Munich Cancer Registry

ICD-10 C45: Mesothelioma

Incidence and Mortality

Year of diagnosis	1998-2020
Patients	1,740
Diseases	1,743
Creation date	12/21/2021
Database export	12/20/2021
Population	4.95 m

BERLIN

GERMANY

BAVARIA

MUNICH

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

https://www.tumorregister-muenchen.de/en/facts/base/bC45__E-ICD-10-C45-Mesothelioma-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 2015) used for specifying cancer site

Code	Description
C45.-	Mesothelioma
C45.0	Mesothelioma of pleura
C45.1	Mesothelioma of peritoneum
C45.2	Mesothelioma of pericardium
C45.7	Mesothelioma of other sites
C45.9	Mesothelioma, 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	41	12	29.3	4.9	3.4	100.0	100.0
1999	33	8	24.2	5.4	3.5	100.0	100.0
2000	43	22	51.2	8.5	3.5	97.7	100.0
2001	45	10	22.2	8.6	3.6	97.8	100.0
2002	60	19	31.7	9.9	3.5	96.7	100.0 #
2003	63	14	22.2	10.9	3.5	96.8	100.0
2004	80	10	12.5	10.7	3.5	96.3	98.8
2005	76	9	11.8	10.9	3.5	96.1	97.4
2006	74	9	12.2	11.8	3.3	95.9	97.3
2007	102	5	4.9	12.5	3.3	92.2	98.0 #
2008	101	7	6.9	13.0	3.1	99.0	100.0
2009	85	5	5.9	13.7	3.3	94.1	100.0
2010	99	11	11.1	14.9	2.9	93.9	99.0
2011	98	6	6.1	15.4	2.8	89.8	95.9
2012	105	6	5.7	16.1	2.7	99.0	100.0
2013	94	9	9.6	16.4	2.2	94.7	100.0
2014	79	10	12.7	16.8	2.1	93.7	100.0
2015	113	3	2.7	17.8	2.4	94.7	99.1
2016	84	3	3.6	18.4	1.7	88.1	100.0
2017	81	8	9.9	18.7	1.5	85.2	100.0
2018	84	8	9.5	19.1	0.0	85.7	100.0
2019	58			19.4	0.0	74.1	100.0
2020	45			19.9	0.0	51.1	100.0 ##
1998-2020	1743	194	11.1	19.9	3.4	92.4	99.3

1,743 cases diagnosed 1998-2020 are related to a total of 1,740 patients. Currently, in 404 (23.2 %) of these 1,740 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 341 / 47 / 16 (19.6 % / 2.7 % / 0.9 %) 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 2018, a subgroup of 84 cases has been diagnosed, of which 19.1 % 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	30	73.2	11	36.7	6.7	3.4	100.0	100.0
1999	25	75.8	5	20.0	5.5	3.4	100.0	100.0
2000	33	76.7	17	51.5	8.0	3.4	100.0	100.0
2001	30	66.7	6	20.0	8.5	3.5	96.7	100.0
2002	45	75.0	12	26.7	11.0	3.5	97.8	100.0 #
2003	50	79.4	9	18.0	12.2	3.3	98.0	100.0
2004	70	87.5	10	14.3	11.3	3.4	97.1	100.0
2005	57	75.0	6	10.5	11.5	3.3	94.7	96.5
2006	60	81.1	6	10.0	12.5	3.1	95.0	96.7
2007	81	79.4	4	4.9	12.9	3.2	95.1	98.8 #
2008	81	80.2	4	4.9	13.3	2.9	100.0	100.0
2009	69	81.2	4	5.8	13.8	3.1	94.2	100.0
2010	76	76.8	10	13.2	15.4	2.8	97.4	100.0
2011	80	81.6	3	3.8	15.8	2.7	90.0	96.3
2012	82	78.1	4	4.9	16.6	2.6	98.8	100.0
2013	77	81.9	8	10.4	16.6	2.0	96.1	100.0
2014	64	81.0	6	9.4	17.2	1.6	93.8	100.0
2015	93	82.3	3	3.2	18.5	1.9	96.8	98.9
2016	62	73.8	2	3.2	19.0	1.5	87.1	100.0
2017	64	79.0	6	9.4	19.2	1.4	89.1	100.0
2018	70	83.3	8	11.4	19.7	0.0	87.1	100.0
2019	46	79.3			20.0	0.0	78.3	100.0
2020	35	77.8			20.7	0.0	54.3	100.0 ##
1998–2020	1380	79.2	144	10.4	20.7	3.4	93.5	99.3

1,380 cases diagnosed 1998-2020 are related to a total of 1,377 patients. Currently, in 330 (24.0 %) of these 1,377 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 281 / 35 / 14 (20.4 % / 2.5 % / 1.0 %) 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 2018, a subgroup of 70 cases has been diagnosed, of which 19.7 % 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	11	26.8	1	9.1	0.0	3.6	100.0	100.0
1999	8	24.2	3	37.5	5.3	3.7	100.0	100.0
2000	10	23.3	5	50.0	10.3	3.8	90.0	100.0
2001	15	33.3	4	26.7	9.1	3.9	100.0	100.0
2002	15	25.0	7	46.7	6.8	3.8	93.3	100.0 #
2003	13	20.6	5	38.5	6.9	4.0	92.3	100.0
2004	10	12.5			8.5	4.2	90.0	90.0
2005	19	25.0	3	15.8	8.9	4.3	100.0	100.0
2006	14	18.9	3	21.4	9.6	4.3	100.0	100.0
2007	21	20.6	1	4.8	11.0	3.7	81.0	95.2 #
2008	20	19.8	3	15.0	11.5	3.6	95.0	100.0
2009	16	18.8	1	6.3	13.4	3.9	93.8	100.0
2010	23	23.2	1	4.3	12.8	3.2	82.6	95.7
2011	18	18.4	3	16.7	14.1	3.0	88.9	94.4
2012	23	21.9	2	8.7	14.4	3.4	100.0	100.0
2013	17	18.1	1	5.9	15.8	3.2	88.2	100.0
2014	15	19.0	4	26.7	15.3	3.7	93.3	100.0
2015	20	17.7			15.3	4.3	85.0	100.0
2016	22	26.2	1	4.5	16.5	2.7	90.9	100.0
2017	17	21.0	2	11.8	16.8	1.9	70.6	100.0
2018	14	16.7			17.0	0.0	78.6	100.0
2019	12	20.7			17.0	0.0	58.3	100.0
2020	10	22.2			16.8	0.0	40.0	100.0 ##
1998–2020	363	20.8	50	13.8	16.8	3.6	88.2	98.9

363 cases diagnosed 1998-2020 are related to a total of 363 patients. Currently, in 74 (20.4 %) of these 363 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 60 / 12 / 2 (16.5 % / 3.3 % / 0.6 %) 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 14 cases has been diagnosed, of which 17.0 % 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	30	11	2.7	0.9	1.7	0.5	2.4	0.7	2.9	0.9
1999	25	8	2.2	0.7	1.3	0.4	2.0	0.5	2.5	0.6
2000	33	10	2.9	0.8	1.7	0.3	2.6	0.5	3.2	0.7
2001	30	15	2.6	1.2	1.6	0.6	2.3	0.9	2.7	1.1
2002	45	15	2.4	0.8	1.4	0.4	2.0	0.6	2.7	0.7
2003	50	13	2.7	0.7	1.5	0.3	2.2	0.4	2.8	0.5
2004	70	10	3.7	0.5	1.9	0.3	2.8	0.4	3.6	0.5
2005	57	19	3.0	1.0	1.6	0.5	2.3	0.6	3.1	0.8
2006	60	14	3.1	0.7	1.6	0.3	2.4	0.4	3.2	0.6
2007	81	21	3.7	0.9	1.8	0.4	2.8	0.6	3.7	0.8
2008	81	20	3.6	0.9	1.8	0.3	2.6	0.5	3.4	0.6
2009	69	16	3.1	0.7	1.5	0.2	2.2	0.4	3.0	0.5
2010	76	23	3.4	1.0	1.6	0.4	2.4	0.6	3.1	0.8
2011	80	18	3.6	0.8	1.6	0.2	2.5	0.4	3.4	0.6
2012	82	23	3.6	1.0	1.5	0.4	2.4	0.6	3.3	0.8
2013	77	17	3.3	0.7	1.5	0.3	2.3	0.4	3.0	0.5
2014	64	15	2.7	0.6	1.1	0.2	1.7	0.3	2.4	0.4
2015	93	20	3.9	0.8	1.5	0.3	2.4	0.4	3.5	0.6
2016	62	22	2.6	0.9	1.0	0.3	1.6	0.5	2.3	0.7
2017	64	17	2.7	0.7	1.0	0.3	1.6	0.4	2.3	0.5
2018	70	14	2.9	0.6	1.2	0.2	1.8	0.3	2.5	0.4
2019	46	12	1.9	0.5	0.7	0.2	1.1	0.3	1.6	0.4
2020	35	10	1.4	0.4	0.5	0.2	0.9	0.2	1.2	0.3
1998–2020	1380	363	3.0	0.8	1.4	0.3	2.1	0.5	2.9	0.6

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	41	66.7	10.2	48.8	89.2	55.9	59.5	66.0	70.5	84.0
1999	33	67.5	9.3	47.8	86.4	56.1	61.4	67.7	74.3	80.6
2000	43	67.8	15.9	8.5	92.8	55.3	58.9	66.2	78.8	88.4
2001	45	66.0	9.8	45.6	85.4	54.5	57.7	65.6	72.9	79.8
2002	60	67.7	12.5	27.9	88.5	49.6	60.9	66.0	76.2	84.7
2003	63	69.6	10.9	30.7	91.2	58.1	62.1	69.8	77.7	82.6
2004	80	69.9	8.1	44.9	90.1	61.8	65.1	68.8	73.8	81.6
2005	76	69.6	10.3	38.5	88.3	57.5	63.8	70.5	76.7	83.4
2006	74	70.1	9.9	40.6	87.8	57.0	64.9	71.2	77.8	81.7
2007	102	69.4	9.4	40.3	92.4	55.4	64.6	70.4	76.1	79.6
2008	101	71.9	8.8	42.4	88.1	61.9	67.4	71.8	77.2	84.2
2009	85	72.1	9.6	44.3	97.3	60.3	65.4	72.0	80.1	83.8
2010	99	71.4	9.9	36.2	93.6	57.3	66.9	72.1	78.1	83.1
2011	98	73.3	8.3	52.5	87.3	62.0	67.4	73.4	79.8	84.1
2012	105	73.3	9.7	41.3	95.6	60.1	69.3	73.5	79.6	84.8
2013	94	72.1	9.6	43.1	95.4	59.7	65.7	72.7	78.2	85.2
2014	79	74.5	9.0	35.4	92.1	62.1	70.3	75.0	80.0	85.2
2015	113	75.1	9.9	26.1	91.6	66.4	71.2	76.3	80.4	87.4
2016	84	73.6	10.1	45.1	91.6	54.9	70.6	75.6	80.8	83.3
2017	81	73.9	10.5	43.5	92.6	58.0	67.0	76.0	80.9	84.5
2018	84	75.3	10.1	45.1	95.4	62.7	69.6	76.3	81.7	87.5
2019	58	74.9	11.1	34.2	90.1	56.9	68.8	78.3	83.0	85.4
2020	45	73.6	10.3	45.7	87.0	59.3	68.2	75.4	81.3	84.3
1998-2020	1743	71.8	10.3	8.5	97.3	58.2	65.7	72.8	79.0	84.1

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%
1998	30	66.9	9.7	49.4	89.2	56.8	59.5	65.6	70.5	83.2
1999	25	67.1	9.1	50.8	86.4	56.1	60.9	67.3	74.1	80.6
2000	33	67.1	15.8	8.5	92.8	55.3	58.9	65.0	78.1	85.9
2001	30	64.0	9.3	45.6	83.2	51.5	57.1	64.0	69.1	77.3
2002	45	68.4	11.2	46.4	88.4	50.3	61.8	66.3	75.8	84.5
2003	50	68.5	10.5	30.7	90.3	58.0	62.1	69.6	74.8	80.6
2004	70	70.3	7.7	44.9	90.1	62.9	65.5	68.9	73.7	81.6
2005	57	69.9	9.4	45.1	86.8	57.5	64.5	70.5	76.5	83.4
2006	60	69.6	9.2	46.6	87.8	57.1	64.5	69.7	76.9	80.8
2007	81	70.1	8.8	44.4	92.4	58.2	64.8	70.6	76.1	79.6
2008	81	71.2	7.7	48.5	88.1	61.9	66.4	71.0	74.7	82.3
2009	69	71.2	9.6	44.3	97.3	59.0	65.2	70.5	79.6	82.6
2010	76	71.5	8.9	46.1	91.8	58.9	66.9	71.8	77.6	83.1
2011	80	72.7	8.4	52.5	87.0	61.6	66.6	73.3	78.7	84.0
2012	82	73.8	8.0	53.7	91.5	63.2	69.7	73.5	79.6	84.0
2013	77	72.1	8.6	49.4	92.4	61.0	67.1	72.9	77.8	81.5
2014	64	73.7	8.9	35.4	88.0	62.1	70.2	74.7	78.4	83.8
2015	93	74.9	9.8	26.1	91.6	66.7	71.3	76.2	79.8	85.6
2016	62	74.5	10.0	45.1	91.6	54.9	71.2	75.9	81.2	83.5
2017	64	75.3	9.9	43.5	92.6	61.1	69.5	77.7	81.8	86.0
2018	70	75.0	10.5	45.1	95.4	63.0	69.1	75.6	81.6	87.8
2019	46	75.1	11.8	34.2	87.8	56.2	70.7	79.6	83.4	85.4
2020	35	74.4	9.8	52.9	87.0	59.3	68.2	77.5	82.2	84.3
1998-2020	1380	71.8	9.8	8.5	97.3	58.9	66.0	72.6	78.7	83.6

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	11	66.3	12.1	48.8	85.2	53.1	55.9	66.0	76.8	84.0
1999	8	68.8	10.6	47.8	81.3	47.8	63.7	70.7	76.0	81.3
2000	10	70.3	17.0	35.6	90.6	46.4	59.8	73.1	82.6	89.5
2001	15	69.9	9.7	54.5	85.4	56.4	64.4	70.0	79.8	83.6
2002	15	65.5	16.0	27.9	88.5	48.9	57.4	63.8	79.1	85.6
2003	13	74.0	11.6	57.3	91.2	58.1	62.7	77.8	82.6	88.3
2004	10	67.1	10.8	53.1	84.7	53.5	57.5	66.8	76.6	81.7
2005	19	68.5	12.9	38.5	88.3	39.9	62.8	70.9	77.1	84.2
2006	14	72.2	12.5	40.6	86.6	57.0	65.9	76.5	79.6	83.9
2007	21	66.8	11.5	40.3	81.1	49.8	64.6	68.8	76.0	79.3
2008	20	74.6	12.1	42.4	87.8	55.9	70.0	75.7	83.2	86.9
2009	16	75.8	9.0	62.3	87.1	63.3	66.8	77.1	84.0	86.9
2010	23	71.2	13.1	36.2	93.6	54.6	65.3	73.8	78.2	82.5
2011	18	76.0	7.8	57.9	87.3	66.6	70.1	76.6	83.9	85.2
2012	23	71.4	14.5	41.3	95.6	51.3	59.6	72.3	84.1	86.7
2013	17	71.9	13.6	43.1	95.4	55.8	63.7	72.4	81.5	90.0
2014	15	77.9	8.6	59.6	92.1	68.1	70.3	78.8	84.1	88.6
2015	20	75.8	10.7	53.5	90.8	59.3	68.3	77.5	84.0	88.7
2016	22	71.2	10.5	50.4	91.3	55.3	66.7	73.8	76.4	82.2
2017	17	68.3	10.8	50.3	85.2	54.8	58.6	66.8	77.7	80.9
2018	14	76.7	7.9	61.1	87.7	62.7	73.3	77.5	81.8	85.8
2019	12	74.1	7.9	63.8	90.1	66.0	67.3	73.1	78.3	84.5
2020	10	70.5	11.9	45.7	85.6	52.5	62.8	73.2	75.5	84.7
1998−2020	363	71.7	11.9	27.9	95.6	55.9	64.6	73.3	80.5	85.2

Table 4

Age distribution by 5-year age group and sex for period 2007-2020
(incl. DCO)
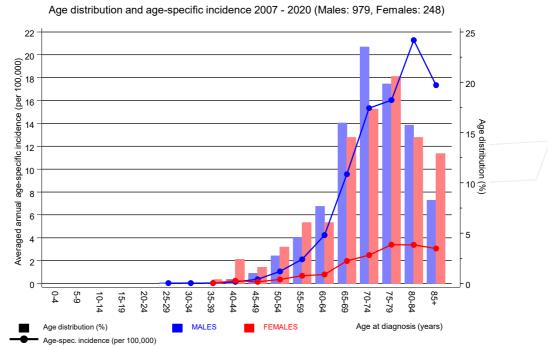
Age at diagnosis Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
0-4									
5-9									
10-14									
15-19									
20-24									
25-29	1	0.1	0.1	1	0.1	0.1			0.0
30-34	1	0.1	0.2	1	0.1	0.2			0.0
35-39	2	0.2	0.3	1	0.1	0.3	1	0.4	0.4
40-44	10	0.8	1.1	4	0.4	0.7	6	2.4	2.8
45-49	14	1.1	2.3	10	1.0	1.7	4	1.6	4.4
50-54	36	2.9	5.2	27	2.8	4.5	9	3.6	8.1
55-59	60	4.9	10.1	45	4.6	9.1	15	6.0	14.1
60-64	90	7.3	17.4	75	7.7	16.7	15	6.0	20.2
65-69	192	15.6	33.1	156	15.9	32.7	36	14.5	34.7
70-74	274	22.3	55.4	231	23.6	56.2	43	17.3	52.0
75-79	245	20.0	75.3	194	19.8	76.0	51	20.6	72.6
80-84	190	15.5	90.8	154	15.7	91.7	36	14.5	87.1
85+	113	9.2	100.0	81	8.3	100.0	32	12.9	100.0
All ages	1228	100.0		980	100.0		248	100.0	

Table 5

Age-specific incidence, DCO rate 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 DCO rate n=62 %	Females DCO rate n=19 %	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	1		0.0				0.1	
35-39	1	1	0.0	0.0			0.1	0.0
40-44	4	6	0.2	0.2			0.1	0.1
45-49	10	4	0.4	0.2			0.2	0.0
50-54	27	9	1.1	0.4	3.7		0.3	0.1
55-59	45	15	2.1	0.7			0.4	0.1
60-64	75	15	4.2	0.8	4.0		0.4	0.1
65-69	156	36	9.6	2.0	3.8		0.6	0.2
70-74	230	43	15.3	2.5	4.3	4.7	0.8	0.2
75-79	194	51	16.0	3.4	4.6	3.9	0.8	0.3
80-84	154	36	21.3	3.4	11.7	16.7	1.0	0.2
85+	81	32	17.3	3.1	18.5	28.1	0.8	0.2
All ages	979	248			6.3	7.7	0.6	0.2
Incidence								
Raw			3.0	0.7				
WS			1.3	0.3				
ES			2.0	0.4				
BRD-S			2.8	0.6				
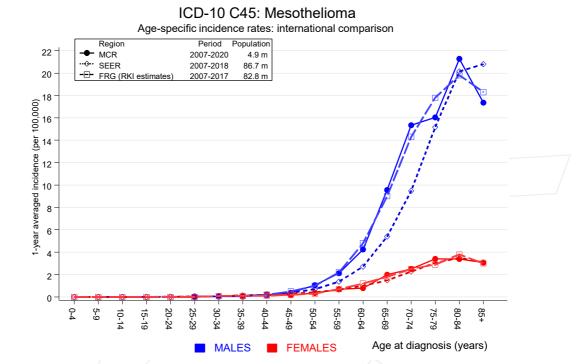
The age-specific incidence characterizes the disease risk in a particular age group. The age distribution depends on the patient population frequency in each age group and reflects the tangible clinical picture of everyday patients care (see following chart).

ICD-10 C45: Mesothelioma
Age distribution and age-specific incidence 2007 - 2020 (Males: 979, Females: 248)

Figure 6. Age distribution (males: mean=73.1 yrs, median=73.9 yrs; females: mean=72.8 yrs, median=74.3 yrs) and age-specific incidence.

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 1998-2020
MALES

Diagnosis		Observed n	Expected n	SIR	CI 95%	CI 95%		EAR	DCO %
C03-C06	Oral cavity	1	0.2	4.0	0.1	22.6		4.1	
C16	Stomach	2	1.2	1.7	0.2	6.0		4.4	
C17	Small intestine	1	0.2	5.3	0.1	29.3		4.5	
C18	Colon	4	3.0	1.3	0.4	3.4		5.3	
C19-C20	Rectum	2	1.7	1.2	0.1	4.3		1.8	
C22	Liver	2	0.9	2.1	0.3	7.6		5.8	100.0
C25	Pancreas	1	1.2	0.8	0.0	4.5		-1.3	
C33-C34	Lung	16	3.8	4.3	2.4	6.9	#	67.4	68.8
C38,C45	Mesothelioma	3	0.2	12.7	2.6	37.1	#	15.2	
C43	Malign. melanoma	3	1.5	2.1	0.4	6.0		8.5	33.3
C48	Peritoneal	1	0.0	38.2	1.0	212.7		5.4	
C61	Prostate	7	9.2	0.8	0.3	1.6		-12.4	28.6
C64	Kidney	3	1.1	2.7	0.6	8.0		10.5	33.3
C70-C72	CNS cancer	1	0.4	2.5	0.1	14.1		3.3	
C73	Thyroid	1	0.2	5.3	0.1	29.4		4.5	100.0
C76-C79	CUP	1	0.5	1.9	0.0	10.8		2.7	
C82-C85	NHL	5	1.3	3.8	1.2	8.9	#	20.3	40.0
C91-C96	Leukaemia	3	0.5	6.4	1.3	18.7	#	13.9	33.3
	Not observed	0	4.9	0.0	0.0	0.8	#	-26.8	
	All further malignancies	57	32.1	1.8	1.3	2.3	#	137.1	36.8

Patients	1278
Median age at next malignancy (years)	73.7
Person-years	1816
Mean observation time (years)	1.4
Median observation time (years)	0.9

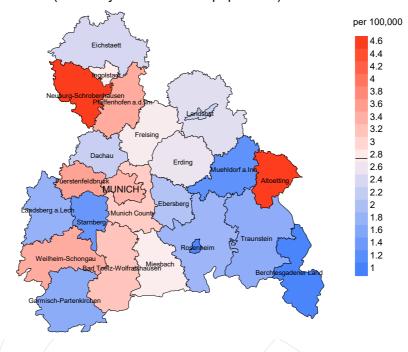# The occurrence of further specified malignancy is statistically significant.

Table 7b

Standardized incidence ratio (SIR, with 95% confidence limits),
excess absolute risk (EAR) and DCO rate of further malignancies
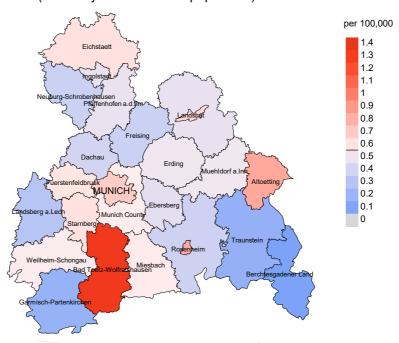for period 1998-2020
FEMALES

Diagnosis		Observed n	Expected n	SIR	CI 95%	CI 95%		EAR	DCO %
C16	Stomach	1	0.2	6.3	0.2	35.1		17.6	100.0
C25	Pancreas	1	0.2	4.2	0.1	23.5		16.0	
C33-C34	Lung	3	0.4	7.2	1.5	21.0	#	54.1	66.7
C46,C49	Soft tissue	1	0.0	34.3	0.9	191.1		20.3	
C50	Breast	1	1.6	0.6	0.0	3.4		-13.0	100.0
C54	Corpus uteri	1	0.3	3.4	0.1	18.8		14.8	
C56	Ovary	2	0.2	9.6	1.2	34.7	#	37.6	50.0
C64	Kidney	1	0.1	8.3	0.2	46.5		18.4	
Not observed		0	2.1	0.0	0.0	1.8		-43.6	
All further malignancies		11	5.2	2.1	1.1	3.8	#	122.2	45.5

Patients	327
Median age at next malignancy (years)	70.2
Person-years	477
Mean observation time (years)	1.5
Median observation time (years)	0.7

The occurrence of further specified malignancy is statistically significant.

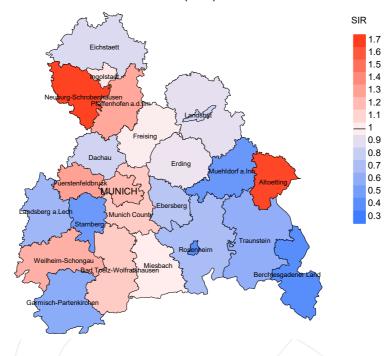### Average incidence (Germany 1987 standard population) 2007 - 2020: Males

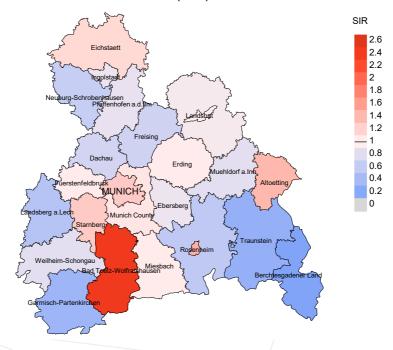### Average incidence (Germany 1987 standard population) 2007 - 2020: Females

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 2.8/100,000 WS N=979, females 0.6/100,000 WS N=248).

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 mesothelioma. 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.

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=979, females N=248).

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 mesothelioma. Therefore, the mean standardized incidence ratio (SIR) for this cancer type in this area can be calculated at 0.89. Though, the value of this parameter may vary with an underlying probability of 99% between 0.23 and 2.33, 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	41	100.0	29.3	41	100.0	92.7
1999	33	100.0	24.2	33	100.0	93.9
2000	43	100.0	51.2	42	97.7	95.2
2001	45	100.0	22.2	44	97.8	90.9
2002	60	100.0	31.7	58	96.7	98.3
2003	63	100.0	22.2	61	96.8	95.1
2004	80	98.8	12.5	77	96.3	96.1
2005	76	97.4	11.8	73	96.1	100.0
2006	74	97.3	12.2	71	95.9	98.6
2007	102	98.0	4.9	94	92.2	97.9
2008	101	100.0	6.9	100	99.0	99.0
2009	85	100.0	5.9	80	94.1	95.0
2010	99	99.0	11.1	93	93.9	97.8
2011	98	95.9	6.1	88	89.8	98.9
2012	105	100.0	5.7	104	99.0	98.1
2013	94	100.0	9.6	89	94.7	96.6
2014	79	100.0	12.7	74	93.7	97.3
2015	113	99.1	2.7	107	94.7	92.5
2016	84	100.0	3.6	74	88.1	87.8
2017	81	100.0	9.9	69	85.2	89.9
2018	84	100.0	9.5	72	85.7	70.8
2019	58	100.0		43	74.1	97.7
2020	45	100.0		23	51.1	95.7
1998–2020	1743	99.3	11.1	1610	92.4	94.8

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	41	39	94.9	23	56.1
1999	33	28	92.9	12	36.4
2000	43	40	95.0	19	44.2
2001	45	38	94.7	19	42.2
2002	60	51	96.1	25	41.7
2003	63	44	93.2	24	38.1
2004	80	58	96.6	24	30.0
2005	76	61	96.7	24	31.6
2006	74	68	98.5	23	31.1
2007	102	73	95.9	28	27.5
2008	101	94	98.9	36	35.6
2009	85	71	98.6	19	22.4
2010	99	90	96.7	31	31.3
2011	98	93	97.8	30	30.6
2012	105	98	100.0	36	34.3
2013	94	89	97.8	34	36.2
2014	79	78	100.0	26	32.9
2015	113	74	100.0	32	28.3
2016	84	97	99.0	23	27.4
2017	81	94	98.9	26	32.1
2018	84	67	76.1	24	28.6
2019	58	70	52.9	15	25.9
2020	45	65	96.9	14	31.1
1998–2020	1743	1580	94.7	567	32.5

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	39	87.2	12.8	97.3
1999	28	92.9	7.1	100.0
2000	40	92.5	7.5	100.0
2001	38	89.5	10.5	100.0
2002	51	94.1	5.9	100.0
2003	44	90.9	9.1	100.0
2004	58	91.4	8.6	98.2
2005	61	96.7	3.3	94.9
2006	68	97.1	2.9	98.5
2007	73	93.2	6.8	100.0
2008	94	97.9	2.1	100.0
2009	71	95.8	4.2	100.0
2010	90	94.4	5.6	98.9
2011	93	92.5	7.5	97.8
2012	98	93.9	6.1	95.9
2013	89	96.6	3.4	98.9
2014	78	93.6	6.4	96.2
2015	74	95.9	4.1	98.6
2016	97	95.9	4.1	97.9
2017	94	94.7	5.3	98.9
2018	67	86.6	13.4	98.0
2019	70	64.3	35.7	97.3
2020	65	84.6	15.4	92.1
1998-2020	1580	92.3	7.7	98.1

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	31	67.5	69.1	65.5	68.3
1999	22	68.6	68.6		68.6
2000	27	67.3	66.8	79.6	67.5
2001	26	65.7	65.9	56.2	65.8
2002	42	66.2	67.0	57.9	66.8
2003	36	66.3	66.3	73.3	66.3
2004	46	70.8	71.0	66.2	71.0
2005	54	71.0	71.2	66.2	71.2
2006	56	72.7	73.1	55.1	73.1
2007	61	69.7	70.0	69.5	69.7
2008	75	70.3	70.3	69.3	70.1
2009	57	70.3	70.3	72.6	70.5
2010	70	74.3	74.1	74.9	74.5
2011	80	75.2	74.9	80.9	75.2
2012	78	74.0	73.8	79.1	73.7
2013	70	73.8	73.6	85.1	73.9
2014	65	74.3	74.0	78.0	74.2
2015	61	76.6	76.6	72.2	76.6
2016	77	77.3	77.3	74.6	77.3
2017	75	76.8	76.6	80.8	76.7
2018	52	79.1	78.1	79.8	79.1
2019	56	77.2	75.1	79.2	79.6
2020	60	78.5	77.9	81.3	78.1
1998–2020	1277	73.7	73.6	77.7	73.6

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	8	73.7	70.4	85.6	73.7
1999	6	62.8	66.1	55.0	66.1
2000	13	77.2	79.3	75.2	79.3
2001	12	70.5	70.6	60.9	70.6
2002	9	64.9	64.3	80.3	64.3
2003	8	81.3	81.3	80.5	82.6
2004	12	64.5	64.5		63.8
2005	7	75.1	75.1		75.1
2006	12	75.1	75.1		75.1
2007	12	71.7	72.3	64.9	72.2
2008	19	72.2	72.2		72.2
2009	14	78.6	78.6		78.6
2010	20	75.9	75.9		75.9
2011	13	79.1	79.1		79.1
2012	20	76.4	75.0	81.2	77.1
2013	19	74.7	74.7		74.7
2014	13	74.4	72.3	88.6	74.4
2015	13	83.7	83.7		83.7
2016	20	76.3	76.0	91.5	76.0
2017	19	67.5	70.6	65.0	70.6
2018	15	75.7	75.6	78.2	76.5
2019	14	77.1	76.5	79.2	77.1
2020	5	75.6	75.6		75.6
1998–2020	303	74.8	74.7	78.2	74.8

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	27	2.4	0.90	1.5	0.89	2.2	0.90	2.6	0.89
1999	22	2.0	0.88	1.2	0.88	1.7	0.89	2.2	0.90
2000	25	2.2	0.76	1.3	0.73	2.0	0.76	2.5	0.77
2001	23	2.0	0.77	1.2	0.72	1.7	0.72	2.1	0.76
2002	40	2.1	0.89	1.2	0.87	1.8	0.89	2.3	0.86
2003	34	1.8	0.68	1.0	0.70	1.5	0.68	1.9	0.68
2004	41	2.2	0.59	1.1	0.58	1.7	0.60	2.3	0.63
2005	52	2.7	0.91	1.4	0.88	2.1	0.90	2.8	0.90
2006	54	2.8	0.90	1.3	0.82	2.0	0.85	3.0	0.93
2007	58	2.6	0.72	1.3	0.70	1.9	0.70	2.6	0.70
2008	73	3.3	0.90	1.6	0.92	2.4	0.93	3.2	0.95
2009	54	2.4	0.78	1.1	0.77	1.7	0.76	2.2	0.74
2010	65	2.9	0.86	1.3	0.82	2.0	0.84	2.8	0.89
2011	73	3.3	0.91	1.3	0.86	2.2	0.88	3.1	0.93
2012	74	3.3	0.90	1.4	0.93	2.2	0.92	3.0	0.92
2013	67	2.9	0.87	1.2	0.82	1.9	0.84	2.6	0.86
2014	61	2.6	0.95	1.1	1.04	1.7	1.00	2.3	0.96
2015	58	2.4	0.62	0.8	0.55	1.4	0.58	2.1	0.62
2016	74	3.1	1.19	1.1	1.15	1.9	1.19	2.8	1.18
2017	71	2.9	1.11	1.1	1.08	1.7	1.08	2.6	1.12
2018	44	1.8	0.64	0.6	0.54	1.1	0.58	1.5	0.63
2019	38	1.6	0.83	0.6	0.92	0.9	0.86	1.4	0.86
2020	50	2.1	1.43	0.8	1.40	1.3	1.46	1.8	1.42
1998–2020	1178	2.5	0.85	1.2	0.83	1.8	0.84	2.5	0.86

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	7	0.6	0.64	0.3	0.53	0.4	0.57	0.6	0.65
1999	4	0.3	0.50	0.2	0.63	0.3	0.59	0.3	0.52
2000	12	1.0	1.20	0.4	1.06	0.6	1.09	0.8	1.24
2001	11	0.9	0.73	0.4	0.63	0.6	0.66	0.8	0.73
2002	8	0.4	0.53	0.2	0.49	0.3	0.50	0.3	0.49
2003	6	0.3	0.46	0.1	0.48	0.2	0.46	0.2	0.47
2004	12	0.6	1.20	0.3	1.30	0.5	1.27	0.5	1.20
2005	7	0.4	0.37	0.1	0.30	0.2	0.34	0.3	0.40
2006	12	0.6	0.86	0.3	0.95	0.4	0.90	0.5	0.88
2007	10	0.4	0.48	0.2	0.36	0.3	0.41	0.4	0.46
2008	19	0.8	0.95	0.4	1.18	0.5	1.10	0.6	0.99
2009	14	0.6	0.88	0.2	0.77	0.3	0.81	0.4	0.87
2010	20	0.9	0.87	0.3	0.67	0.4	0.71	0.6	0.76
2011	13	0.6	0.72	0.2	0.64	0.3	0.67	0.4	0.71
2012	18	0.8	0.78	0.3	0.69	0.4	0.72	0.6	0.77
2013	19	0.8	1.12	0.3	0.93	0.4	0.99	0.6	1.07
2014	12	0.5	0.80	0.2	1.12	0.3	0.98	0.4	0.81
2015	13	0.5	0.65	0.2	0.57	0.3	0.60	0.4	0.61
2016	19	0.8	0.86	0.3	0.84	0.4	0.82	0.6	0.87
2017	18	0.7	1.06	0.3	1.05	0.5	1.03	0.6	1.08
2018	14	0.6	1.00	0.2	1.19	0.3	1.13	0.4	1.04
2019	7	0.3	0.58	0.1	0.53	0.2	0.55	0.2	0.57
2020	5	0.2	0.50	0.1	0.46	0.1	0.45	0.1	0.46
1998-2020	280	0.6	0.77	0.2	0.73	0.3	0.74	0.5	0.76

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	5	0.5	0.5	1	0.1	0.1	4	2.0	2.0
45-49	14	1.3	1.8	10	1.2	1.3	4	2.0	4.0
50-54	24	2.3	4.1	18	2.1	3.4	6	3.0	7.0
55-59	40	3.8	7.8	31	3.6	7.0	9	4.5	11.4
60-64	72	6.8	14.6	56	6.5	13.5	16	8.0	19.4
65-69	164	15.5	30.1	144	16.7	30.2	20	10.0	29.4
70-74	232	21.9	51.9	193	22.4	52.7	39	19.4	48.8
75-79	224	21.1	73.0	183	21.3	74.0	41	20.4	69.2
80-84	174	16.4	89.4	143	16.6	90.6	31	15.4	84.6
85+	112	10.6	100.0	81	9.4	100.0	31	15.4	100.0
All ages	1061	100.0		860	100.0		201	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.	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								
40-44	1	4	0.0	0.25	0.2	0.67	0.2	0.5
45-49	10	4	0.4	1.00	0.2	1.00	0.7	0.2
50-54	18	6	0.7	0.67	0.2	0.67	0.7	0.2
55-59	31	9	1.5	0.69	0.4	0.60	0.7	0.2
60-64	56	16	3.2	0.75	0.8	1.07	0.9	0.3
65-69	144	20	8.8	0.92	1.1	0.56	1.6	0.3
70-74	193	39	12.9	0.84	2.3	0.91	1.6	0.4
75-79	183	41	15.1	0.94	2.7	0.80	1.5	0.4
80-84	143	31	19.7	0.93	2.9	0.86	1.4	0.3
85+	81	31	17.3	1.00	3.0	0.97	0.9	0.3
All ages	860	201					1.2	0.3
Mortality								
Raw			2.6	0.88	0.6	0.81		
WS			1.1	0.85	0.2	0.77		
ES			1.7	0.86	0.3	0.78		
BRD-S			2.4	0.88	0.4	0.80		
PYLL-70								
per 100,000			6.1		2.1			
ES			5.0		1.7			
AYLL-70			6.7		10.0			

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 ←%
C03-C06 Oral cavity	2	0.7	1	50.0			1	50.0
C07-C08 Salivary gland	1	0.3	1	100.0				
C09-C10 Oropharynx	2	0.7	2	100.0				
C12-C13 Hypopharynx	1	0.3	1	100.0				
C15　　 Oesophagus	1	0.3	1	100.0				
C16　　 Stomach	9	3.0	7	77.8	1	11.1	1	11.1
C17　　 Small intestine	3	1.0	2	66.7			1	33.3
C18　　 Colon	24	7.9	18	75.0	4	16.7	2	8.3
C19-C20 Rectum	16	5.3	14	87.5	2	12.5		
C22　　 Liver	3	1.0	1	33.3	2	66.7		
C23-C24 Bile	1	0.3	1	100.0				
C25　　 Pancreas	2	0.7			1	50.0	1	50.0
C30-C31 Sinuses	1	0.3	1	100.0				
C32　　 Larynx	1	0.3	1	100.0				
C33-C34 Lung	21	6.9	4	19.0	7	33.3	10	47.6
C38,C45 Mesothelioma	4	1.3			1	25.0	3	75.0
C43　　 Malign. melanoma	20	6.6	17	85.0			3	15.0
C44　　 Skin others	33	10.9	23	69.7	2	6.1	8	24.2
C46,C49 Soft tissue	2	0.7	2	100.0				
C48　　 Peritoneal	1	0.3					1	100.0
C60　　 Penis	1	0.3	1	100.0				
C61　　 Prostate	100	32.9	89	89.0	5	5.0	6	6.0
C62　　 Testis	2	0.7	2	100.0				
C64　　 Kidney	15	4.9	12	80.0	1	6.7	2	13.3
C67　　 Bladder	7	2.3	6	85.7	1	14.3		
C70-C72 CNS cancer	1	0.3					1	100.0
C73　　 Thyroid	3	1.0	2	66.7			1	33.3
C76-C79 CUP	4	1.3	3	75.0			1	25.0
C81　　 Hodgkin lymphoma	2	0.7	2	100.0				
C82-C85 NHL	17	5.6	9	52.9	5	29.4	3	17.6
C90　　 Mult. myeloma	2	0.7	2	100.0				
C91-C96 Leukaemia	2	0.7			1	50.0	1	50.0
All further malignancies	304	100.0	225	74.0	33	10.9	46	15.1

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 1998–2020
FEMALES

Diagnosis		Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C16	Stomach	2	3.0	1	50.0			1	50.0
C18	Colon	7	10.6	7	100.0				
C25	Pancreas	1	1.5					1	100.0
C33–C34	Lung	4	6.1	1	25.0	1	25.0	2	50.0
C43	Malign. melanoma	2	3.0	2	100.0				
C44	Skin others	4	6.1	3	75.0			1	25.0
C46,C49	Soft tissue	1	1.5					1	100.0
C50	Breast	19	28.8	18	94.7			1	5.3
C53	Cervix uteri	2	3.0	2	100.0				
C54	Corpus uteri	6	9.1	5	83.3			1	16.7
C56	Ovary	3	4.5	1	33.3			2	66.7
C64	Kidney	2	3.0	2	100.0				
C67	Bladder	2	3.0	2	100.0				
C70–C72	CNS cancer	1	1.5	1	100.0				
C73	Thyroid	4	6.1	4	100.0				
C76–C79	CUP	1	1.5			1	100.0		
C81	Hodgkin lymphoma	2	3.0	2	100.0				
C82–C85	NHL	2	3.0	2	100.0				
C90	Mult. myeloma	1	1.5	1	100.0				
All further malignancies		66	100.0	54	81.8	2	3.0	10	15.2

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.	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								
40-44	1	3	0.0	0.25	0.1	0.75	0.2	0.4
45-49	10	4	0.4	1.00	0.2	1.00	0.8	0.3
50-54	16	6	0.6	0.70	0.2	0.67	0.7	0.3
55-59	29	7	1.4	0.66	0.3	0.64	0.8	0.2
60-64	50	13	2.8	0.79	0.7	1.08	0.9	0.3
65-69	124	14	7.6	0.97	0.8	0.54	1.7	0.3
70-74	150	32	10.0	0.86	1.9	0.84	1.7	0.5
75-79	128	31	10.6	0.95	2.1	0.84	1.4	0.4
80-84	99	27	13.7	0.99	2.5	0.93	1.3	0.4
85+	50	24	10.7	0.98	2.3	1.00	0.8	0.3
All ages	657	161					1.2	0.3
Mortality								
Raw			2.0	0.89	0.5	0.83		
WS			0.9	0.87	0.2	0.79		
ES			1.4	0.88	0.3	0.80		
BRD-S			1.8	0.90	0.4	0.82		
PYLL-70								
per 100,000			5.5		1.8			
ES			4.6		1.4			
AYLL-70			6.9		10.6			

* See corresponding tables with multiple malignancies.

Table 16
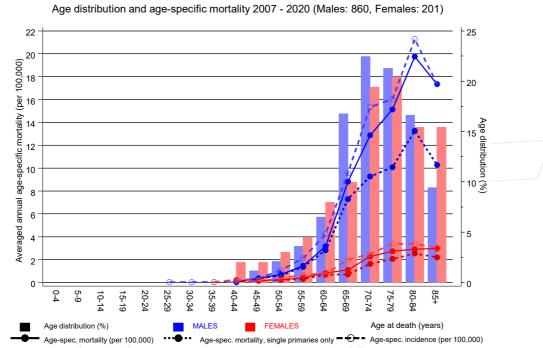
Age-specific mortality (cancer-related) and proportion of all cancers
for period 2007-2020
(**Single primaries only ***)

Age at death Years	Males n	Females n	Males Age- spec. mortal.	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								
40-44	1	3	0.0	0.25	0.1	1.00	0.2	0.4
45-49	10	4	0.4	1.00	0.2	1.00	0.8	0.3
50-54	16	6	0.6	0.70	0.2	0.67	0.7	0.3
55-59	29	7	1.4	0.66	0.3	0.64	0.8	0.2
60-64	50	13	2.8	0.82	0.7	1.08	0.9	0.3
65-69	119	13	7.3	0.96	0.7	0.52	1.7	0.2
70-74	139	28	9.3	0.84	1.6	0.78	1.6	0.4
75-79	122	31	10.1	0.93	2.1	0.84	1.4	0.4
80-84	96	27	13.3	0.97	2.5	0.96	1.4	0.4
85+	48	23	10.3	0.96	2.2	0.96	0.8	0.3
All ages	630	155					1.2	0.3
Mortality								
Raw			1.9	0.88	0.5	0.82		
WS			0.8	0.86	0.2	0.79		
ES			1.3	0.87	0.3	0.79		
BRD-S			1.8	0.88	0.3	0.81		
PYLL-70								
per 100,000			5.5		1.8			
ES			4.6		1.4			
AYLL-70			7.0		10.8			

* See corresponding tables with multiple malignancies.

ICD-10 C45: Mesothelioma
Age distribution and age-specific mortality 2007 - 2020 (Males: 860, Females: 201)
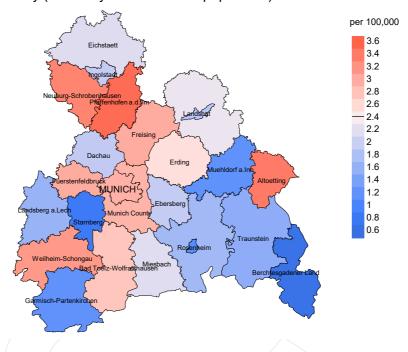
Figure 17. Distribution of age at death (bars; males: mean=72.5 yrs, median=73.1 yrs; females: mean=72.5 yrs, median=73.8 yrs) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).
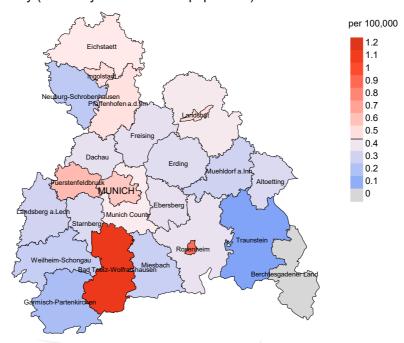
The difference between age at diagnosis (Table 3) and age at mesothelioma-related death (see Table 10) should be considered.

Average mortality (Germany 1987 standard population) 2007 - 2020: Males
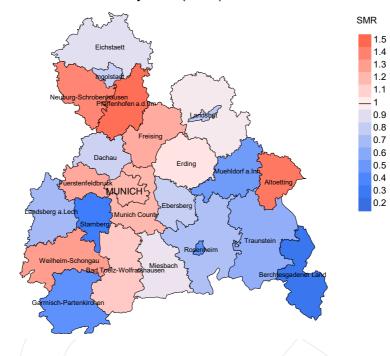
Average mortality (Germany 1987 standard population) 2007 - 2020: Females
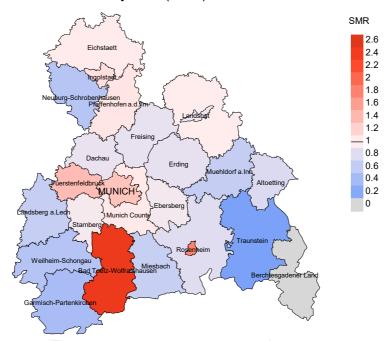
Figure 18a. Map of cancer mortality (german standard population) by county averaged for period 2007 to 2020. According to their individual mortality rates, the counties are displayed in different red and blue hues, being the fine white color attributed to the population mean (males 2.4/100,000 WS N=860, females 0.4/100,000 WS N=201).

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 5 women died from mesothelioma. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 0.4/100,000 (german standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.1 and 1.2/100,000.

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=860, females N=201).

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 5 women died from mesothelioma. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 0.92. Though, the value of this parameter may vary with an underlying probability of 99% between 0.20 and 2.60, 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

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