Munich Cancer Registry

- Survival
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ICD-10 D39.1: Borderline ovarian tumor

Incidence and Mortality

Year of diagnosis	1998-2014
Patients	1,168
Diseases	1,169
Creation date	04/13/2016
Export date	12/23/2015
Population (females)	2.36 m

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

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

http://www.tumorregister-muenchen.de/en/facts/base/bD391_E-ICD-10-D39.1-Borderline-ovarian-tumor-incidence-and-mortality.pdf

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

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

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

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

Clinics and physicians have access to essentially more detailed data, with which they can check, compare and in the best case optimize their own data and results.

We would be pleased to receive corrections, critique and useful suggestions. Just send an e-mail to tumor@ibe.med.uni-muenchen.de.

Munich Cancer Registry, April 2016

[#] Base data has been collected since 1998. An increase in new diseases is apparent, which is an effect of two extensions in the MCR catchment area (from a base population of 2.51 million to 3.96 in 2002, and to 4.52 million in 2007).

[##] Due to the high frequency and good prognosis of non-malignant skin cancer (C44), no systematic ascertainment is performed for this diagnosis. C44 is not designated as a primary, but rather as a secondary tumor.

[###] 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
D39.1	Neoplasm of uncertain or unknown behaviour of female genital organs: Ovary

INCIDENCE

Table 1

All patients by year of diagnosis,
proportions of multiple primaries, deaths, and active follow-up

Year of diagnosis	Cases n	Prop. mult. primaries %	Prop. deaths %	Prop. actively followed %
1998	19	31.6	26.3	94.7
1999	24	25.0	29.2	91.7
2000	32	28.1	18.8	93.8
2001	23	21.7	21.7	95.7
2002	43	23.3	11.6	83.7 #
2003	50	24.0	26.0	90.0
2004	70	25.7	22.9	91.4
2005	75	21.3	16.0	90.7
2006	73	19.2	4.1	83.6
2007	90	22.2	11.1	55.6 #
2008	98	12.2	7.1	35.7
2009	94	18.1	8.5	43.6
2010	103	16.5	5.8	39.8
2011	107	12.1	0.9	39.3
2012	86	23.3	3.5	48.8
2013	95	16.8	5.3	98.9
2014	87	14.9	2.3	97.7 ##
1998-2014	1169	19.2	9.8	68.1

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

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

Table 2

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

Year of diagnosis	Cases n	Incidence raw	Incidence WS	Incidence ES	Incidence BRD-S
1998	19	1.6	1.1	1.4	1.5
1999	24	2.0	1.5	1.8	1.9
2000	32	2.7	1.7	2.2	2.4
2001	23	1.9	1.5	1.8	2.0
2002	43	2.2	1.7	1.9	2.1
2003	50	2.5	1.8	2.2	2.4
2004	70	3.5	2.5	3.1	3.2
2005	75	3.8	2.7	3.4	3.6
2006	73	3.6	2.6	3.2	3.4
2007	90	3.9	2.7	3.4	3.7
2008	98	4.2	2.9	3.6	3.9
2009	94	4.0	2.7	3.4	3.7
2010	103	4.4	3.0	3.7	4.1
2011	107	4.5	3.3	4.1	4.3
2012	86	3.6	2.4	3.1	3.3
2013	95	4.0	2.8	3.4	3.8
2014	87	3.7	2.3	3.0	3.3
1998–2014	1169	3.5	2.4	3.0	3.3

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

Table 3

Age distribution parameters by year of diagnosis

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	19	57.1	17.3	18.2	80.2	30.2	44.1	58.8	68.3	79.9
1999	24	54.8	14.8	17.0	83.5	34.9	48.7	58.6	63.9	68.5
2000	32	55.1	16.4	28.5	86.4	31.9	44.5	53.7	66.3	78.6
2001	23	51.3	17.9	18.8	79.5	24.1	34.5	49.9	66.9	75.4
2002	43	49.0	18.1	6.6	83.4	25.2	35.9	48.5	61.8	72.8
2003	50	54.1	19.5	16.6	88.6	29.0	35.2	55.5	67.7	77.5
2004	70	53.1	14.7	11.5	79.7	35.6	42.3	54.5	64.6	70.0
2005	75	53.5	15.9	18.9	86.7	30.6	43.3	53.5	66.4	73.8
2006	73	52.6	17.7	12.8	85.3	30.5	40.4	53.1	63.3	79.6
2007	90	54.5	15.7	17.8	85.2	34.9	43.8	56.1	64.9	77.8
2008	98	53.2	14.6	18.7	92.3	36.2	41.3	50.2	63.6	73.4
2009	94	54.3	15.8	18.6	82.3	32.1	41.5	53.7	68.5	75.8
2010	103	54.6	15.5	16.3	85.2	34.3	45.9	52.8	67.8	75.7
2011	107	53.3	15.8	7.8	95.5	29.3	43.9	53.8	62.9	73.1
2012	86	54.1	15.2	26.0	88.8	31.9	42.8	54.2	67.0	75.4
2013	95	54.0	15.4	21.3	91.3	31.8	45.5	52.6	63.7	74.4
2014	87	57.7	15.6	15.8	93.6	38.5	47.2	56.7	67.9	77.9
1998-2014	1169	54.0	16.0	6.6	95.5	32.6	42.9	54.0	65.3	75.6

Table 4

Age distribution by 5-year age group for period 2007-2014

Age at diagnosis Years	Cases n	%	Cum.%
5-9	1	0.1	0.1
10-14	0	0.0	0.1
15-19	5	0.7	0.8
20-24	9	1.2	2.0
25-29	29	3.8	5.8
30-34	45	5.9	11.7
35-39	45	5.9	17.6
40-44	66	8.7	26.3
45-49	107	14.1	40.4
50-54	95	12.5	52.9
55-59	88	11.6	64.5
60-64	72	9.5	73.9
65-69	62	8.2	82.1
70-74	55	7.2	89.3
75-79	43	5.7	95.0
80-84	24	3.2	98.2
85+	14	1.8	100.0
All ages	760	100.0	

Included in the statistics are 20.5% multiple primaries.

Table 5

Age-specific incidence
for period 2007-2014

Age at diagnosis Years	Cases n	Age-spec. incidence
0- 4		0.0
5- 9	1	0.1
10-14		0.0
15-19	5	0.5
20-24	9	0.8
25-29	29	2.4
30-34	45	3.6
35-39	45	3.6
40-44	66	4.3
45-49	107	7.1
50-54	95	7.4
55-59	88	7.8
60-64	72	6.8
65-69	62	5.9
70-74	55	5.3
75-79	43	6.0
80-84	24	4.3
85+	14	2.4
All ages	760	
Incidence		
Raw		4.1
WS		2.8
ES		3.5
BRD-S		3.8

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).

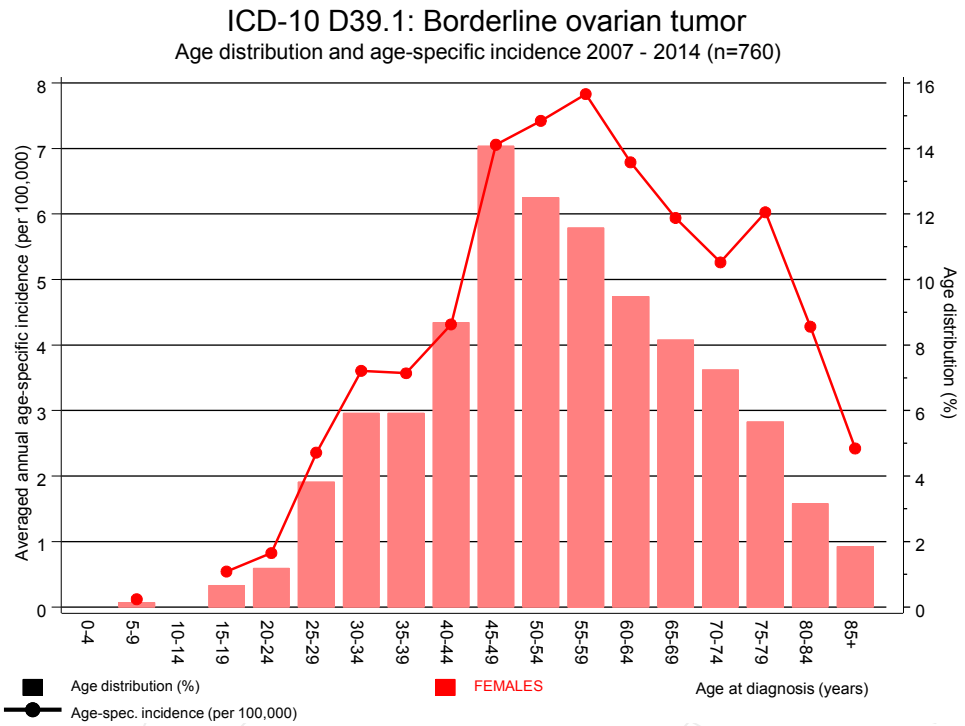

Figure 6. Age distribution and age-specific incidence

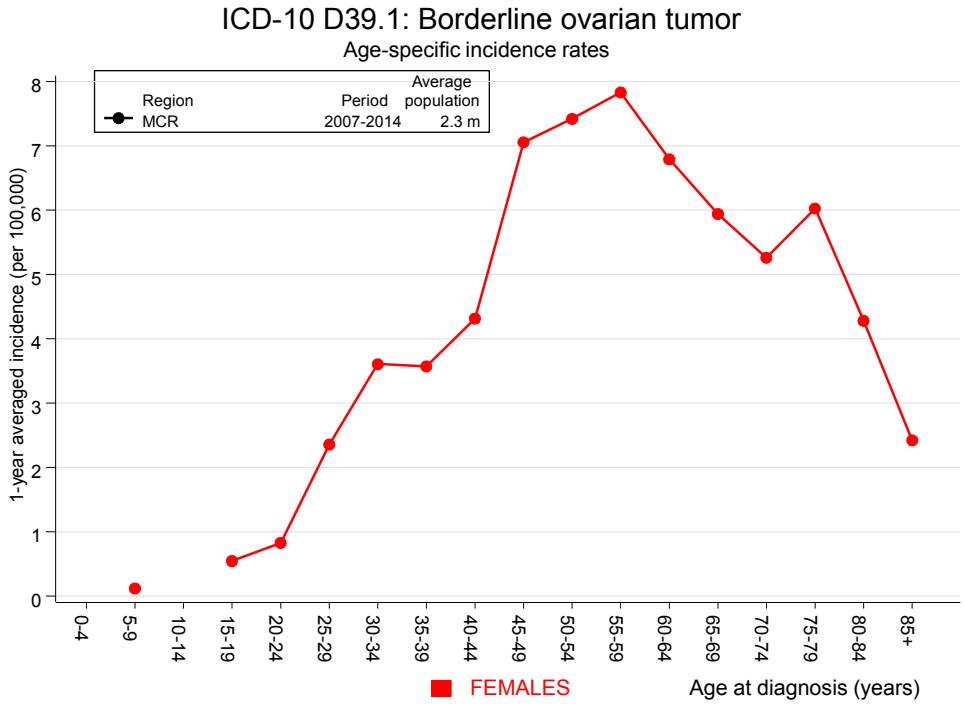

Figure 6a. Age-specific incidence in MCR registry areas.

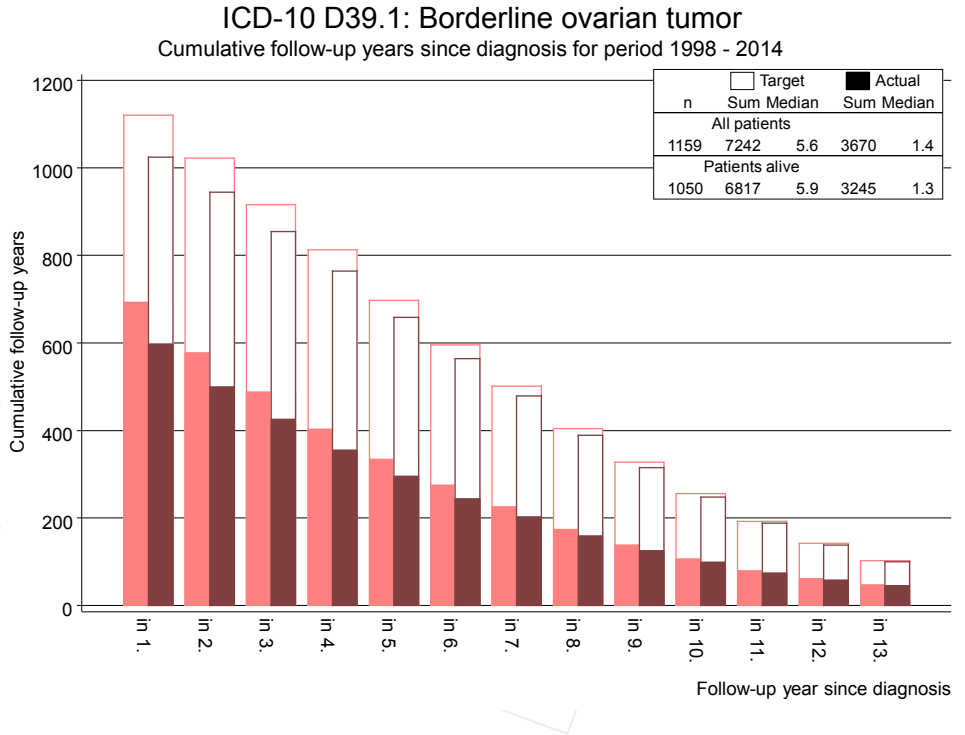

Figure 7. Cumulative follow-up years depending on time since diagnosis

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

Table 8

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

Diagnosis		Observed n	Expected n	SIR	LCL 95%	UCL 95%		EAR	DCO %
C16	Stomach	4	0.8	4.9	1.3	12.6	#	8.7	
C18	Colon	9	2.3	3.9	1.8	7.4	#	18.3	
C19–C20	Rectum	3	1.1	2.8	0.6	8.3		5.3	
C25	Pancreas	6	1.0	5.8	2.1	12.6	#	13.6	16.7
C33–C34	Lung	3	2.0	1.5	0.3	4.4		2.8	
C43	Malign. melanoma	3	1.2	2.5	0.5	7.2		4.9	
C46,C49	Soft tissue	3	0.2	19.0	3.9	55.4	#	7.8	
C48	Peritoneal	2	0.1	18.8	2.3	68.1	#	5.2	
C50	Breast	22	9.4	2.3	1.5	3.6	#	34.6	
C53	Cervix uteri	5	0.5	9.6	3.1	22.3	#	12.3	
C54	Corpus uteri	9	1.5	5.9	2.7	11.1	#	20.4	11.1
C56	Ovary	17	1.1	15.2	8.8	24.3	#	43.5	
C64	Kidney	3	0.6	4.8	1.0	14.0		6.5	
C73	Thyroid	3	0.7	4.3	0.9	12.6		6.3	
C76–C79	CUP	4	0.4	9.6	2.6	24.5	#	9.8	
C82–C85	NHL	2	1.0	2.1	0.2	7.4		2.8	
Other primaries		12	2.2	5.5	2.8	9.6	#	26.8	
Not observed		0	1.7	0.0	0.0	2.2		-4.6	
All mult. primaries		110	27.8	4.0	3.3	4.8	#	224.9	1.8

Patients	1141
Median age at second malignancy (years)	62.3
Person-years	3654
Mean observation time (years)	3.2
Median observation time (years)	1.5

The occurrence of second malignancy is statistically significant.

Observed second primaries with count 1 are pooled in category “Other primaries”

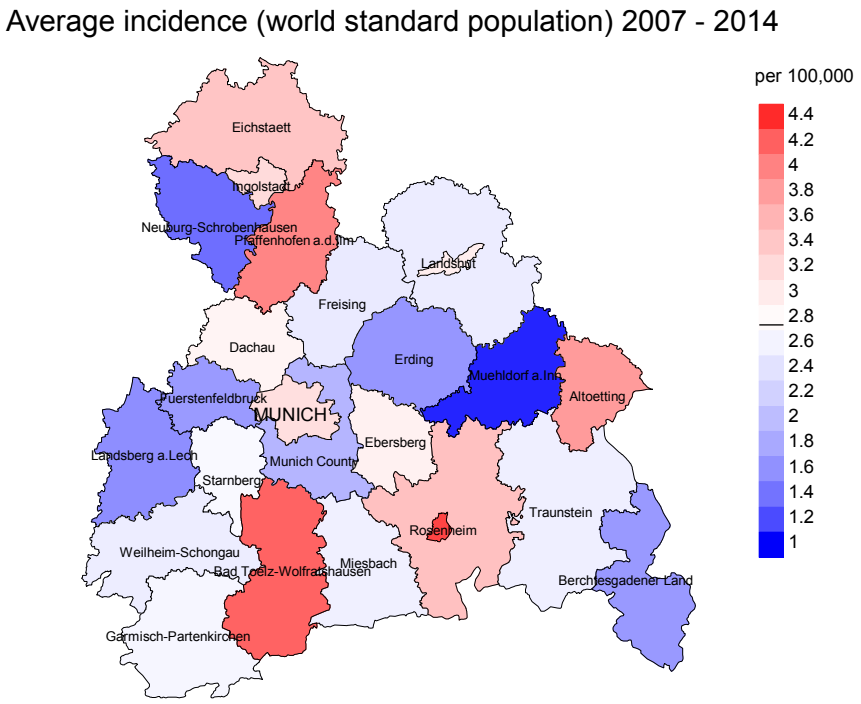

Figure 9a. Map of cancer incidence (world standard population) by county averaged for period 2007 to 2014. According to their individual incidence rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (2.7/100,000 WS N=760).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 65,347 female residents (averaged) in the period from 2007 to 2014 a total of 22 women were identified with newly diagnosed borderline ovarian tumor. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 2.9/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 1.5 and 5.4/100,000.

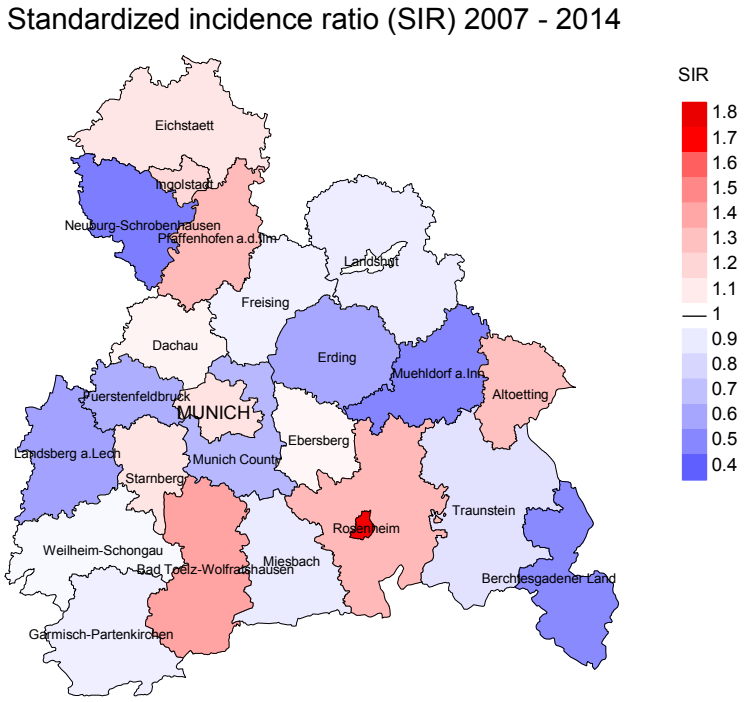

Figure 9b. Map of standardized incidence ratio (SIR) by county averaged for period 2007 to 2014. According to their individual SIR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (N=760).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 64,924 female residents (averaged) in the period from 2007 to 2014 a total of 22 women were identified with newly diagnosed borderline ovarian tumor. Therefore, the mean standardized incidence ratio (SIR) for this cancer type in this area can be calculated at 1.04. Though, the value of this parameter may vary with an underlying probability of 99% between 0.56 and 1.76, and is therefore not statistically striking.

MORTALITY

Table 10a

Patient cohorts of incident cancers by year of diagnosis, follow-up status, and deaths among the annual cohorts

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

Year of diagnosis	Incident cases n	Prop. actively followed %	Deaths n	Prop. deaths %	Prop. deaths with death certific. %
1998	19	94.7	5	26.3	100.0
1999	24	91.7	7	29.2	100.0
2000	32	93.8	6	18.8	100.0
2001	23	95.7	5	21.7	100.0
2002	43	83.7	5	11.6	80.0
2003	50	90.0	13	26.0	92.3
2004	70	91.4	16	22.9	100.0
2005	75	90.7	12	16.0	100.0
2006	73	83.6	3	4.1	100.0
2007	90	55.6	10	11.1	100.0
2008	98	35.7	7	7.1	100.0
2009	94	43.6	8	8.5	100.0
2010	103	39.8	6	5.8	100.0
2011	107	39.3	1	0.9	100.0
2012	86	48.8	3	3.5	100.0
2013	95	98.9	5	5.3	100.0
2014	87	97.7	2	2.3	100.0
1998-2014	1169	68.1	114	9.8	98.2

Table 10b

Annual cohorts of incident cancers and deaths,
and cases deceased the same year of cancer diagnosis

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

Year of diagnosis/ death	Incident cases n	Deaths n	Deaths in same year n	Prop. deaths in same year %
1998	19	1		
1999	24	3		
2000	32	3	1	3.1
2001	23	5		
2002	43	2		
2003	50	8	4	8.0
2004	70	4		
2005	75	8		
2006	73	6		
2007	90	11	2	2.2
2008	98	7		
2009	94	12	1	1.1
2010	103	11	1	1.0
2011	107	9	1	0.9
2012	86	18		
2013	95	16	1	1.1
2014	87	19	2	2.3
1998-2014	1169	143	13	1.1

Table 10c

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

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

Year of death	Deaths n	Prop. cancer-related %	Prop. non-cancer-related %	Prop. cancer recorded on death certificate %
1998	1		100.0	
1999	3	33.3	66.7	33.3
2000	3	66.7	33.3	66.7
2001	5	40.0	60.0	80.0
2002	2	100.0		100.0
2003	8	62.5	37.5	85.7
2004	4	25.0	75.0	25.0
2005	8	50.0	50.0	50.0
2006	6	66.7	33.3	80.0
2007	11	45.5	54.5	45.5
2008	7	71.4	28.6	71.4
2009	12	50.0	50.0	50.0
2010	11	63.6	36.4	63.6
2011	9	77.8	22.2	77.8
2012	18	66.7	33.3	66.7
2013	16	56.3	43.8	62.5
2014	19	36.8	63.2	47.4
1998-2014	143	55.2	44.8	60.7

Table 11

Medians of age at death according to the grouping in Table 10

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	1	72.2		72.2	
1999	3	75.8	69.7	78.1	69.7
2000	3	62.6	57.8	78.7	57.8
2001	5	82.8	83.2	82.8	82.2
2002	2	71.2	71.2		71.2
2003	8	68.3	65.8	68.8	73.2
2004	4	75.3	75.2	75.4	75.2
2005	8	65.1	70.0	58.8	70.0
2006	6	72.4	72.4	76.1	77.4
2007	11	71.9	61.9	78.1	61.9
2008	7	63.8	62.8	87.5	62.8
2009	12	76.3	72.8	81.9	72.8
2010	11	75.2	71.0	83.1	71.0
2011	9	66.4	64.7	77.4	64.7
2012	18	73.6	65.9	82.2	65.9
2013	16	80.8	64.0	87.6	66.1
2014	19	80.1	76.8	82.6	76.8
1998-2014	143	73.8	68.6	81.3	71.0

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

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

Table 12

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

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
1999	1	0.1	0.04	0.1	0.04	0.1	0.04	0.1	0.04
2000	2	0.2	0.06	0.1	0.06	0.1	0.07	0.1	0.06
2001	2	0.2	0.09	0.0	0.02	0.1	0.04	0.1	0.06
2002	2	0.1	0.05	0.0	0.03	0.1	0.04	0.1	0.05
2003	5	0.3	0.10	0.1	0.07	0.2	0.08	0.2	0.08
2004	1	0.1	0.01	0.0	0.01	0.0	0.01	0.0	0.02
2005	4	0.2	0.05	0.1	0.03	0.1	0.04	0.2	0.05
2006	4	0.2	0.05	0.1	0.03	0.1	0.04	0.2	0.05
2007	5	0.2	0.06	0.1	0.04	0.1	0.04	0.2	0.05
2008	5	0.2	0.05	0.2	0.06	0.2	0.06	0.2	0.06
2009	6	0.3	0.06	0.1	0.04	0.2	0.04	0.2	0.05
2010	7	0.3	0.07	0.1	0.05	0.2	0.06	0.3	0.06
2011	7	0.3	0.07	0.2	0.05	0.2	0.05	0.2	0.06
2012	12	0.5	0.14	0.3	0.10	0.4	0.11	0.4	0.13
2013	9	0.4	0.09	0.2	0.07	0.3	0.08	0.3	0.08
2014	7	0.3	0.08	0.1	0.05	0.2	0.06	0.2	0.07
1999-2014	79	0.2	0.07	0.1	0.05	0.2	0.06	0.2	0.06

Statistical Notes

In all tables and figures the respective reference values should be carefully considered. The incidence rates include diagnoses (with multiple primary), and death certificate only (DCO) cases, where applicable. For mortality statistics patients, diagnoses and progressive course of disease are presented. In the calculations, all courses of disease are considered whereby progressions occurred and/or death certificate identified progressive cancers were ascertained. Additionally there are three groups of disease course to consider:

1. **All multiple primaries included**

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

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

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

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

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

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

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

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

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

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

Shortcuts

FRG	Federal Republic of Germany
GEKID	Association of Population-based Cancer Registries in Germany (Gesellschaft der epidemiologischen Krebsregister in Deutschland e.V.)
MCR	Munich Cancer Registry (Tumorregister München)
SEER	Surveillance, Epidemiology, and End Results (USA)
AYLL-70	Average years of life lost prior to age 70 given a person dies before that age
BRD-S	German standard population
DCO	Death certificate only
EAR	Excess absolute risk = excess cancer cases (O - E) per 10,000 person-years
ES	European standard population (old)
LCL	Lower confidence limit
MI-index	Ratio between mortality and incidence
PYLL-70	Potential years of life lost prior to age 70 given a person dies before that age
SIR	Standardized incidence ratio
SMR	Standardized mortality ratio
UCL	Upper confidence limit
WS	World standard population

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