

Munich Cancer Registry



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- ▶ Selection Matrix
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- ▶ *Deutsch*

ICD-10 D46: Myelodysplastic syndrome

Incidence and Mortality

Year of diagnosis	1998-2016
Patients	2,732
Diseases	2,736
Creation date	08/21/2018
Export date	08/09/2018
Population	4.81 m



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

https://www.tumorregister-muenchen.de/en/facts/base/bD46__E-ICD-10-D46-Myelodysplastic-syndrome-incidence-and-mortality.pdf

Index of figures and tables

Fig./Tbl.		Page
1	Annual cases, DCO, mult. malignancies, follow-up / yr	4
2	Incidence by year of diagnosis	7
3	Age distribution parameters by year of diagnosis	8
4	Age distribution by 5-year age group and sex	9
5	Age-specific incidence, DCO rate	10
6	Age distribution and age-specific incidence (chart)	11
6a	Age-specific incidence internationally (chart)	12
7	Standardized incidence ratio of further malignancies	13
8a	Map of cancer incidence (WS) by county (chart)	15
8b	Standardized incidence ratio (SIR) by county (chart)	16
9a	Pts incident cohorts and mortality / yr	17
9b	Incidence and mortality by year of diagnosis	18
9c	Cancer-related deaths, death certification available / yr	19
10	Medians of age at death / yr	20
11	Mortality by year of death	22
12	Distribution of age at death	23
13	Age-specific mortality	24
14	Further malignancies in deaths	25
15	Age-specific mortality (first primaries)	26
16	Age-specific mortality (single primaries)	27
17	Age distribution and age-specific mortality (chart)	28
18a	Map of cancer mortality (WS) by county (chart)	29
18b	Standardized mortality ratio (SMR) by county (chart)	30

**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, August 2018

[#] 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
D46.-	Myelodysplastic syndromes
D46.0	Refractory anaemia without ring sideroblasts, so stated
D46.1	Refractory anaemia with ring sideroblasts
D46.2	Refractory anaemia with excess of blasts [RAEB]
D46.4	Refractory anaemia, unspecified
D46.5	Refractory anaemia with multi-lineage dysplasia
D46.6	Myelodysplastic syndrome with isolated del(5q) chromosomal abnormality
D46.7	Other myelodysplastic syndromes
D46.9	Myelodysplastic syndrome, unspecified

INCIDENCE

Table 1

Cases 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	53	25	47.2	15.1	13.1	94.3	100.0
1999	57	27	47.4	15.5	13.2	94.7	100.0
2000	68	39	57.4	16.9	13.4	95.6	100.0
2001	60	35	58.3	15.5	13.6	95.0	96.7
2002	110	57	51.8	16.7	13.3	97.3	98.2 #
2003	99	55	55.6	17.9	13.4	92.9	96.0
2004	110	68	61.8	19.4	13.4	90.9	97.3
2005	145	92	63.4	19.4	13.8	94.5	97.9
2006	151	83	55.0	20.8	14.2	86.8	94.7
2007	196	95	48.5	20.7	14.5	87.2	90.8 #
2008	202	95	47.0	21.1	14.3	88.6	91.6
2009	198	81	40.9	21.6	14.3	83.3	89.4
2010	203	91	44.8	22.3	13.2	85.2	90.6
2011	241	104	43.2	23.3	12.9	84.2	89.2
2012	202	105	52.0	24.3	11.5	88.1	93.6
2013	207	87	42.0	24.3	10.4	81.2	89.9
2014	159	92	57.9	24.7	8.6	82.4	91.2
2015	144	99	68.8	25.2	7.4	88.9	99.3
2016	131	99	75.6	25.2	6.9	85.5	95.4 ##
1998-2016	2736	1429	52.2	25.2	13.1	87.8	93.5

2,736 cases diagnosed 1998-2016 are related to a total of 2,732 patients. Currently, in 1,111 (40.7 %) of these 2,732 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 860 / 203 / 48 (31.5 % / 7.4 % / 1.8 %) 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 2014, a subgroup of 159 cases has been diagnosed, of which 24.7 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 8.6 % of cases, at least one new malignancy has occurred during the follow-up period (all numbers refer to the date of the database export, see cover sheet).

Table 1a

Cases 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	17	32.1	8	47.1	17.6	15.4	88.2	100.0
1999	29	50.9	13	44.8	17.4	15.5	93.1	100.0
2000	37	54.4	18	48.6	18.1	15.7	91.9	100.0
2001	21	35.0	13	61.9	17.3	16.0	95.2	100.0
2002	61	55.5	27	44.3	18.2	15.9	98.4	98.4 #
2003	51	51.5	26	51.0	17.1	16.0	92.2	94.1
2004	66	60.0	34	51.5	18.8	15.8	90.9	97.0
2005	70	48.3	40	57.1	18.8	16.3	97.1	100.0
2006	87	57.6	44	50.6	20.3	16.6	89.7	95.4
2007	108	55.1	44	40.7	21.2	16.8	83.3	88.0 #
2008	93	46.0	40	43.0	21.9	16.6	90.3	91.4
2009	99	50.0	37	37.4	22.3	16.4	79.8	84.8
2010	113	55.7	49	43.4	23.6	15.2	86.7	94.7
2011	116	48.1	42	36.2	24.9	15.1	86.2	91.4
2012	106	52.5	47	44.3	26.1	13.5	86.8	93.4
2013	114	55.1	46	40.4	26.2	12.4	80.7	87.7
2014	88	55.3	47	53.4	26.4	10.0	83.0	90.9
2015	68	47.2	42	61.8	26.9	9.7	86.8	100.0
2016	72	55.0	52	72.2	27.0	9.4	83.3	95.8 ##
1998-2016	1416	51.8	669	47.2	27.0	15.4	87.3	93.4

1,416 cases diagnosed 1998-2016 are related to a total of 1,413 patients. Currently, in 633 (44.8 %) of these 1,413 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 484 / 113 / 36 (34.3 % / 8.0 % / 2.5 %) patients exist having 2 / 3 / 4+ malignancies.

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

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

How to interpret:

In 2014, a subgroup of 88 cases has been diagnosed, of which 26.4 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 10.0 % 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 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	36	67.9	17	47.2	13.9	10.8	97.2	100.0
1999	28	49.1	14	50.0	14.1	10.8	96.4	100.0
2000	31	45.6	21	67.7	15.8	10.9	100.0	100.0
2001	39	65.0	22	56.4	14.2	11.0	94.9	94.9
2002	49	44.5	30	61.2	15.3	10.6	95.9	98.0 #
2003	48	48.5	29	60.4	18.6	10.7	93.8	97.9
2004	44	40.0	34	77.3	20.0	10.8	90.9	97.7
2005	75	51.7	52	69.3	20.0	11.1	92.0	96.0
2006	64	42.4	39	60.9	21.3	11.7	82.8	93.8
2007	88	44.9	51	58.0	20.1	12.1	92.0	94.3 #
2008	109	54.0	55	50.5	20.3	12.0	87.2	91.7
2009	99	50.0	44	44.4	20.8	12.1	86.9	93.9
2010	90	44.3	42	46.7	21.0	11.0	83.3	85.6
2011	125	51.9	62	49.6	21.7	10.6	82.4	87.2
2012	96	47.5	58	60.4	22.4	9.2	89.6	93.8
2013	93	44.9	41	44.1	22.4	8.2	81.7	92.5
2014	71	44.7	45	63.4	22.9	7.2	81.7	91.5
2015	76	52.8	57	75.0	23.4	5.0	90.8	98.7
2016	59	45.0	47	79.7	23.3	3.8	88.1	94.9 ##
1998-2016	1320	48.2	760	57.6	23.3	10.8	88.3	93.6

1,320 cases diagnosed 1998-2016 are related to a total of 1,319 patients. Currently, in 478 (36.2 %) of these 1,319 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 376 / 90 / 12 (28.5 % / 6.8 % / 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 2014, a subgroup of 71 cases has been diagnosed, of which 22.9 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 7.2 % 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 4.81 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	17	36	1.5	3.1	1.2	1.2	1.5	1.8	1.9	2.5
1999	29	28	2.6	2.4	1.7	0.6	2.5	1.1	3.8	1.7
2000	37	31	3.2	2.6	1.9	0.8	2.9	1.3	4.1	1.8
2001	21	39	1.8	3.2	0.9	1.1	1.6	1.7	2.5	2.3
2002	61	49	3.3	2.5	1.6	0.7	2.7	1.3	4.0	1.9
2003	51	48	2.7	2.4	1.4	0.7	2.2	1.2	3.3	1.7
2004	66	44	3.5	2.2	1.7	0.7	2.9	1.1	4.1	1.6
2005	70	75	3.7	3.8	1.6	1.2	2.8	1.9	4.3	2.6
2006	87	64	4.5	3.2	2.3	1.0	3.6	1.6	4.9	2.2
2007	108	88	4.9	3.8	2.6	1.3	3.9	2.0	5.2	2.8
2008	93	109	4.2	4.7	2.0	1.7	3.0	2.5	4.3	3.3
2009	99	99	4.4	4.3	2.1	1.5	3.2	2.3	4.5	3.2
2010	113	90	5.0	3.8	2.2	1.1	3.5	1.8	5.1	2.7
2011	116	125	5.2	5.3	2.1	1.6	3.4	2.6	5.0	3.6
2012	106	96	4.7	4.1	2.1	1.3	3.3	1.9	4.6	2.6
2013	114	93	5.0	3.9	2.2	1.3	3.3	2.0	4.7	2.7
2014	88	71	3.8	2.9	1.5	0.7	2.4	1.2	3.5	1.9
2015	68	76	2.9	3.1	1.1	0.8	1.8	1.4	2.6	1.9
2016	72	59	3.0	2.4	1.0	0.6	1.7	1.0	2.6	1.5
1998-2016	1416	1320	3.8	3.4	1.8	1.1	2.8	1.7	4.0	2.4

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

Table 3

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

Year of diagnosis	Cases n	Std.		Min.	Max.	Median				
		Mean	dev.			10%	25%	50%	75%	90%
1998	53	73.1	16.7	4.5	93.4	59.6	67.2	74.2	84.7	87.9
1999	57	76.4	16.0	1.7	94.6	64.6	73.4	80.9	85.0	89.4
2000	68	75.2	14.4	10.2	101	58.3	67.1	76.7	87.1	90.9
2001	60	76.4	13.1	31.7	96.0	61.2	71.3	78.6	85.1	90.5
2002	110	77.2	10.3	41.0	97.4	65.0	72.9	77.6	83.2	90.1
2003	99	76.1	13.6	12.2	93.9	63.1	69.0	78.4	84.5	89.4
2004	110	76.9	12.3	12.0	103	63.0	69.5	78.6	85.4	90.2
2005	145	77.1	12.0	6.0	97.1	64.6	70.4	80.3	84.5	90.0
2006	151	74.4	15.2	4.5	96.5	58.8	68.7	78.4	84.7	88.8
2007	196	74.9	17.7	3.0	100	58.5	69.4	78.3	85.6	89.9
2008	202	75.1	15.5	3.9	99.5	60.3	69.6	78.0	85.0	88.9
2009	198	74.0	14.8	2.6	100	57.7	67.4	77.6	83.6	88.2
2010	203	77.2	13.2	3.7	98.9	65.5	72.3	79.5	85.3	89.0
2011	241	77.2	11.9	3.7	95.8	64.8	72.3	79.1	85.5	88.5
2012	202	76.9	15.7	4.6	99.0	62.8	72.0	80.3	86.7	90.3
2013	207	75.4	14.9	7.6	97.5	62.1	71.2	78.4	84.0	88.6
2014	159	78.6	12.4	3.9	99.3	68.0	74.2	79.4	86.6	90.7
2015	144	79.3	11.9	5.2	96.0	67.5	73.9	81.6	86.6	90.5
2016	131	81.4	8.8	45.3	96.7	68.7	77.6	82.2	87.5	91.5
1998-2016	2736	76.5	14.0	1.7	103	62.8	71.1	79.1	85.3	89.7

Table 3a

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

Year of diagnosis	Cases n	Std.		Min.	Max.	Median				
		Mean	dev.			10%	25%	50%	75%	90%
1998	17	66.2	23.4	4.5	90.1	11.6	63.8	72.2	78.3	86.2
1999	29	70.7	19.7	1.7	90.6	47.2	67.7	74.2	81.4	85.0
2000	37	71.0	15.4	10.2	93.8	55.2	62.5	74.0	80.5	88.5
2001	21	74.3	9.6	49.9	89.1	62.1	70.7	76.7	80.8	82.7
2002	61	75.3	11.0	41.0	92.1	62.8	69.9	76.4	82.6	86.8
2003	51	73.4	15.0	12.2	93.9	61.8	65.7	76.2	82.5	87.1
2004	66	76.4	10.1	54.9	93.7	62.5	68.6	77.4	85.4	89.2
2005	70	76.0	10.1	27.1	95.6	66.0	71.0	77.7	81.4	86.0
2006	87	72.2	14.3	4.5	96.5	56.4	63.1	72.8	82.4	88.8
2007	108	72.1	19.5	3.0	100	50.3	68.5	76.5	84.1	87.8
2008	93	72.7	14.2	14.0	94.6	55.7	67.9	74.7	82.2	87.2
2009	99	72.8	14.4	2.6	92.5	59.9	67.0	74.9	82.4	86.6
2010	113	76.4	14.1	3.7	98.9	63.2	72.0	79.2	84.9	88.8
2011	116	75.7	10.8	3.7	89.0	66.1	71.4	77.2	82.5	85.6
2012	106	75.3	15.8	10.0	96.8	60.2	69.4	77.8	85.1	89.7
2013	114	73.9	15.6	7.6	93.0	62.1	70.8	76.4	83.5	86.6
2014	88	76.4	14.5	3.9	99.3	66.4	72.3	78.5	83.5	89.9
2015	68	78.1	12.9	5.2	93.7	67.5	73.2	81.2	85.6	90.5
2016	72	81.4	9.2	45.3	96.7	68.7	78.3	82.8	87.4	91.1
1998-2016	1416	74.7	14.4	1.7	100	61.7	69.5	77.4	83.4	88.3

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		
				Min.	Max.	10%	25%	50%	75%	90%
1998	36	76.4	11.5	41.4	93.4	59.6	67.5	79.0	84.9	89.6
1999	28	82.2	7.8	64.6	94.6	66.4	78.4	83.7	87.2	92.3
2000	31	80.4	11.2	53.3	101	64.9	74.7	80.7	89.2	91.2
2001	39	77.6	14.6	31.7	96.0	61.0	72.9	81.0	88.4	90.8
2002	49	79.5	8.8	62.8	97.4	66.2	74.2	78.2	85.0	92.4
2003	48	78.9	11.4	39.6	92.7	66.4	76.3	82.0	86.5	89.7
2004	44	77.7	15.1	12.0	103	64.1	74.0	80.6	86.5	90.6
2005	75	78.2	13.5	6.0	97.1	63.2	69.5	82.8	85.5	92.5
2006	64	77.4	16.0	6.4	92.4	66.3	71.6	82.1	86.1	90.2
2007	88	78.2	14.6	7.4	98.1	62.9	73.2	81.3	87.6	92.4
2008	109	77.0	16.4	3.9	99.5	62.1	72.5	81.0	86.3	90.8
2009	99	75.2	15.2	12.9	100	57.4	69.1	78.5	85.1	88.9
2010	90	78.2	12.1	13.3	93.4	68.8	72.9	80.8	86.2	89.2
2011	125	78.7	12.7	10.1	95.8	63.0	73.0	82.5	87.4	90.3
2012	96	78.6	15.4	4.6	99.0	65.9	73.0	81.9	88.2	90.3
2013	93	77.1	13.9	11.3	97.5	62.7	73.6	79.8	86.6	91.1
2014	71	81.5	8.3	60.9	97.2	70.7	75.1	81.8	88.5	91.9
2015	76	80.3	10.9	43.6	96.0	66.8	75.5	81.8	88.9	90.6
2016	59	81.4	8.4	59.3	96.4	68.6	77.4	81.4	88.4	92.3
1998-2016	1320	78.4	13.3	3.9	103	64.4	73.0	81.0	87.0	90.7

Table 4

Age distribution by 5-year age group and sex for period 2007-2016
(incl. DCO)

Age at diagnosis Years	Cases n	Males			Females				
		%	Cum.%	n	%	Cum.%	n	%	Cum.%
0-4	7	0.4	0.4	5	0.5	0.5	2	0.2	0.2
5-9	6	0.3	0.7	4	0.4	0.9	2	0.2	0.4
10-14	18	1.0	1.6	11	1.1	2.0	7	0.8	1.2
15-19	7	0.4	2.0	5	0.5	2.6	2	0.2	1.4
20-24	0	0.0	2.0			2.6			1.4
25-29	4	0.2	2.2	2	0.2	2.8	2	0.2	1.7
30-34	2	0.1	2.3	2	0.2	3.0			1.7
35-39	7	0.4	2.7	1	0.1	3.1	6	0.7	2.3
40-44	11	0.6	3.3	7	0.7	3.8	4	0.4	2.8
45-49	15	0.8	4.1	11	1.1	4.9	4	0.4	3.2
50-54	22	1.2	5.3	12	1.2	6.1	10	1.1	4.3
55-59	42	2.2	7.5	16	1.6	7.8	26	2.9	7.2
60-64	81	4.3	11.8	47	4.8	12.6	34	3.8	10.9
65-69	168	8.9	20.7	111	11.4	24.0	57	6.3	17.2
70-74	260	13.8	34.5	150	15.4	39.3	110	12.1	29.4
75-79	355	18.9	53.4	192	19.7	59.0	163	18.0	47.4
80-84	367	19.5	72.9	198	20.3	79.2	169	18.7	66.0
85+	511	27.1	100.0	203	20.8	100.0	308	34.0	100.0
All ages	1883	100.0		977	100.0		906	100.0	

Table 5

Age-specific incidence and DCO rate
for period 2007-2016

Age at diagnosis Years	Males n	Females n	Males Age- spec. incid.	Females Age- spec. incid.	Males DCO rate n=446 %	Females DCO rate n=501 %
0- 4	5	2	0.4	0.2		
5- 9	4	2	0.4	0.2		
10-14	11	7	1.0	0.6		
15-19	5	2	0.4	0.2		
20-24						
25-29	2	2	0.1	0.1		
30-34	2		0.1			
35-39	1	6	0.1	0.4		16.7
40-44	7	4	0.4	0.2		
45-49	11	4	0.6	0.2		
50-54	12	10	0.7	0.6	8.3	10.0
55-59	16	26	1.1	1.8	18.8	15.4
60-64	47	34	3.8	2.6	25.5	20.6
65-69	111	57	9.4	4.4	36.0	28.1
70-74	150	110	13.6	8.7	28.0	30.0
75-79	192	163	24.1	16.3	36.5	47.9
80-84	197	168	42.8	23.7	60.9	63.1
85+	203	308	66.3	42.0	77.8	82.8
All ages	976	905			45.7	55.4
Incidence						
Raw			4.3	3.8		
WS			1.9	1.2		
ES			2.9	1.8		
BRD-S			4.1	2.6		

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).

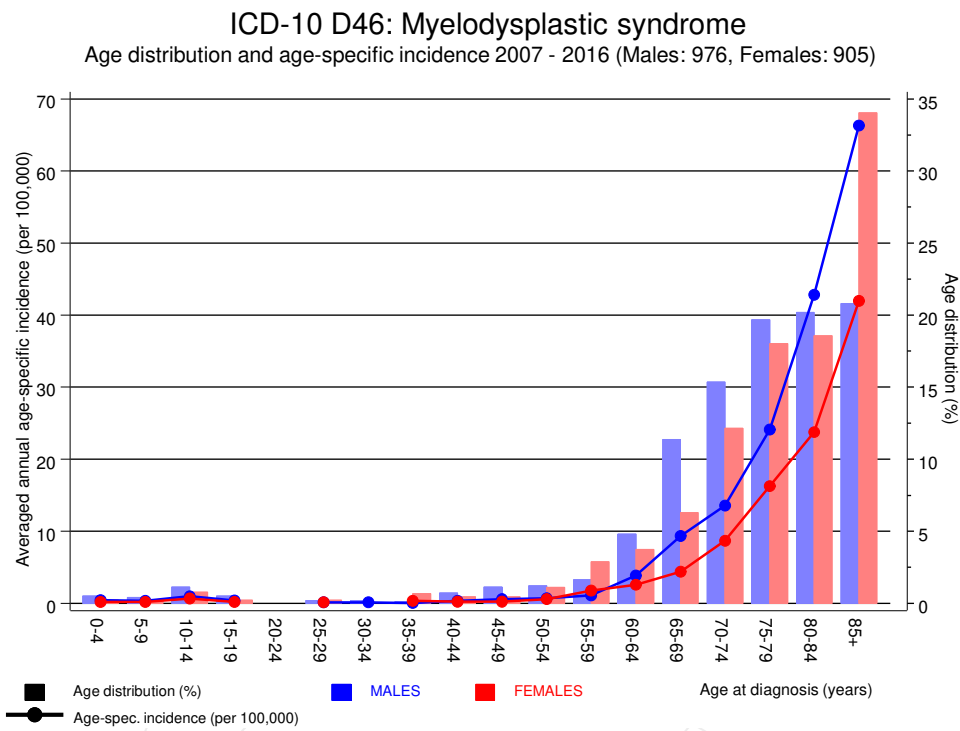


Figure 6. Age distribution (males: mean=75.2 yrs, median=78.0 yrs; females: mean=78.4 yrs, median=80.9 yrs) and age-specific incidence.

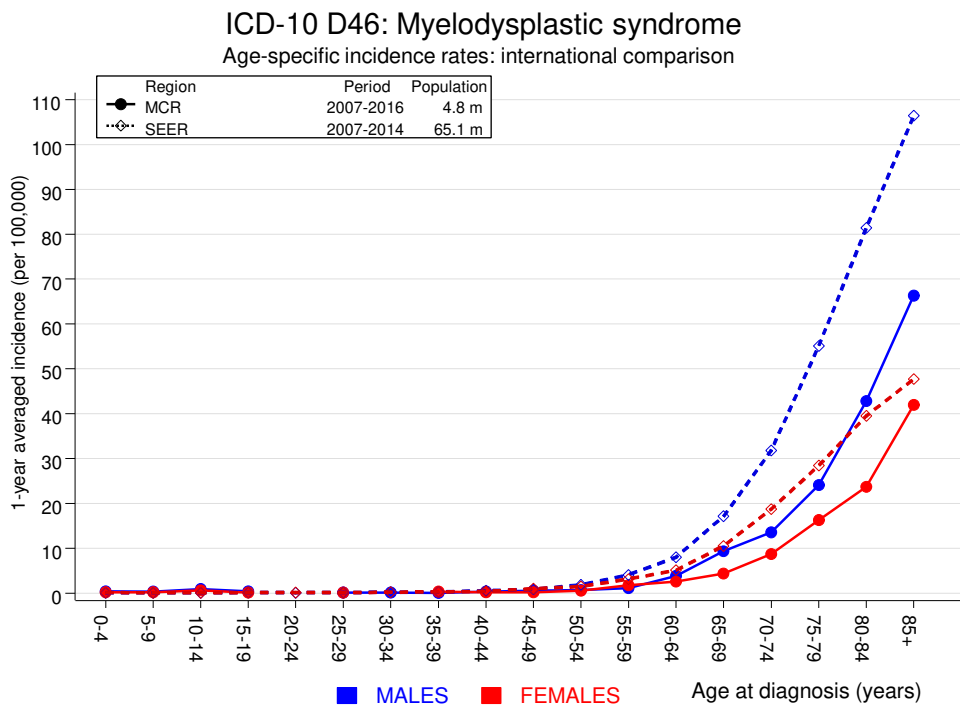


Figure 6a. Age-specific incidence in MCR registry areas compared to SEER (Surveillance, Epidemiology, and End Results, USA).

Reference:
 Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Incidence - SEER 18 Regs Research Data, released April 2014, based on the November 2013 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 1998–2016

MALES

Diagnosis		Observed n	Expected n	SIR	CI 95%	CI 95%	EAR	DCO %
C15	Oesophagus	3	0.6	5.1	1.0	14.8 #	13.5	
C16	Stomach	3	1.5	2.0	0.4	5.8	8.4	
C18	Colon	4	3.6	1.1	0.3	2.9	2.5	
C19–C20	Rectum	6	1.8	3.4	1.2	7.3 #	23.7	
C22	Liver	2	1.0	2.0	0.2	7.4	5.7	50.0
C25	Pancreas	2	1.4	1.5	0.2	5.3	3.5	
C32	Larynx	2	0.3	6.5	0.8	23.4	9.5	
C33–C34	Lung	22	4.0	5.4	3.4	8.2 #	100.8	22.7
C43	Malign. melanoma	2	1.5	1.4	0.2	5.0	3.1	
C61	Prostate	11	9.9	1.1	0.6	2.0	6.4	18.2
C64	Kidney	3	1.1	2.6	0.5	7.6	10.4	
C67	Bladder	4	1.8	2.3	0.6	5.8	12.6	50.0
C82–C85	NHL	19	1.5	12.9	7.8	20.1 #	98.4	10.5
C90	Mult. myeloma	10	0.5	20.9	10.0	38.4 #	53.5	
C91–C96	Leukaemia	113	0.6	178.3	146.9	214.3 #	630.9	22.1
Others, specified		6	1.7	3.6	1.3	7.8 #	24.3	33.3
Not observed		0	2.4	0.0	0.0	1.6	-13.3	
All further malignancies		212	35.0	6.1	5.3	6.9 #	993.9	18.4
Patients			881					
Median age at next malignancy (years)			75.9					
Person-years			1781					
Mean observation time (years)			2.0					
Median observation time (years)			1.0					

The occurrence of further malignancy listed is statistically significant.

Observed further malignancies with count 1 are pooled in category "Others, specified".

Table 7b

Standardized incidence ratio (SIR, with 95% confidence limits),
excess absolute risk (EAR) and DCO rate of further malignancies
for period 1998–2016

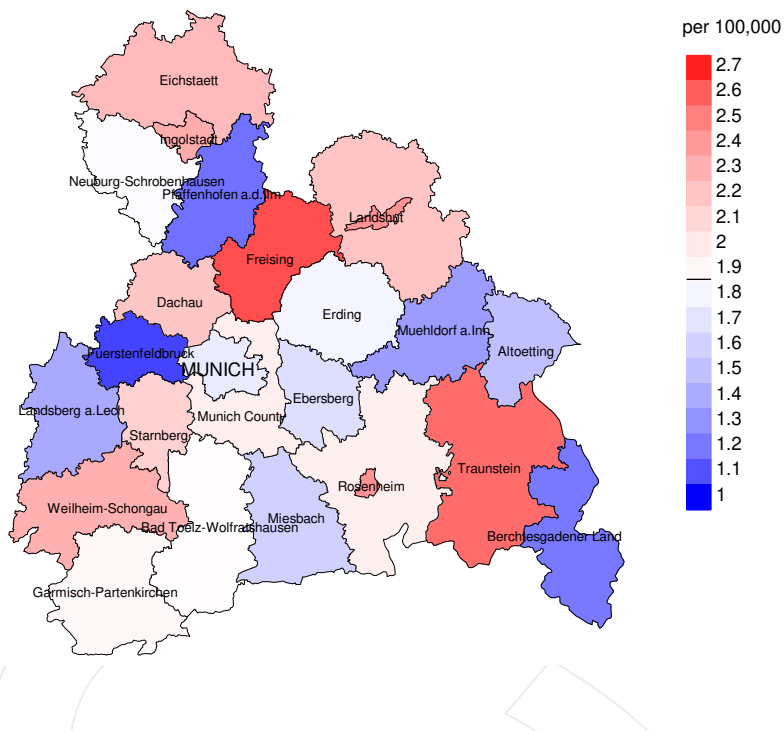
FEMALES

Diagnosis	Observed n	Expected n	SIR	CI 95%	CI 95%	EAR	DCO %
C16 Stomach	3	0.8	4.0	0.8	11.6	15.4	
C18 Colon	5	2.1	2.4	0.8	5.7	20.1	20.0
C19–C20 Rectum	2	0.8	2.5	0.3	8.9	8.1	
C25 Pancreas	2	1.0	2.0	0.2	7.4	7.0	50.0
C33–C34 Lung	2	1.3	1.5	0.2	5.4	4.5	50.0
C50 Breast	13	5.2	2.5	1.3	4.3 #	53.5	30.8
C67 Bladder	2	0.4	4.8	0.6	17.3	10.8	50.0
C82–C85 NHL	8	0.8	10.3	4.4	20.2 #	49.4	
C90 Mult. myeloma	5	0.3	19.7	6.4	46.0 #	32.4	
C91–C96 Leukaemia	83	0.3	246.6	196.4	305.7 #	565.1	18.1
Others, specified	8	1.7	4.8	2.1	9.4 #	43.2	12.5
Not observed	0	4.4	0.0	0.0	0.8 #	-29.9	
All further malignancies	133	18.9	7.0	5.9	8.3 #	779.7	18.0
Patients		724					
Median age at next malignancy (years)		77.0					
Person-years		1463					
Mean observation time (years)		2.0					
Median observation time (years)		1.0					

The occurrence of further malignancy listed is statistically significant.

Observed further malignancies with count 1 are pooled in category "Others, specified".

Average incidence (world standard population) 2007 - 2016: Males



Average incidence (world standard population) 2007 - 2016: Females

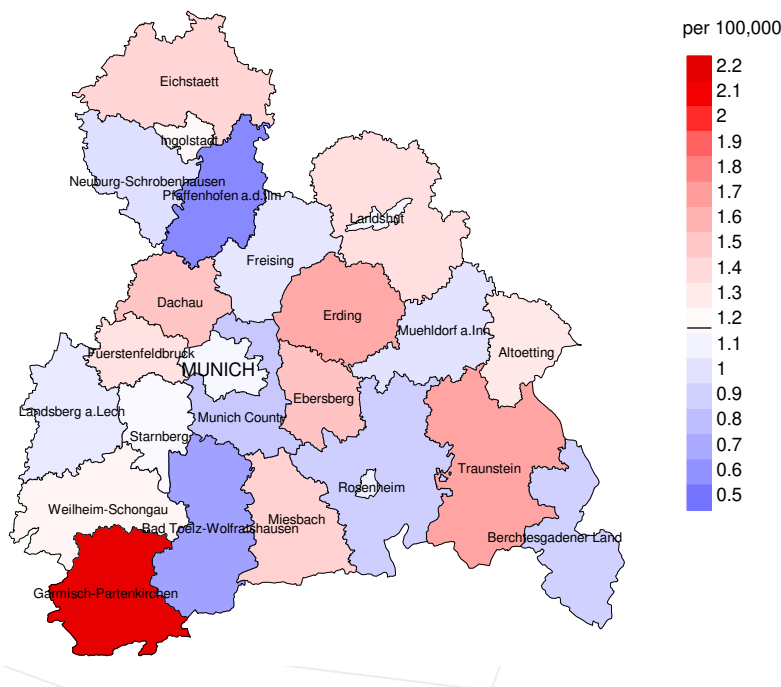
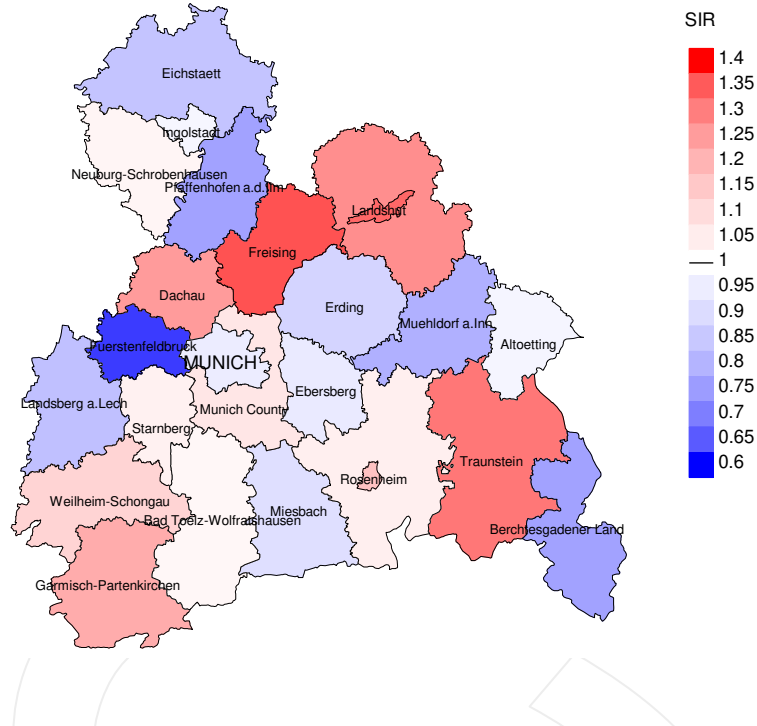


Figure 8a. Map of cancer incidence (world standard population, incl. DCO cases) by county averaged for period 2007 to 2016. According to their individual incidence rates, the counties are displayed in different red and blue hues, being the fine white color attributed to the population mean (males 1.9/100,000 WS N=976, females 1.2/100,000 WS N=905).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 66,416 female residents (averaged) in the period from 2007 to 2016 a total of 20 women were identified with newly diagnosed myelodysplastic syndrome. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 1.5/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.5 and 3.4/100,000.

Standardized incidence ratio (SIR) 2007 - 2016: Males



Standardized incidence ratio (SIR) 2007 - 2016: Females

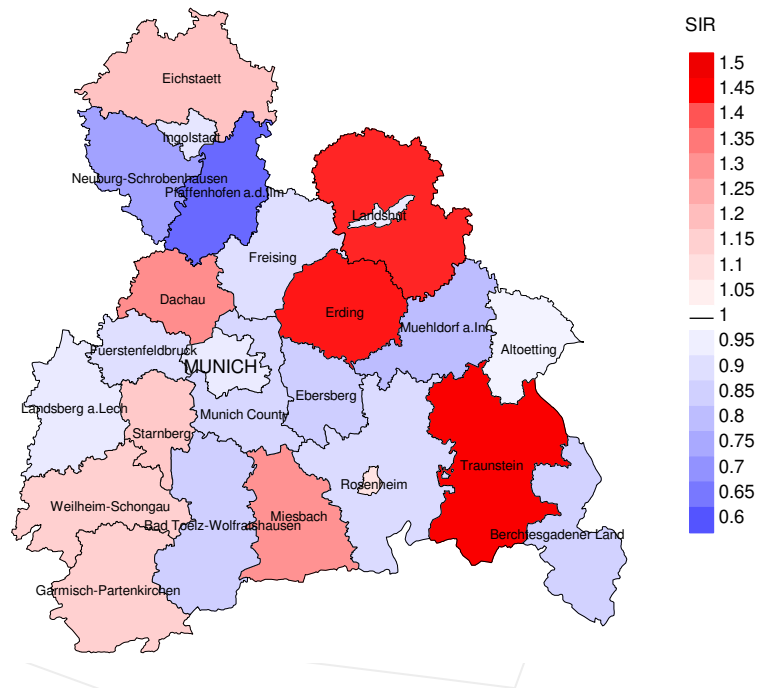


Figure 8b. Map of standardized incidence ratio (SIR, incl. DCO cases) by county averaged for period 2007 to 2016. According to their individual SIR values, the counties are displayed in different red and blue hues, being the fine white color attributed to the population overall of 1.0 (males N=976, females N=905).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 66,416 female residents (averaged) in the period from 2007 to 2016 a total of 20 women were identified with newly diagnosed myelodysplastic syndrome. Therefore, the mean standardized incidence ratio (SIR) for this cancer type in this area can be calculated at 0.85. Though, the value of this parameter may vary with an underlying probability of 99% between 0.44 and 1.47, 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 4.81 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	53	100.0	47.2	50	94.3	98.0
1999	57	100.0	47.4	54	94.7	98.1
2000	68	100.0	57.4	65	95.6	100.0
2001	60	96.7	58.3	57	95.0	98.2
2002	110	98.2	51.8	107	97.3	99.1
2003	99	96.0	55.6	92	92.9	97.8
2004	110	97.3	61.8	100	90.9	99.0
2005	145	97.9	63.4	137	94.5	98.5
2006	151	94.7	55.0	131	86.8	100.0
2007	196	90.8	48.5	171	87.2	98.2
2008	202	91.6	47.0	179	88.6	100.0
2009	198	89.4	40.9	165	83.3	98.8
2010	203	90.6	44.8	173	85.2	98.3
2011	241	89.2	43.2	203	84.2	98.5
2012	202	93.6	52.0	178	88.1	98.9
2013	207	89.9	42.0	168	81.2	100.0
2014	159	91.2	57.9	131	82.4	99.2
2015	144	99.3	68.8	128	88.9	97.7
2016	131	95.4	75.6	112	85.5	98.2
1998-2016	2736	93.5	52.2	2401	87.8	98.8

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 4.81 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	53	37	100.0	27	50.9
1999	57	53	98.1	35	61.4
2000	68	60	100.0	43	63.2
2001	60	41	100.0	31	51.7
2002	110	62	100.0	58	52.7
2003	99	72	98.6	56	56.6
2004	110	74	97.3	68	61.8
2005	145	90	96.7	94	64.8
2006	151	104	99.0	88	58.3
2007	196	109	99.1	99	50.5
2008	202	120	98.3	108	53.5
2009	198	122	99.2	90	45.5
2010	203	120	99.2	100	49.3
2011	241	139	98.6	121	50.2
2012	202	138	98.6	113	55.9
2013	207	129	100.0	100	48.3
2014	159	142	98.6	96	60.4
2015	144	156	100.0	110	76.4
2016	131	125	99.2	111	84.7
1998-2016	2736	1893	98.9	1548	56.6

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 4.81 m as of 2007, respectively)

Year of death	Deaths n	Prop. cancer- related %	Prop. non-cancer- related %	Prop. cancer recorded on death certificate %
1998	37	48.6	51.4	97.3
1999	53	56.6	43.4	96.2
2000	60	65.0	35.0	96.7
2001	41	41.5	58.5	100.0
2002	62	72.6	27.4	98.4
2003	72	68.1	31.9	94.4
2004	74	64.9	35.1	100.0
2005	90	66.7	33.3	94.3
2006	104	73.1	26.9	97.1
2007	109	74.3	25.7	97.2
2008	120	73.3	26.7	96.6
2009	122	77.9	22.1	91.7
2010	120	72.5	27.5	91.6
2011	139	78.4	21.6	96.4
2012	138	78.3	21.7	94.1
2013	129	81.4	18.6	94.6
2014	142	67.6	32.4	87.1
2015	156	73.1	26.9	91.0
2016	125	68.8	31.2	92.7
1998-2016	1893	71.4	28.6	94.3

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	13	73.0	72.3	73.9	73.0
1999	26	81.1	77.6	85.2	80.9
2000	28	74.7	75.3	74.2	75.3
2001	18	78.9	75.4	81.7	78.9
2002	33	78.8	78.8	79.7	78.8
2003	39	77.4	77.2	81.6	77.3
2004	35	80.7	79.9	83.3	80.7
2005	41	77.9	76.5	79.8	78.2
2006	64	76.1	74.5	80.1	76.3
2007	60	79.0	80.0	77.5	79.4
2008	72	76.0	73.2	80.8	76.0
2009	59	76.7	76.7	77.2	77.4
2010	71	81.2	79.3	85.6	80.7
2011	69	77.8	77.8	78.1	77.8
2012	78	78.2	78.1	80.8	78.2
2013	73	79.4	79.0	82.1	78.8
2014	70	79.6	79.9	79.3	80.9
2015	80	78.2	76.7	83.1	78.2
2016	69	81.0	78.2	85.7	80.7
1998–2016	998	78.4	77.2	81.1	78.4

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	24	83.2	76.7	86.7	82.0
1999	27	84.7	84.2	85.1	83.7
2000	32	82.1	78.2	83.8	82.0
2001	23	84.9	81.0	88.2	84.9
2002	29	81.4	85.2	80.9	82.9
2003	33	84.5	82.2	84.8	84.5
2004	39	83.4	80.1	86.7	83.4
2005	49	83.4	81.2	85.8	83.6
2006	40	83.8	83.9	81.9	83.7
2007	49	84.2	83.7	85.6	84.2
2008	48	82.0	81.1	84.6	82.0
2009	63	78.2	78.3	78.2	78.8
2010	49	80.9	81.1	78.8	81.1
2011	70	82.1	81.0	83.3	82.6
2012	60	80.1	77.3	85.1	79.7
2013	56	80.3	81.3	78.7	81.3
2014	72	81.4	79.8	83.1	81.5
2015	76	81.0	79.3	86.6	81.0
2016	56	80.9	79.9	81.1	80.1
1998–2016	895	82.1	80.9	84.5	82.2

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 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	6	0.5	0.35	0.3	0.26	0.5	0.32	0.6	0.33
1999	14	1.3	0.48	0.8	0.47	1.2	0.49	1.8	0.47
2000	19	1.7	0.51	0.9	0.47	1.5	0.50	2.1	0.52
2001	6	0.5	0.29	0.3	0.29	0.4	0.29	0.7	0.29
2002	20	1.1	0.33	0.5	0.32	0.9	0.34	1.4	0.34
2003	29	1.5	0.57	0.7	0.53	1.2	0.56	2.0	0.62
2004	25	1.3	0.38	0.6	0.32	1.0	0.35	1.7	0.42
2005	27	1.4	0.39	0.6	0.39	1.1	0.39	1.6	0.38
2006	47	2.5	0.54	1.1	0.48	1.8	0.50	2.6	0.54
2007	47	2.1	0.44	1.0	0.36	1.6	0.40	2.3	0.44
2008	54	2.4	0.58	1.1	0.56	1.7	0.57	2.4	0.56
2009	47	2.1	0.47	0.9	0.42	1.5	0.45	2.2	0.49
2010	50	2.2	0.44	0.9	0.42	1.5	0.44	2.2	0.43
2011	55	2.5	0.48	1.0	0.48	1.6	0.49	2.4	0.49
2012	64	2.8	0.60	1.2	0.55	1.9	0.58	2.7	0.60
2013	59	2.6	0.52	1.0	0.45	1.6	0.50	2.4	0.51
2014	48	2.1	0.55	0.7	0.46	1.2	0.52	1.9	0.54
2015	60	2.5	0.88	0.9	0.84	1.5	0.86	2.2	0.87
2016	49	2.0	0.68	0.7	0.75	1.2	0.70	1.8	0.70
1998-2016	726	2.0	0.51	0.8	0.47	1.4	0.50	2.1	0.51

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	12	1.0	0.33	0.4	0.37	0.6	0.35	0.9	0.35
1999	16	1.3	0.57	0.4	0.59	0.7	0.58	1.0	0.57
2000	20	1.7	0.65	0.6	0.73	0.9	0.69	1.2	0.64
2001	11	0.9	0.28	0.3	0.25	0.5	0.27	0.7	0.30
2002	25	1.3	0.51	0.3	0.43	0.6	0.46	0.9	0.46
2003	20	1.0	0.42	0.3	0.37	0.5	0.40	0.7	0.41
2004	23	1.2	0.52	0.4	0.60	0.6	0.55	0.9	0.54
2005	33	1.7	0.44	0.5	0.39	0.8	0.42	1.2	0.46
2006	29	1.4	0.45	0.4	0.36	0.7	0.41	1.0	0.43
2007	34	1.5	0.39	0.4	0.30	0.7	0.34	1.0	0.36
2008	34	1.5	0.31	0.4	0.23	0.7	0.27	1.0	0.29
2009	48	2.1	0.48	0.7	0.43	1.0	0.45	1.5	0.46
2010	37	1.6	0.41	0.5	0.42	0.8	0.42	1.1	0.43
2011	54	2.3	0.44	0.6	0.38	1.0	0.40	1.5	0.42
2012	44	1.9	0.46	0.5	0.41	0.9	0.46	1.3	0.47
2013	46	1.9	0.49	0.6	0.50	1.0	0.50	1.3	0.50
2014	48	2.0	0.68	0.6	0.78	0.9	0.74	1.4	0.73
2015	54	2.2	0.71	0.6	0.78	1.0	0.75	1.5	0.77
2016	37	1.5	0.63	0.4	0.73	0.7	0.69	0.9	0.63
1998-2016	625	1.6	0.47	0.5	0.44	0.8	0.46	1.1	0.47

Table 12

Age distribution of age at death (cancer-related) for period 2007-2016
(incl. multiple malignancies)

Age at death Years	Cases			Males			Females		
	n	%	Cum.%	n	%	Cum.%	n	%	Cum.%
0-4									
5-9	1	0.1	0.1	1	0.2	0.2			0.0
10-14	0	0.0	0.1			0.2			0.0
15-19	1	0.1	0.2			0.2	1	0.2	0.2
20-24	0	0.0	0.2			0.2			0.2
25-29	0	0.0	0.2			0.2			0.2
30-34	0	0.0	0.2			0.2			0.2
35-39	3	0.3	0.5	2	0.4	0.6	1	0.2	0.5
40-44	3	0.3	0.8			0.6	3	0.7	1.1
45-49	8	0.8	1.7	5	0.9	1.5	3	0.7	1.8
50-54	6	0.6	2.3	2	0.4	1.9	4	0.9	2.8
55-59	18	1.9	4.1	10	1.9	3.8	8	1.8	4.6
60-64	52	5.4	9.5	33	6.2	9.9	19	4.4	8.9
65-69	93	9.6	19.1	62	11.6	21.6	31	7.1	16.1
70-74	166	17.1	36.2	98	18.4	40.0	68	15.6	31.7
75-79	172	17.8	54.0	98	18.4	58.3	74	17.0	48.6
80-84	204	21.1	75.0	116	21.8	80.1	88	20.2	68.8
85+	242	25.0	100.0	106	19.9	100.0	136	31.2	100.0
All ages	969	100.0		533	100.0		436	100.0	

Table 13

Age-specific mortality (cancer-related) and proportion of all cancers for period 2007-2016 (incl. multiple malignancies)

Age at death Years	Males n	Females n	Males Age- spec. mortal.	MI-index	Females Age- spec. mortal.	MI-index
0- 4						
5- 9	1		0.1	0.25		
10-14						
15-19		1			0.1	0.50
20-24						
25-29						
30-34						
35-39	2	1	0.1	2.00	0.1	0.17
40-44		3			0.2	0.75
45-49	5	3	0.3	0.45	0.2	0.75
50-54	2	4	0.1	0.17	0.2	0.40
55-59	10	8	0.7	0.63	0.5	0.31
60-64	33	19	2.7	0.70	1.4	0.56
65-69	62	31	5.2	0.56	2.4	0.54
70-74	98	68	8.9	0.65	5.4	0.62
75-79	98	74	12.3	0.51	7.4	0.45
80-84	116	88	25.2	0.59	12.4	0.52
85+	106	136	34.6	0.52	18.5	0.44
All ages	533	436				
Mortality						
Raw			2.3	0.55	1.8	0.48
WS			0.9	0.50	0.5	0.45
ES			1.5	0.53	0.9	0.47
BRD-S			2.2	0.54	1.3	0.48
PYLL-70						
per 100,000			4.0		3.1	
ES			3.5		2.7	
AYLL-70			7.0		8.9	

Table 14a

Further malignancies in deaths in period 1998-2016
MALES

N=0 further malignancies in deaths were registered. Therefore, the table was not created.

Table 14b

Further malignancies in deaths in period 1998-2016
FEMALES

N=0 further malignancies in deaths were registered. Therefore, the table was not created.

Table 15

Age-specific mortality (cancer-related) and proportion of all cancers
for period 2007-2016
(First primaries only *)

Age at death Years	Males n	Females n	Males Age- spec. mortal.	MI-index	Females Age- spec. mortal.	MI-index
0- 4						
5- 9	1		0.1	0.25		
10-14						
15-19						
20-24						
25-29						
30-34						
35-39	2	1	0.1	2.00	0.1	0.25
40-44		2			0.1	0.67
45-49	4	2	0.2	0.40	0.1	0.67
50-54	2	2	0.1	0.18	0.1	0.50
55-59	8	3	0.6	0.67	0.2	0.18
60-64	27	14	2.2	0.71	1.1	0.67
65-69	39	18	3.3	0.54	1.4	0.53
70-74	62	44	5.6	0.66	3.5	0.65
75-79	61	47	7.7	0.51	4.7	0.41
80-84	61	62	13.3	0.59	8.8	0.55
85+	64	106	20.9	0.52	14.4	0.43
All ages	331	301				
Mortality						
Raw			1.4	0.53	1.3	0.47
WS			0.6	0.47	0.3	0.43
ES			1.0	0.51	0.6	0.45
BRD-S			1.4	0.53	0.8	0.47
PYLL-70 per 100,000			3.2		1.8	
ES			2.9		1.5	
AYLL-70			7.9		8.5	

* See corresponding tables with multiple malignancies.

Table 16

Age-specific mortality (cancer-related) and proportion of all cancers
for period 2007-2016
(**Single primaries only ***)

Age at death Years	Males n	Females n	Males Age- spec. mortal.	MI-index	Females Age- spec. mortal.	MI-index
0- 4						
5- 9	1		0.1	0.25		
10-14						
15-19						
20-24						
25-29						
30-34						
35-39	1	1	0.1	1.00	0.1	0.33
40-44						
45-49	2		0.1	0.29		
50-54	1	1	0.1	0.17	0.1	0.50
55-59	5	2	0.4	0.50	0.1	0.15
60-64	20	12	1.6	0.65	0.9	0.67
65-69	25	12	2.1	0.54	0.9	0.48
70-74	40	26	3.6	0.56	2.1	0.51
75-79	39	38	4.9	0.39	3.8	0.39
80-84	51	50	11.1	0.55	7.1	0.51
85+	48	96	15.7	0.43	13.1	0.40
All ages	233	238				
Mortality						
Raw			1.0	0.46	1.0	0.42
WS			0.4	0.40	0.3	0.38
ES			0.7	0.44	0.4	0.40
BRD-S			1.0	0.46	0.6	0.42
PYLL-70						
per 100,000			2.1		1.0	
ES			2.0		0.8	
AYLL-70			7.9		7.0	

* See corresponding tables with multiple malignancies.

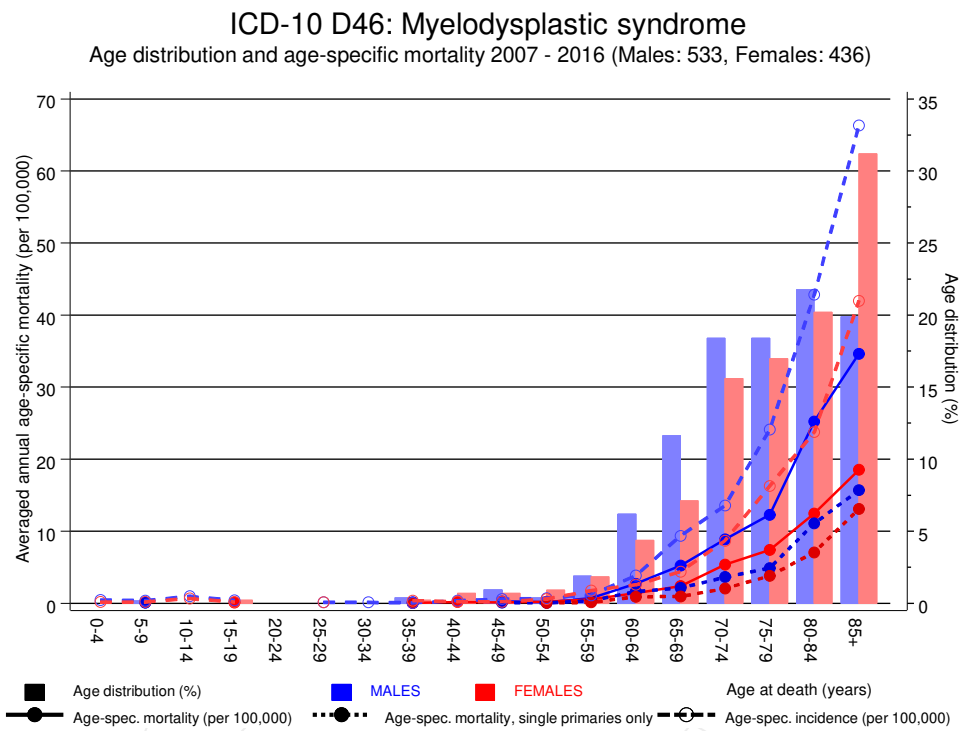
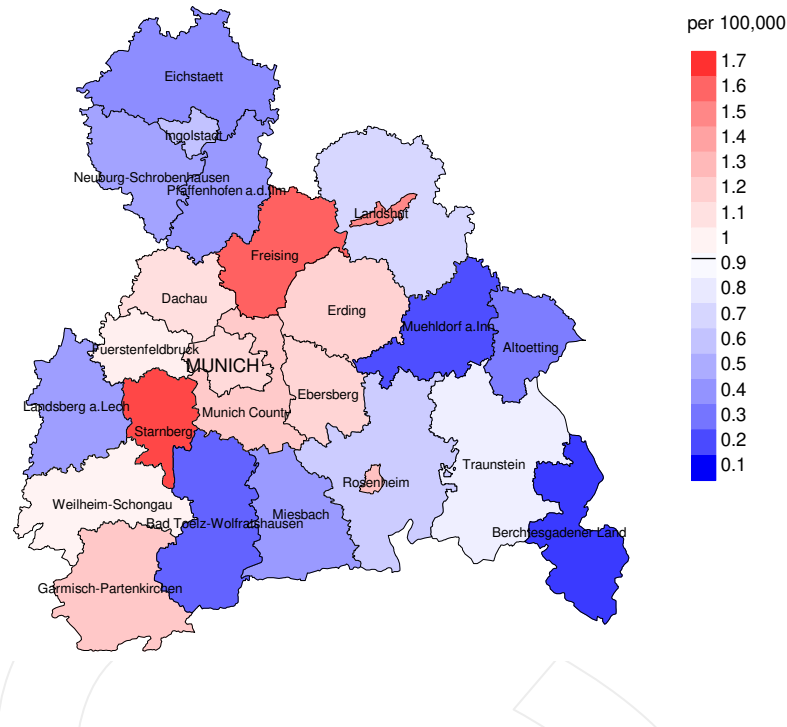


Figure 17. Distribution of age at death (bars; males: mean=75.1 yrs, median=75.8 yrs; females: mean=77.2 yrs, median=79.0 yrs) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

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

Average mortality (world standard population) 2007 - 2016: Males



Average mortality (world standard population) 2007 - 2016: Females

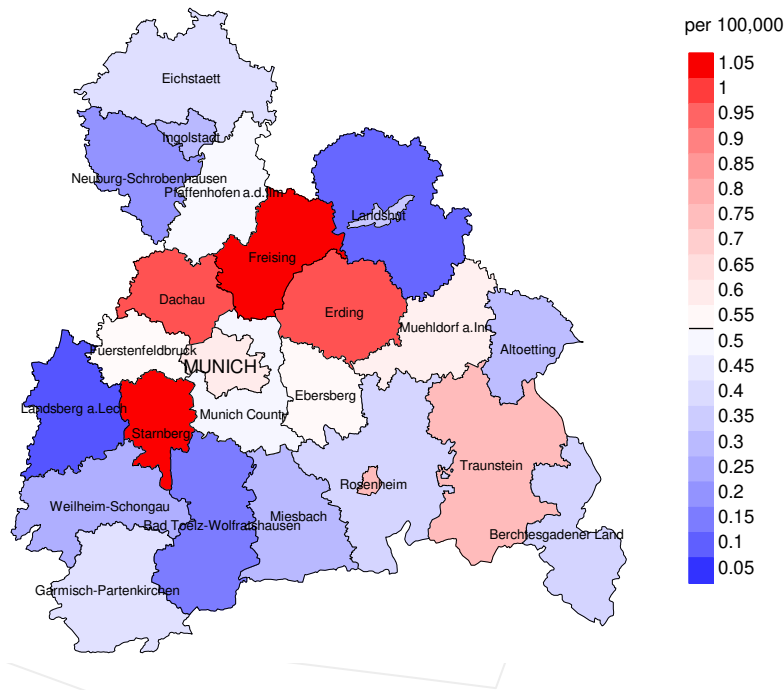
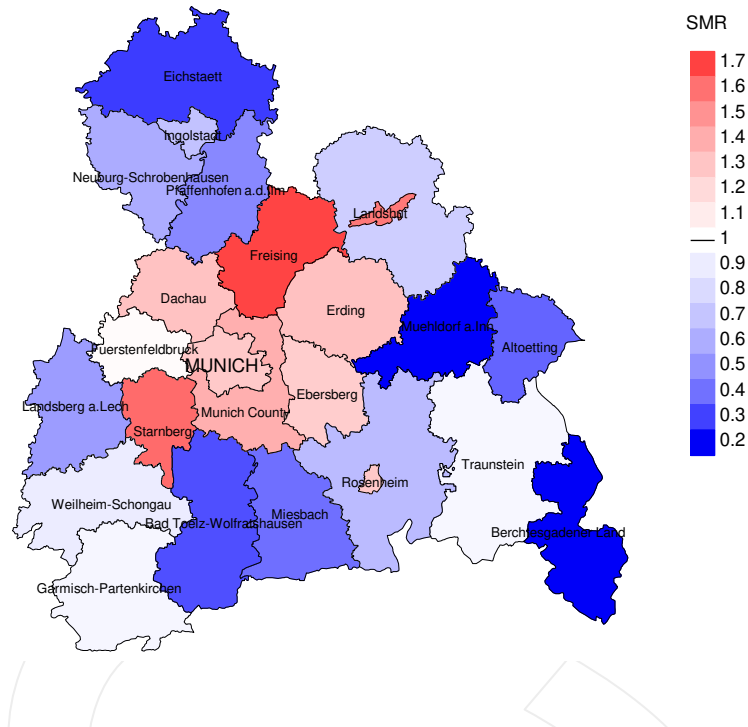


Figure 18a. Map of cancer mortality (world standard population) by county averaged for period 2007 to 2016. According to their individual mortality rates, the counties are displayed in different red and blue hues, being the fine white color attributed to the population mean (males 0.9/100,000 WS N=533, females 0.5/100,000 WS N=436).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 66,416 female residents (averaged) in the period from 2007 to 2016 a total of 11 women died from myelodysplastic syndrome. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 0.5/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.2 and 1.6/100,000.

Standardized mortality ratio (SMR) 2007 - 2016: Males



Standardized mortality ratio (SMR) 2007 - 2016: Females

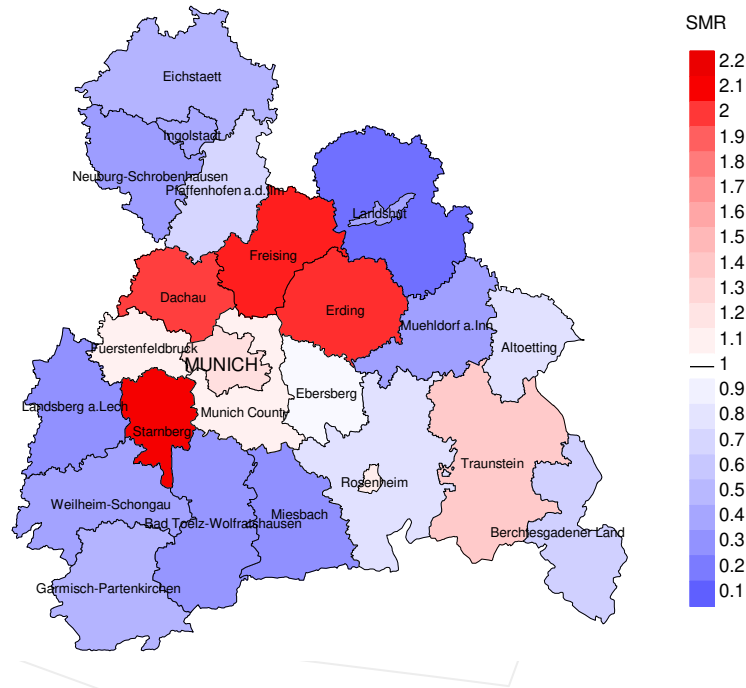


Figure 18b. Map of standardized mortality ratio (SMR, incl. DCO cases) by county averaged for period 2007 to 2016. According to their individual SMR values, the counties are displayed in different red and blue hues, being the fine white color attributed to the population overall of 1.0 (males N=533, females N=436).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 66,416 female residents (averaged) in the period from 2007 to 2016 a total of 11 women died from myelodysplastic syndrome. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 0.96. Though, the value of this parameter may vary with an underlying probability of 99% between 0.38 and 2.00, 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 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

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 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 between mortality and incidence
FRG	Federal Republic of Germany

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