1.7	1.00	1.7	0.55	0.1	0.2
All ages	35	37					0.1	0.1
Mortality								
Raw			0.1	0.40	0.1	0.37		
WS			0.0	0.34	0.0	0.27		
ES			0.1	0.38	0.0	0.31		
BRD-S			0.1	0.41	0.1	0.34		
PYLL-70								
per 100,000			0.3		0.0			
ES			0.2		0.0			
AYLL-70			8.6		2.5			

* See corresponding tables with multiple malignancies.

Table 16

Age-specific mortality (cancer-related) and proportion of all cancers
for period 2007-2020
(**Single primaries only** *)

Age at death Years	Males n	Females n	Males Age-spec. mortal.	Males MI-index	Females Age-spec. mortal.	Females 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								
40-44								
45-49								
50-54	2		0.1	1.00			0.1	
55-59	2		0.1	0.25			0.1	
60-64	1		0.1	0.11			0.0	
65-69	2	1	0.1	0.22	0.1	0.33	0.0	0.0
70-74	1	3	0.1	0.07	0.2	0.19	0.0	0.0
75-79	8	4	0.7	0.53	0.3	0.44	0.1	0.1
80-84	6	4	0.8	0.60	0.4	0.19	0.1	0.1
85+	3	17	0.6	0.60	1.6	0.61	0.1	0.2
All ages	25	29					0.0	0.1
Mortality								
Raw			0.1	0.33	0.1	0.33		
WS			0.0	0.28	0.0	0.24		
ES			0.0	0.30	0.0	0.27		
BRD-S			0.1	0.34	0.0	0.28		
PYLL-70								
per 100,000			0.3		0.0			
ES			0.2		0.0			
AYLL-70			10.4		2.5			

* See corresponding tables with multiple malignancies.

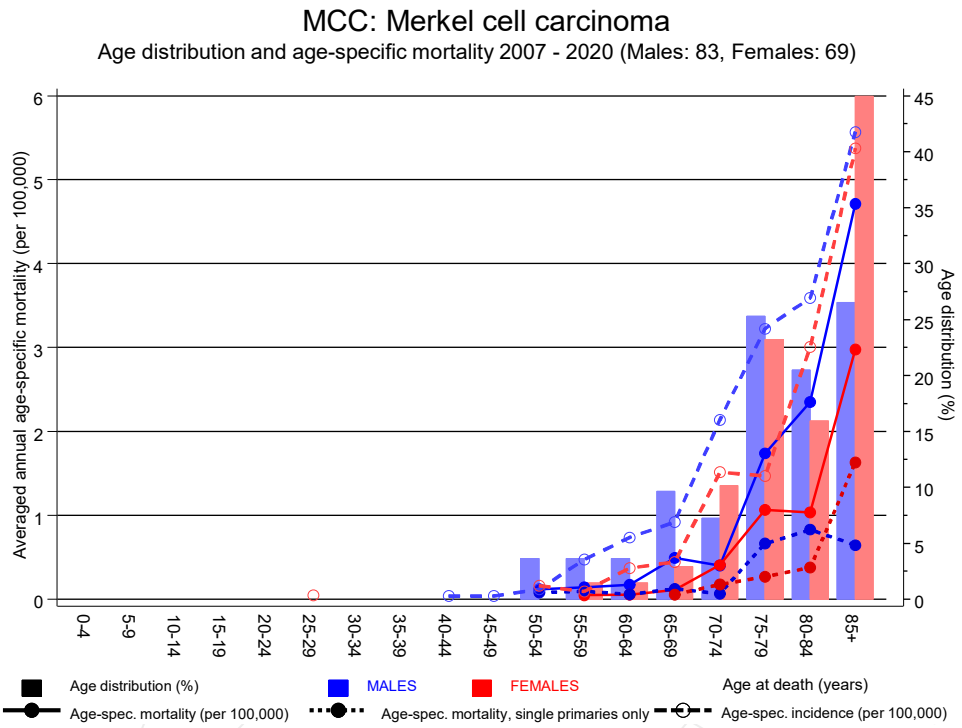


Figure 17. Distribution of age at death (bars; males: mean=76.2 yrs, median=77.6 yrs; females: mean=79.5 yrs, median=79.9 yrs) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

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

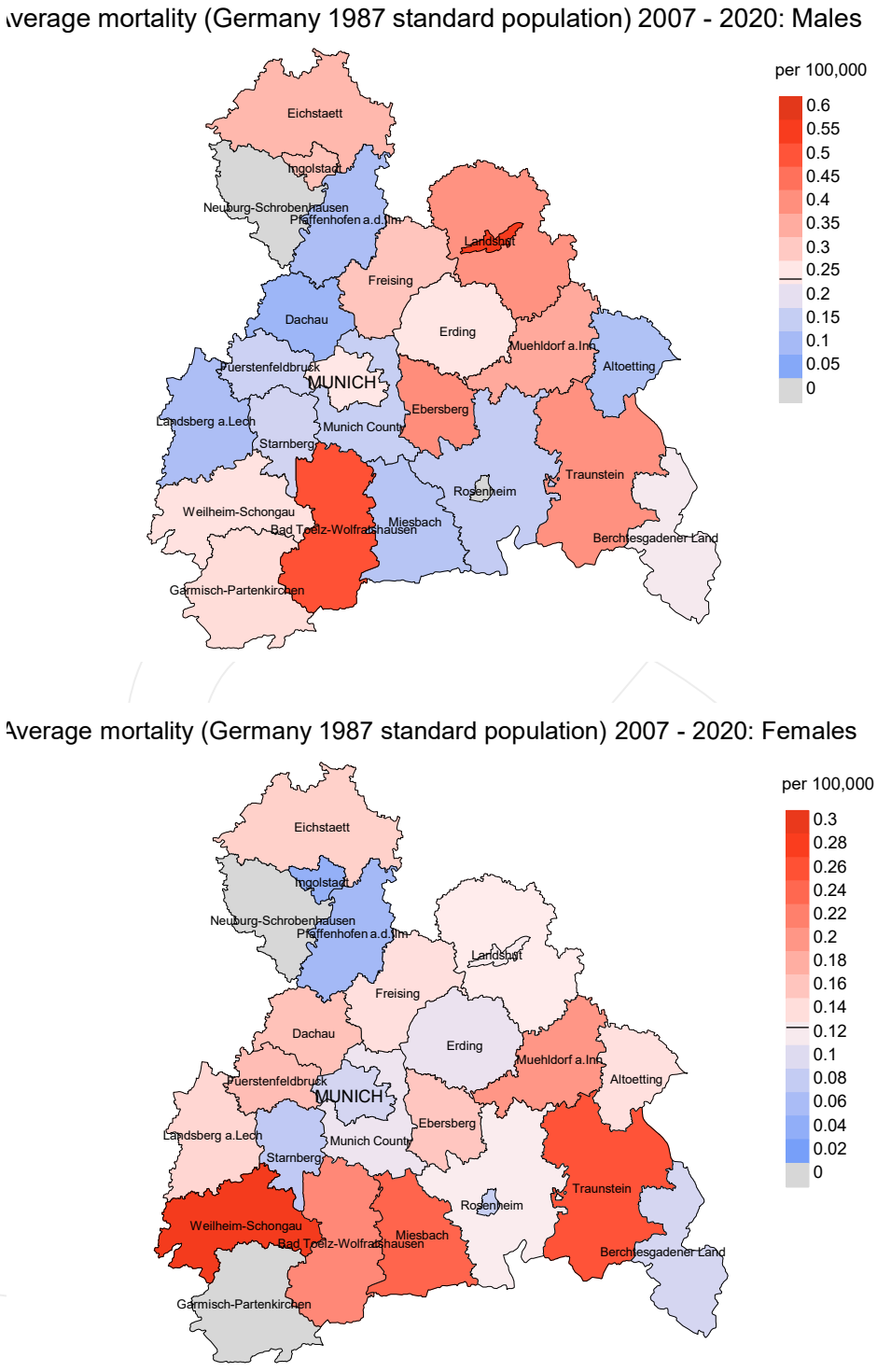


Figure 18a. Map of cancer mortality (german standard population) by county averaged for period 2007 to 2020. According to their individual mortality rates, the counties are displayed in different red and blue hues, being the fine white color attributed to the population mean (males 0.2/100,000 WS N=83, females 0.1/100,000 WS N=69).

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 died from merkel cell carcinoma. Therefore, the mean mortality 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 0.8/100,000.

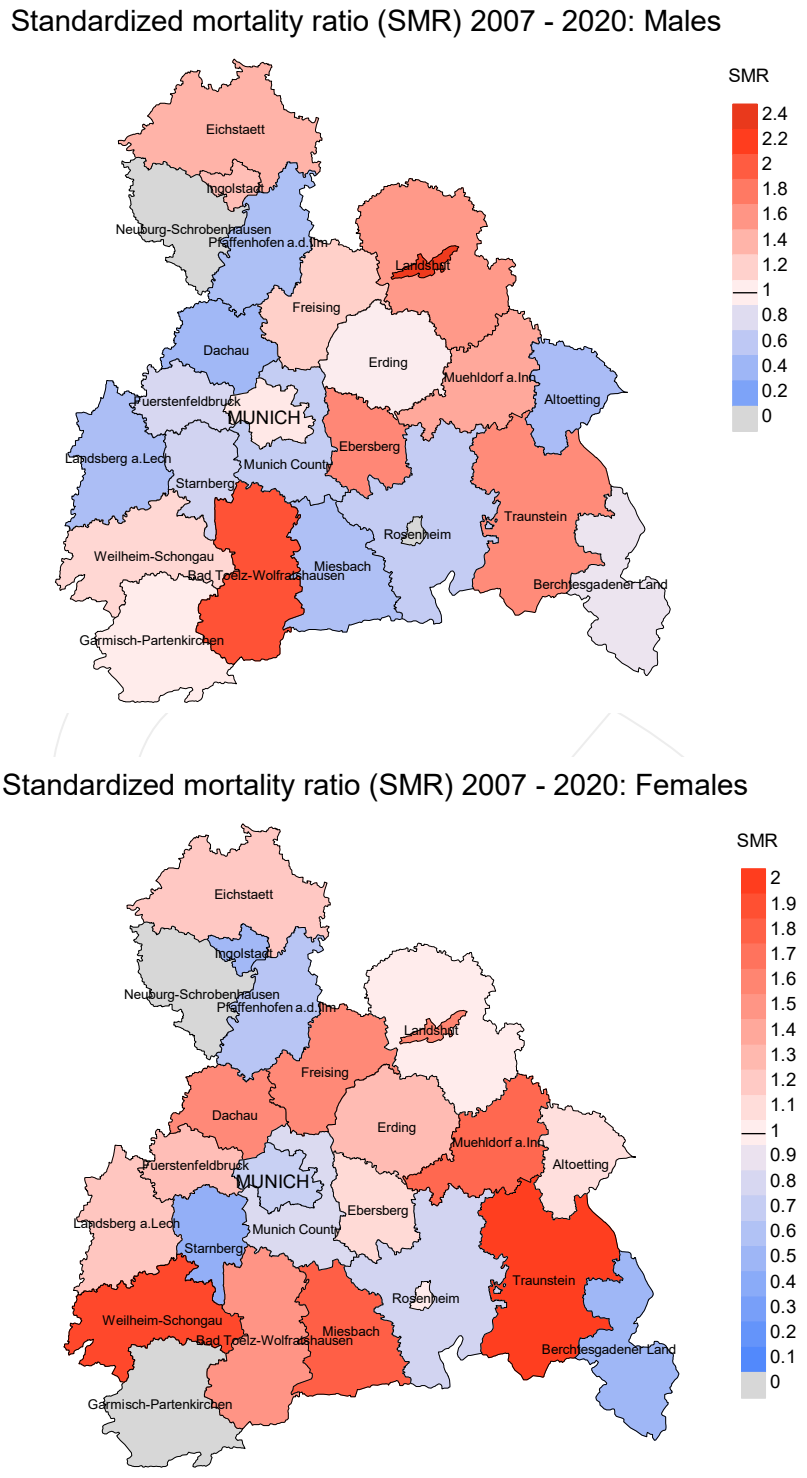


Figure 18b. Map of standardized mortality ratio (SMR) by county averaged for period 2007 to 2020. According to their individual SMR values, the counties are displayed in different red and blue hues, being the fine white color attributed to the population overall of 1.0 (males N=83, females N=69).

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 died from merkel cell carcinoma. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 1.11. Though, the value of this parameter may vary with an underlying probability of 99% between 0.06 and 5.17, 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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