Munich Cancer Registry

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

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

Cancer statistics: Baseline statistics

C56: Ovarian cancer

Year of diagnosis	1998-2011
Patients	5244
Diseases	5247
Creation date	04/02/2013
Export date	01/03/2013
Population (females)	2.3 m

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 4.5 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. The time-delayed acquisition of data and the occasionally high DCO-rates indicate optimizing reserves, among others, because of current financial and legal conditions that hinder the analyses.

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 2013

[#] 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). Death certificates from 2011 are incorporated into these analyses.

[##] 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. A high proportion of DCO cases (≥5%) in particular cancer types indicate insufficient participation of specific cancer specializations.

INCIDENCE

Table 1

Patient cohorts by year of diagnosis including DCO cases
and multiple primaries, and with proportion of deaths and active follow-up

Year of diagnosis	Cases # n	DCO cases n	Prop. DCO %	Prop. mult. primaries %	Prop. deaths %	Prop. actively followed %
1998	275	36	13.1	17.8	80.0	99.3
1999	260	25	9.6	21.2	74.6	98.8
2000	265	32	12.1	23.8	71.3	99.2
2001	234	34	14.5	22.2	72.6	98.7
2002	433	74	17.1	29.1	77.4	98.6
2003	447	73	16.3	21.9	72.9	98.0
2004	391	58	14.8	23.0	75.4	97.4
2005	367	49	13.4	22.9	73.3	96.2
2006	403	43	10.7	20.8	69.5	98.0
2007	486	67	13.8	25.3	64.0	88.5 ##
2008	489	64	13.1	19.2	61.6	80.0
2009	395	48	12.2	19.7	54.2	75.2
2010	427	56	13.1	23.7	44.3	91.8
2011	375	54	14.4	22.4	33.9	72.3 ###
1998-2011	5247	713	13.6	22.5	65.2	91.5

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

\##   Since 2007 the percentage of actively followed patients sharply declined compared to the previous years. This is a consequence of ambiguous data protection rules that currently forbid cancer registries in Bavaria to obtain the essential life status informations from competent registration offices.

\###   Please be aware that data of recent annual patient cohorts may not yet be fully processed. Therefore, the presented figures and tables are potentially related to different time periods as pointed out in the respective headlines or legends.

Table 2

Incidence measures by year of diagnosis and gender including DCO cases
(with respect to registry area expansion from 2.51 to 3.96 m as of 2002,
and from 3.96 to 4.52 m as of 2007, respectively)

Year of diagnosis	Cases n	Incidence raw	Incidence WS	Incidence ES	Incidence BRD-S
1998	275	23.4	12.6	17.4	20.7
1999	260	21.9	11.0	15.6	19.0
2000	265	22.1	11.3	16.0	19.2
2001	234	19.2	10.2	14.0	16.6
2002	433	22.1	11.0	15.5	18.9
2003	447	22.7	11.5	16.1	19.5
2004	391	19.8	10.2	14.2	17.0
2005	367	18.4	8.9	12.5	15.3
2006	403	20.1	9.7	13.7	16.7
2007	486	21.0	10.1	14.4	17.4
2008	489	21.1	10.6	14.8	17.8
2009	395	17.0	8.1	11.4	14.1
2010	427	18.2	8.6	12.2	14.8
2011	375	16.0	7.8	11.0	13.3
1998–2011	5247	19.9	9.9	13.9	16.8

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

Table 3

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

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	275	64.8	15.9	14.6	92.1	44.1	55.2	66.0	76.9	84.9
1999	260	67.0	14.4	16.5	96.5	49.2	58.1	67.6	78.0	85.0
2000	265	66.5	14.4	19.9	94.8	46.9	57.2	66.1	78.5	85.3
2001	234	65.0	15.6	26.3	98.8	42.6	55.5	65.5	76.8	85.4
2002	433	67.2	14.3	13.2	96.6	47.8	59.0	68.1	78.1	83.2
2003	447	66.6	14.9	7.6	95.3	46.8	56.8	67.7	78.1	83.5
2004	391	66.2	15.1	15.9	97.3	45.6	56.6	66.6	77.9	84.4
2005	367	67.6	14.8	19.2	96.4	45.7	57.7	68.1	79.9	85.0
2006	403	67.7	14.4	24.9	95.8	45.8	57.8	68.9	79.2	84.7
2007	486	67.8	14.5	18.3	98.1	47.8	58.3	69.3	79.3	85.8
2008	489	66.8	14.9	11.1	102	46.5	57.9	68.1	78.2	84.8
2009	395	67.5	14.9	11.2	97.6	46.7	57.0	69.5	78.9	84.5
2010	427	68.2	14.7	17.0	98.5	48.5	58.5	69.2	78.9	87.0
2011	375	67.5	13.8	4.1	94.5	49.9	58.8	69.3	77.5	83.8
1998-2011	5247	67.0	14.7	4.1	102	47.0	57.7	68.1	78.3	84.8

Table 4

Age distribution by 5-year age group for period 1998-2011
(incl. DCO)

Age at diagnosis Years	Cases n	%	Cum.%
0-4	1	0.0	0.0
5-9	1	0.0	0.0
10-14	7	0.1	0.2
15-19	17	0.3	0.5
20-24	17	0.3	0.8
25-29	32	0.6	1.4
30-34	53	1.0	2.4
35-39	109	2.1	4.5
40-44	195	3.7	8.2
45-49	252	4.8	13.0
50-54	397	7.6	20.6
55-59	467	8.9	29.5
60-64	614	11.7	41.2
65-69	694	13.2	54.4
70-74	632	12.0	66.5
75-79	668	12.7	79.2
80-84	585	11.1	90.4
85+	506	9.6	100.0
All ages	5247	100.0	

Included in the statistics are 26.3% multiple primaries.

Table 5

Age-specific incidence, DCO rate and proportion of all cancers
for period 1998-2011

Age at diagnosis Years	Cases n	Age-spec. incidence	DCO rate n=712 %	Prop. all cancers n=129521 %
0- 4	1	0.1		0.5
5- 9	1	0.1		1.0
10-14	7	0.6		4.6
15-19	17	1.4		7.1
20-24	17	1.1		3.9
25-29	32	1.9	3.1	3.5
30-34	53	2.8		3.1
35-39	109	5.3	1.8	3.3
40-44	195	9.2	4.1	3.7
45-49	252	13.2	3.6	3.5
50-54	397	23.2	3.0	4.3
55-59	467	28.5	4.7	4.0
60-64	614	38.3	4.1	4.1
65-69	694	46.6	6.6	4.3
70-74	632	51.2	10.4	4.2
75-79	668	67.2	17.8	4.5
80-84	584	73.4	28.9	4.3
85+	506	68.1	46.0	3.5
All ages	5246		13.6	4.1

Incidence
  Raw   19.9
  WS   9.9
  ES   13.9
  BRD-S   16.8

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).

Table 6

Standardized incidence ratio (SIR, with 95% confidence limits),
excess absolute risk (EAR) and DCO rate of second primaries
for period 1998-2011

Diagnosis	Observed n	Expected n	SIR	LCL 95%	UCL 95%		EAR	DCO %
C03-C06 Oral cavity	2	0.7	3.0	0.4	10.8		1.2	
C16 Stomach	14	3.8	3.7	2.0	6.2	#	9.3	7.1
C17 Small intestine	3	0.5	6.3	1.3	18.4	#	2.3	
C18 Colon	39	10.5	3.7	2.6	5.1	#	25.8	23.1
C19-C20 Rectum	11	4.8	2.3	1.2	4.1	#	5.7	
C22 Liver	3	1.1	2.6	0.5	7.7		1.7	66.7
C23-C24 Bile	4	1.5	2.7	0.7	6.9		2.3	50.0
C25 Pancreas	8	4.3	1.9	0.8	3.7		3.4	37.5
C33-C34 Lung	18	7.6	2.4	1.4	3.7	#	9.4	22.2
C43 Malign. melanoma	5	3.9	1.3	0.4	3.0		1.0	
C48 Peritoneal	5	0.3	15.0	4.9	35.0	#	4.2	
C50 Breast	91	34.9	2.6	2.1	3.2	#	50.8	6.6
C51 Vulva	5	0.9	5.3	1.7	12.4	#	3.7	20.0
C53 Cervix uteri	8	1.7	4.8	2.1	9.5	#	5.7	
C54 Corpus uteri	99	6.2	15.8	12.9	19.3	#	84.1	3.0
C56 Ovary	5	4.7	1.1	0.3	2.5		0.3	20.0
C64 Kidney	5	2.7	1.9	0.6	4.3		2.1	
C67 Bladder	3	1.8	1.7	0.3	4.9		1.1	
C70-C72 CNS cancer	2	1.6	1.2	0.2	4.5		0.4	
C73 Thyroid	5	2.3	2.2	0.7	5.1		2.4	
C76-C79 CUP	2	1.7	1.1	0.1	4.1		0.2	50.0
C82-C85 NHL	8	4.0	2.0	0.9	3.9		3.6	
C90 Mult. myeloma	5	1.3	3.9	1.3	9.0	#	3.4	20.0
C91-C96 Leukaemia	3	1.6	1.9	0.4	5.5		1.3	33.3
Other primaries	4	1.7	2.4	0.7	6.2		2.1	
Not observed	0	3.7	0.0	0.0	1.0	#	-3.4	
All mult. primaries	357	109.8	3.3	2.9	3.6	#	224.1	9.8

Patients	3688
Mean age at second malignancy (years)	66.2
Person-years	11030
Mean observation time (years)	3.0
Median observation time (years)	2.0

The occurrence of second malignancy is statistically significant.

Observed second malignancy with count 1 are pooled in category "Other primaries".
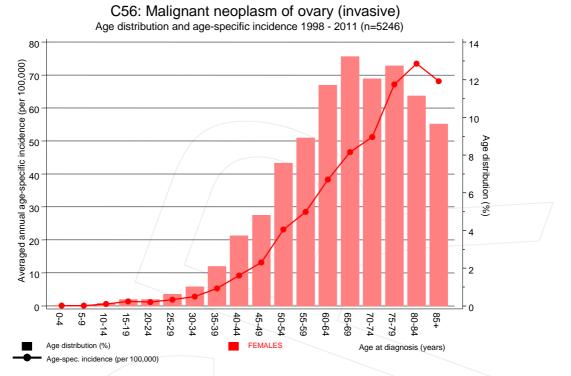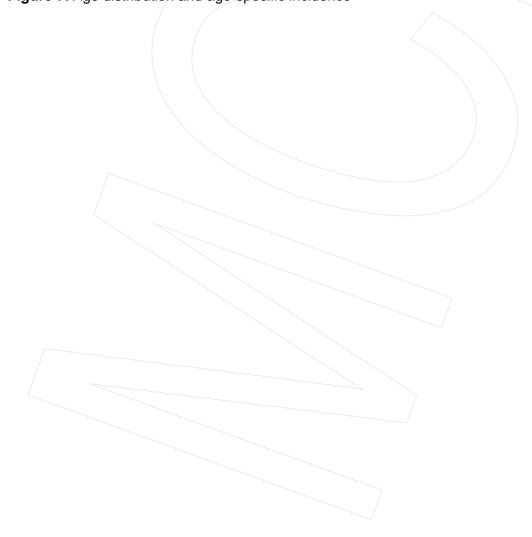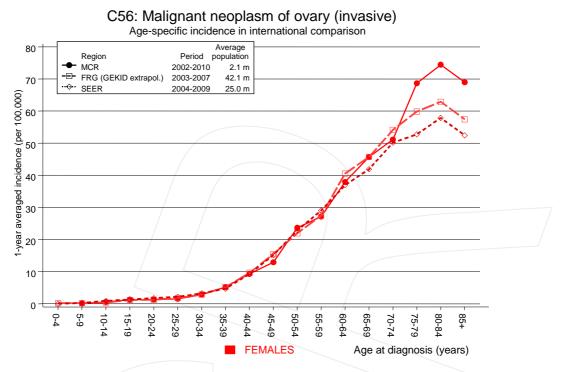
C56: Malignant neoplasm of ovary (invasive)
Age distribution and age-specific incidence 1998 - 2011 (n=5246)

Figure 7. Age distribution and age-specific incidence

C56: Malignant neoplasm of ovary (invasive)

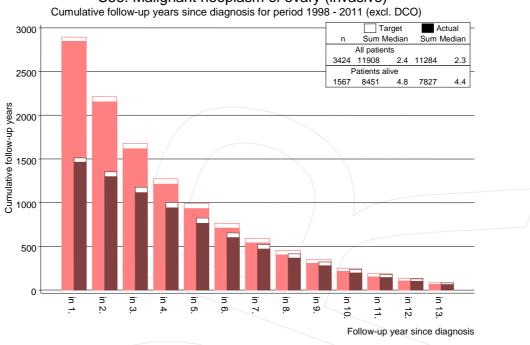Age-specific incidence in international comparison

Figure 7a. Age-specific incidence in MCR registry areas compared to Germany (FRG, GEKID extrapolation) and SEER (Surveillance, Epidemiology, and End Results, USA).

Reference:

Extrapolated age-specific patient population of Germany, data status middle of 2010. Association of Population-based Cancer Registries in Germany (GEKID e.V.). Berlin, 2011. http://www.gekid.de. Last access: 05/12/2011

Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Incidence - SEER 18 Regs Research Data, released April 2012, based on the November 2011 submission. http://www.seer.cancer.gov.
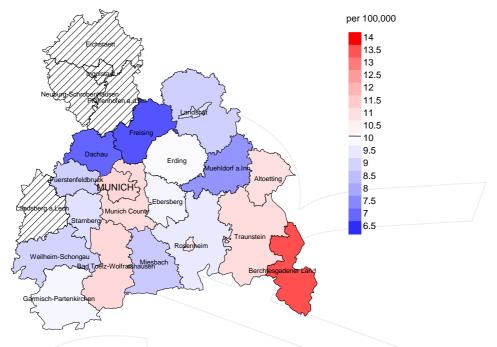
C56: Malignant neoplasm of ovary (invasive)

Cumulative follow-up years since diagnosis for period 1998 - 2011 (excl. DCO)

	Target		Actual	
n	Sum	Median	Sum	Median
All patients				
3424	11908	2.4	11284	2.3
Patients alive				
1567	8451	4.8	7827	4.4

Figure 8. 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.
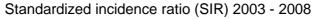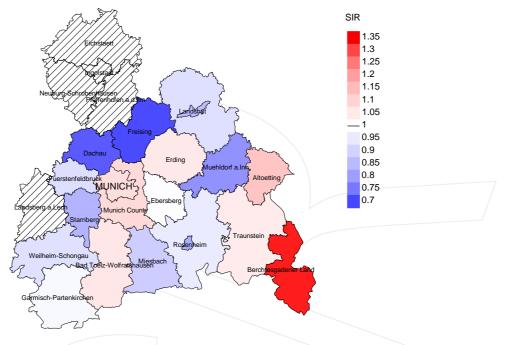
Average incidence (world standard population) 2003 - 2008

Figure 9a. Map of cancer incidence (world standard population, incl. DCO cases) by county averaged for period 2003 to 2008. 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 (10.1/100,000 WS N=2,462). Since cancer data are not available in some counties until 2007, the local incidence rates were not calculated, and the map tiles show as shaded.

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 63,131 female residents (averaged) in the period from 2003 to 2008 a total of 73 women were identified with newly diagnosed ovarian cancer. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 9.8/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 6.9 and 13.6/100,000.

Standardized incidence ratio (SIR) 2003 - 2008

Figure 9b. Map of standardized incidence ratio (SIR, incl. DCO cases) by county averaged for period 2003 to 2008. 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=2,462). Since cancer data are not available in some counties until 2007, the local SIR values were not calculated, and the map tiles show as shaded.

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 63,131 female residents (averaged) in the period from 2003 to 2008 a total of 73 women were identified with newly diagnosed ovarian cancer. Therefore, the mean standardized incidence ratio (SIR) for this cancer type in this area can be calculated at 1.00. Though, the value of this parameter may vary with an underlying probability of 99% between 0.72 and 1.34, and is therefore not statistically striking.

MORTALITY

Table 10a

Patient cohorts of incident cancers by year of diagnosis, follow-up status,
proportion of DCO, deaths among the annual cohorts,
and proportion of available death certificates
(with respect to registry area expansion from 2.51 to 3.96 m as of 2002,
and from 3.96 to 4.52 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	275	99.3	13.1	220	80.0	88.2
1999	260	98.8	9.6	194	74.6	94.8
2000	265	99.2	12.1	189	71.3	94.2
2001	234	98.7	14.5	170	72.6	98.8
2002	433	98.6	17.1	335	77.4	97.3
2003	447	98.0	16.3	326	72.9	97.5
2004	391	97.4	14.8	295	75.4	98.3
2005	367	96.2	13.4	269	73.3	98.9
2006	403	98.0	10.7	280	69.5	98.6
2007	486	88.5	13.8	311	64.0	98.4
2008	489	80.0	13.1	301	61.6	97.0
2009	395	75.2	12.2	214	54.2	99.5
2010	427	91.8	13.1	189	44.3	97.4
2011	375	72.3	14.4	127	33.9	96.1
1998-2011	5247	91.5	13.6	3420	65.2	97.0

Table 10b

Annual cohorts of incident cancers and deaths, proportion of death certificates
and cases deceased the same year of cancer diagnosis
(incl. DCO)
(with respect to registry area expansion from 2.51 to 3.96 m as of 2002,
and from 3.96 to 4.52 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	275	184	88.0	65	23.6
1999	260	191	86.9	56	21.5
2000	265	177	90.4	59	22.3
2001	234	201	93.5	56	23.9
2002	433	314	96.5	136	31.4
2003	447	295	99.0	117	26.2
2004	391	294	97.6	104	26.6
2005	367	308	98.1	89	24.3
2006	403	288	96.2	103	25.6
2007	486	333	98.8	122	25.1
2008	489	357	100.0	122	24.9
2009	395	355	99.4	96	24.3
2010	427	350	98.6	118	27.6
2011	375	320	97.2	94	25.1
1998-2011	5247	3967	96.6	1337	25.5

Table 10c

Annual cohorts of deaths, proportion of cancer-related and not cancer-
related deaths, and cancer recorded on death certificates
(incl. DCO)
(with respect to registry area expansion from 2.51 to 3.96 m as of 2002,
and from 3.96 to 4.52 m as of 2007, respectively)

Year of death	Deaths n	Prop. cancer-related %	Prop. not cancer-related %	Prop. cancer recorded on death certificate %
1998	184	81.0	19.0	94.4
1999	191	85.3	14.7	93.4
2000	177	90.4	9.6	95.0
2001	201	88.1	11.9	93.6
2002	314	88.5	11.5	94.7
2003	295	89.2	10.8	92.8
2004	294	91.5	8.5	93.4
2005	308	92.2	7.8	95.0
2006	288	87.5	12.5	94.9
2007	333	91.3	8.7	93.9
2008	357	93.3	6.7	95.2
2009	355	88.7	11.3	93.5
2010	350	93.7	6.3	96.2
2011	320	87.5	12.5	91.6
1998-2011	3967	89.6	10.4	94.2

Table 11

Means 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 (not cancer-related) Years	Age at death (according to death certificate) Years
1998	184	72.7	71.6	77.5	73.2
1999	191	72.5	71.8	76.5	73.3
2000	177	72.3	72.2	73.4	72.7
2001	201	72.4	70.8	83.9	71.6
2002	314	71.7	70.6	79.6	70.9
2003	295	72.7	71.6	81.7	71.9
2004	294	72.2	71.2	83.6	71.6
2005	308	72.1	71.2	83.1	71.5
2006	288	73.1	71.9	81.4	72.6
2007	333	73.3	72.4	81.9	72.9
2008	357	73.3	72.5	84.7	72.7
2009	355	71.7	70.6	79.9	70.9
2010	350	74.0	73.6	79.7	73.9
2011	320	72.6	71.1	82.6	71.8
1998-2011	3967	72.6	71.7	80.7	72.2

By 2010, life expectancy for a newborn male in Germany is 77.5 years compared with 82.6 years for his female counterpart.

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
1998	149	12.7	0.54	5.5	0.44	8.3	0.48	10.6	0.51
1999	163	13.7	0.63	5.9	0.53	8.9	0.57	11.7	0.62
2000	160	13.3	0.60	5.7	0.50	8.6	0.54	11.2	0.58
2001	177	14.6	0.76	6.5	0.64	9.6	0.69	12.1	0.73
2002	278	14.2	0.64	6.3	0.58	9.3	0.60	11.9	0.63
2003	263	13.4	0.59	5.7	0.49	8.5	0.52	11.0	0.56
2004	269	13.6	0.69	5.8	0.57	8.5	0.60	11.0	0.65
2005	284	14.3	0.77	6.1	0.69	9.1	0.73	11.6	0.76
2006	252	12.5	0.63	5.2	0.54	7.7	0.56	10.0	0.60
2007	304	13.2	0.63	5.2	0.51	7.8	0.54	10.3	0.59
2008	333	14.4	0.68	5.7	0.54	8.5	0.58	11.2	0.63
2009	315	13.5	0.80	5.8	0.72	8.5	0.75	10.8	0.76
2010	328	14.0	0.77	5.3	0.62	8.1	0.66	10.7	0.72
2011	280	12.0	0.75	5.0	0.64	7.5	0.68	9.5	0.72
1998-2011	3555	13.5	0.68	5.7	0.57	8.4	0.61	10.9	0.65

Table 13

Age distribution of age at death (cancer-related) for period 1998-2011
(**incl. multiple primaries**)

Age at death Years	Cases n	%	Cum.%
15-19	1	0.0	0.0
20-24	3	0.1	0.1
25-29	6	0.2	0.3
30-34	11	0.3	0.6
35-39	23	0.6	1.2
40-44	57	1.6	2.8
45-49	114	3.2	6.0
50-54	157	4.4	10.5
55-59	248	7.0	17.4
60-64	355	10.0	27.4
65-69	489	13.7	41.1
70-74	542	15.2	56.4
75-79	530	14.9	71.3
80-84	541	15.2	86.5
85+	482	13.5	100.0
All ages	3559	100.0	

Included in the statistics are 26.3% multiple primaries.

Table 14

Age-specific mortality (cancer-related) and proportion of all cancers
for period 1998-2011
(**incl. multiple primaries**)

Age at death Years	Cases n	Age-spec. mortality	MI-index	Prop. all cancers %
0- 4		0.0		
5- 9		0.0		
10-14		0.0		
15-19	1	0.1	0.06	3.4
20-24	3	0.2	0.18	7.0
25-29	6	0.3	0.19	5.9
30-34	11	0.6	0.21	5.4
35-39	23	1.1	0.21	5.0
40-44	57	2.7	0.29	5.7
45-49	114	6.0	0.45	6.6
50-54	157	9.2	0.40	6.0
55-59	248	15.1	0.53	6.1
60-64	355	22.1	0.58	6.4
65-69	489	32.8	0.70	6.9
70-74	542	43.9	0.86	6.8
75-79	530	53.3	0.79	5.9
80-84	541	68.0	0.92	5.7
85+	482	64.9	0.95	4.2
All ages	3559			5.8
Mortality				
Raw		13.5	0.68	
WS		5.7	0.57	
ES		8.5	0.61	
BRD-S		10.9	0.65	
PYLL-70				
per 100,000		68.6		
ES		58.9		
AYLL-70		10.6		

The rates underestimate the prognosis if other synchronous cancers are prognostic unfavorable.

Table 15

Multiple primaries in deaths in period 1998-2011

Diagnosis		Total n	Total %↓	Pre n	Pre ←%	Syn- chron ±30d n	Syn- chron ±30d ←%	Post n	Post ←%
C16	Stomach	42	3.9	12	28.6	7	16.7	23	54.8
C18	Colon	132	12.3	56	42.4	30	22.7	46	34.8
C19-C20	Rectum	47	4.4	20	42.6	12	25.5	15	31.9
C23-C24	Bile	14	1.3	6	42.9	2	14.3	6	42.9
C25	Pancreas	33	3.1	6	18.2	5	15.2	22	66.7
C33-C34	Lung	34	3.2	4	11.8	7	20.6	23	67.6
C43	Malign. melanoma	31	2.9	21	67.7	1	3.2	9	29.0
C44	Skin others	22	2.1	12	54.5	4	18.2	6	27.3
C48	Peritoneal	29	2.7	14	48.3	6	20.7	9	31.0
C50	Breast	339	31.6	235	69.3	34	10.0	70	20.6
C51	Vulva	10	0.9	2	20.0	3	30.0	5	50.0
C53	Cervix uteri	49	4.6	32	65.3	12	24.5	5	10.2
C54	Corpus uteri	104	9.7	27	26.0	66	63.5	11	10.6
C55,C57	Fem. genitals un	11	1.0	4	36.4	3	27.3	4	36.4
C64	Kidney	14	1.3	3	21.4	2	14.3	9	64.3
C67	Bladder	22	2.1	14	63.6	1	4.5	7	31.8
C70-C72	CNS cancer	11	1.0	3	27.3	3	27.3	5	45.5
C73	Thyroid	18	1.7	16	88.9	1	5.6	1	5.6
C76-C79	CUP	19	1.8	11	57.9	2	10.5	6	31.6
C82-C85	NHL	22	2.1	13	59.1	4	18.2	5	22.7
Other primaries		69	6.4	16	23.2	10	14.5	43	62.3
All mult. primaries		1072	100.0	527	49.2	215	20.1	330	30.8

Multiple primaries with number of cases n<10 are pooled in category "Other primaries".

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 multiple malignancy.

Table 16

Age-specific mortality (cancer-related) and proportion of all cancers
for period 1998-2011
(**Singular primaries only ***)

Age at death Years	Cases n	Age-spec. mortality	MI-index	Prop. all cancers %
0- 4		0.0		
5- 9		0.0		
10-14		0.0		
15-19	1	0.1	0.06	3.7
20-24	3	0.2	0.18	7.7
25-29	4	0.2	0.14	4.2
30-34	10	0.5	0.20	5.6
35-39	21	1.0	0.22	5.0
40-44	47	2.2	0.28	5.4
45-49	93	4.9	0.45	6.2
50-54	120	7.0	0.38	5.4
55-59	209	12.8	0.55	6.0
60-64	299	18.7	0.60	6.5
65-69	388	26.1	0.69	6.8
70-74	444	36.0	0.88	6.9
75-79	425	42.7	0.81	5.9
80-84	453	57.0	0.95	5.9
85+	386	52.0	0.94	4.2
All ages	2903			5.8
Mortality				
Raw		11.0	0.68	
WS		4.6	0.57	
ES		6.9	0.61	
BRD-S		8.9	0.65	
PYLL-70				
per 100,000		56.5		
ES		48.4		
AYLL-70		10.7		

* See corresponding tables with multiple primaries.
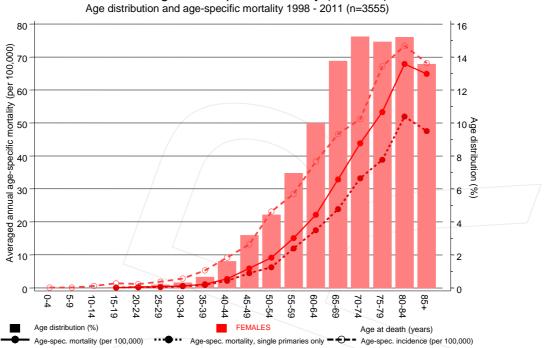
Table 17

Age-specific mortality (cancer-related) and proportion of all cancers
for period 1998-2011
(**Single primaries only ***)

Age at death Years	Cases n	Age-spec. mortality	MI-index	Prop. all cancers %
0- 4		0.0		
5- 9		0.0		
10-14		0.0		
15-19	1	0.1	0.06	4.3
20-24	3	0.2	0.18	8.3
25-29	4	0.2	0.15	4.4
30-34	9	0.5	0.18	5.5
35-39	18	0.9	0.20	4.7
40-44	45	2.1	0.28	5.6
45-49	85	4.4	0.45	6.3
50-54	107	6.2	0.35	5.4
55-59	196	12.0	0.53	6.3
60-64	280	17.5	0.60	7.0
65-69	355	23.8	0.66	7.2
70-74	410	33.2	0.87	7.5
75-79	386	38.8	0.78	6.3
80-84	413	51.9	0.90	6.4
85+	353	47.5	0.87	4.4
All ages	2665			6.2
Mortality				
Raw		10.1	0.66	
WS		4.3	0.55	
ES		6.3	0.59	
BRD-S		8.2	0.63	
PYLL-70				
per 100,000		52.1		
ES		44.6		
AYLL-70		10.7		

* See corresponding tables with multiple primaries.

C56: Malignant neoplasm of ovary (invasive)
Age distribution and age-specific mortality 1998 - 2011 (n=3555)
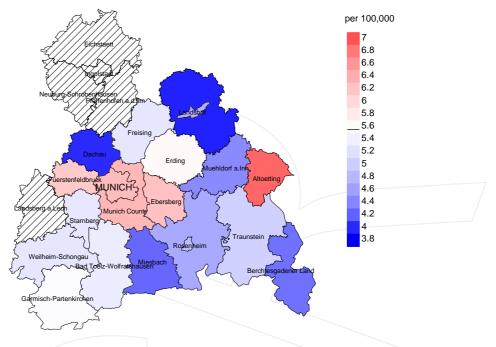
Figure 18. Distribution of age at death (bars) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).
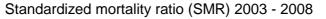
The difference between age at diagnosis (Table 3) and age at ovarian cancer-related death (see Table 10) should be considered.
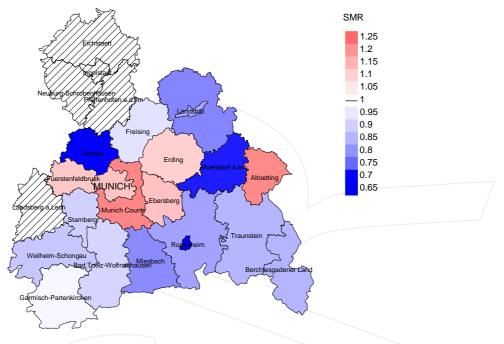
Average mortality (world standard population) 2003 - 2008

Figure 19a. Map of cancer mortality (world standard population) by county averaged for period 2003 to 2008. According to their individual mortality rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (5.6/100,000 WS N=1,622). Since cancer data are not available in some counties until 2007, the local mortality rates were not calculated, and the map tiles show as shaded.

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 63,131 female residents (averaged) in the period from 2003 to 2008 a total of 53 women died from ovarian cancer. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 6.2/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 4.1 and 9.2/100,000.

Standardized mortality ratio (SMR) 2003 - 2008

Figure 19b. Map of standardized mortality ratio (SMR, incl. DCO cases) by county averaged for period 2003 to 2008. According to their individual SMR 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=1,622). Since cancer data are not available in some counties until 2007, the local SMR values were not calculated, and the map tiles show as shaded.

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 63,131 female residents (averaged) in the period from 2003 to 2008 a total of 53 women died from ovarian cancer. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 1.13. Though, the value of this parameter may vary with an underlying probability of 99% between 0.77 and 1.59, 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. 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 tumor-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

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)
FRG	Federal Republic of Germany
GEKID	Association of Population-based Cancer Registries in Germany
	(Gesellschaft der epidemiologischen Krebsregister in Deutschland e.V.)
LCL	Lower confidence limit
MI-index	Ratio between mortality and incidence
MCR	Munich Cancer Registry (Tumorregister München)
PYLL-70	Potential years of life lost prior to age 70 given a person dies before that age
SEER	Surveillance, Epidemiology, and End Results (USA)
SIR	Standardized incidence ratio
SMR	Standardized mortality ratio
UCL	Upper confidence limit
WS	World standard population

Recommended Citation

Munich Cancer Registry. Baseline statistics C56: Ovarian cancer [Internet]. 2013 [updated 2013 Apr 2; cited 2013 Jun 1]. Available from: http://www.tumorregister-muenchen.de/en/facts/base/base_C56__E.pdf

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