Munich Cancer Registry

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

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

Cancer statistics: Baseline statistics

GEP-NET: Gastr.ent.pancr. neuroend. tumor

Year of diagnosis	1998-2011
Patients	1633
Diseases	1648
Creation date	04/02/2013
Export date	01/03/2013
Population	4.5 m

http://www.tumorregister-muenchen.de/en/facts/base/base_hDNETE.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 4.5 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.

ICD-10 codes used for specifying cancer site

Code	Description
C15	Oesophagus
C16	Stomach
C17	Small intestine
C18	Colon
C19	Rectosigmoid junction
C20	Rectum
C21	Anus and anal canal
C22	Liver and intrahepatic bile ducts
C23	Gallbladder
C24	Other and unspecified parts of biliary tract
C25	Pancreas
C26	Other and ill-defined digestive organs

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

Code	Description
8013/3	Large cell neuroendocrine carcinoma
8041/3	Small cell carcinoma, NOS
8150/0	Islet cell adenoma
8150/3	Islet cell carcinoma
8151/3	Insulinoma, malignant
8152/1	Glucagonoma, NOS
8152/3	Glucagonoma, malignant
8153/3	Gastrinoma, malignant
8155/3	Vipoma, malignant
8156/3	Somatostatinoma, malignant
8240/3	Carcinoid tumor, NOS
8241/3	Enterochromaffin cell carcinoid
8243/3	Goblet cell carcinoid
8244/3	Composite carcinoid
8245/1	Tubular carcinoid
8246/3	Neuroendocrine carcinoma, NOS
8249/3	Atypical carcinoid tumor
8683/0	Gangliocytic paraganglioma

Reference:

Bosman FT, Carneiro F, Hruban RH, Theise ND, editors. WHO Classification of Tumours of the Digestive System 4th edition, IARC, Lyon (2010).

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	55			23.6	58.2	100.0
1999	62			21.0	46.8	91.9
2000	48			22.9	43.8	97.9
2001	53			37.7	47.2	100.0
2002	92			19.6	42.4	96.7
2003	93			26.9	47.3	94.6
2004	121			28.1	41.3	93.4
2005	117			31.6	43.6	93.2
2006	145			26.9	40.7	91.0
2007	173			30.1	40.5	80.3 ##
2008	169			23.7	34.3	68.0
2009	172			22.7	35.5	75.0
2010	188			27.7	23.9	94.1
2011	160			19.4	13.1	69.4 ###
1998-2011	1648			25.7	36.7	85.8

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 1a

Patient cohorts by year of diagnosis and gender
including DCO cases

Year of diagnosis	All n	Males n	Females n	Prop. males %
1998	55	30	25	54.5
1999	62	32	30	51.6
2000	48	23	25	47.9
2001	53	29	24	54.7
2002	92	51	41	55.4
2003	93	49	44	52.7
2004	121	68	53	56.2
2005	117	66	51	56.4
2006	145	89	56	61.4
2007	173	110	63	63.6
2008	169	85	84	50.3
2009	172	95	77	55.2
2010	188	93	95	49.5
2011	160	90	70	56.3
1998-2011	1648	910	738	55.2

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	Males n	Females n	Males Inc. raw	Fem. Inc. raw	Males Inc. WS	Fem. Inc. WS	Males Inc. ES	Fem. Inc. ES	Males Inc. BRD-S	Fem. Inc. BRD-S
1998	30	25	2.7	2.1	1.7	1.3	2.3	1.7	2.8	1.9
1999	32	30	2.9	2.5	2.0	1.6	2.5	2.0	2.9	2.2
2000	23	25	2.0	2.1	1.3	1.2	1.8	1.5	2.2	1.8
2001	29	24	2.5	2.0	1.5	1.2	2.2	1.6	2.5	1.8
2002	51	41	2.7	2.1	1.8	1.3	2.4	1.6	2.7	1.9
2003	49	44	2.6	2.2	1.5	1.4	2.2	1.9	2.6	2.1
2004	68	53	3.6	2.7	2.2	1.6	3.0	2.1	3.7	2.4
2005	66	51	3.5	2.6	2.1	1.3	2.9	1.8	3.5	2.2
2006	89	56	4.6	2.8	2.6	1.5	3.7	2.0	4.5	2.4
2007	110	63	5.0	2.7	3.1	1.6	4.1	2.1	4.8	2.4
2008	85	84	3.8	3.6	2.2	2.0	3.1	2.6	3.7	3.1
2009	95	77	4.3	3.3	2.3	2.0	3.3	2.6	4.1	3.0
2010	93	95	4.1	4.1	2.4	2.4	3.3	3.2	3.9	3.6
2011	90	70	4.0	3.0	2.1	1.8	3.0	2.4	3.7	2.7
1998-2011	910	738	3.6	2.8	2.1	1.6	3.0	2.2	3.6	2.5

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

Table 3

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

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	55	62.6	14.9	13.2	87.9	46.6	55.9	63.4	71.5	81.7
1999	62	58.7	15.4	24.9	87.9	33.5	52.5	60.7	67.7	73.7
2000	48	61.4	16.4	24.7	92.1	39.0	49.5	60.5	74.6	80.6
2001	53	61.8	12.7	29.6	88.5	47.7	54.0	62.3	69.1	77.8
2002	92	61.3	15.8	17.7	90.9	37.0	50.7	62.9	72.2	80.3
2003	93	62.4	12.8	23.5	85.0	48.8	56.2	63.2	70.9	78.0
2004	121	61.6	14.7	13.8	93.3	40.8	52.8	63.1	72.3	77.8
2005	117	65.0	14.5	16.1	90.8	45.4	57.6	66.8	74.9	82.5
2006	145	64.2	13.3	16.8	91.9	44.8	56.2	66.7	73.7	79.9
2007	173	62.0	14.8	15.8	91.2	41.7	55.2	64.3	71.1	79.3
2008	169	63.4	15.2	18.9	93.9	41.7	54.7	66.3	73.4	80.2
2009	172	63.7	15.4	15.9	92.6	43.1	55.8	65.4	74.6	81.8
2010	188	62.0	14.1	14.9	89.6	43.9	53.7	62.6	72.5	79.8
2011	160	62.8	15.2	17.1	92.0	41.8	51.9	66.1	73.9	80.5
1998-2011	1648	62.6	14.7	13.2	93.9	42.3	54.3	64.3	72.9	79.8

Table 3a

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

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	30	62.9	10.7	32.1	81.7	51.2	58.6	63.5	66.8	77.2
1999	32	57.5	15.9	24.9	85.3	29.8	52.3	59.8	67.7	73.5
2000	23	61.8	14.2	37.4	92.1	43.9	50.0	60.1	73.9	76.6
2001	29	62.5	11.8	34.3	88.5	50.5	54.9	60.1	69.1	79.8
2002	51	60.0	12.6	27.1	88.3	42.3	51.9	61.0	66.8	74.9
2003	49	64.6	9.9	32.4	85.0	52.9	58.8	64.1	70.9	76.9
2004	68	62.3	11.9	27.8	78.9	47.7	54.0	63.5	71.7	76.5
2005	66	65.0	13.5	19.0	87.6	48.7	57.8	66.5	74.8	79.4
2006	89	64.5	12.4	16.8	85.7	46.4	59.0	67.2	73.1	76.9
2007	110	61.7	14.0	15.8	91.2	41.3	55.3	63.4	69.8	79.0
2008	85	63.5	13.1	19.3	85.6	49.3	56.2	65.6	73.3	79.2
2009	95	65.8	12.2	31.4	89.0	50.2	58.1	67.1	74.6	81.7
2010	93	63.4	12.3	26.3	86.8	47.1	56.4	63.7	72.1	79.0
2011	90	65.4	12.3	39.7	86.8	46.4	55.8	67.8	73.9	80.9
1998-2011	910	63.4	12.7	15.8	92.1	47.0	56.3	64.5	72.2	78.6

Table 3b

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

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	25	62.2	19.0	13.2	87.9	32.4	54.3	62.1	77.0	84.2
1999	30	59.9	14.9	26.9	87.9	38.6	52.5	61.6	72.1	76.0
2000	25	61.0	18.4	24.7	92.0	33.1	46.0	63.0	75.5	81.0
2001	24	60.9	13.9	29.6	84.4	38.6	53.7	63.0	70.0	75.7
2002	41	62.9	19.2	17.7	90.9	32.9	49.4	66.3	76.4	84.7
2003	44	60.1	15.1	23.5	84.0	33.3	52.4	61.7	70.6	79.2
2004	53	60.6	17.7	13.8	93.3	35.4	51.7	62.6	74.4	78.9
2005	51	65.0	15.7	16.1	90.8	42.1	55.6	67.8	77.4	82.5
2006	56	63.9	14.8	29.9	91.9	43.5	51.8	65.5	75.1	83.1
2007	63	62.5	16.1	17.8	86.8	41.7	53.5	65.2	74.3	79.3
2008	84	63.3	17.1	18.9	93.9	39.2	51.2	67.7	74.1	82.2
2009	77	61.1	18.5	15.9	92.6	35.0	50.3	62.3	75.3	84.2
2010	95	60.7	15.5	14.9	89.6	39.8	50.9	61.1	72.7	79.8
2011	70	59.5	17.8	17.1	92.0	35.1	46.8	62.0	73.0	79.8
1998-2011	738	61.7	16.7	13.2	93.9	38.1	51.5	63.9	74.0	81.3

Table 4

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

Age at diagnosis Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
10-14	3	0.2	0.2			0.0	3	0.4	0.4
15-19	14	0.8	1.0	4	0.4	0.4	10	1.4	1.8
20-24	12	0.7	1.8	1	0.1	0.5	11	1.5	3.3
25-29	25	1.5	3.3	12	1.3	1.9	13	1.8	5.0
30-34	35	2.1	5.4	14	1.5	3.4	21	2.8	7.9
35-39	48	2.9	8.3	18	2.0	5.4	30	4.1	11.9
40-44	62	3.8	12.1	30	3.3	8.7	32	4.3	16.3
45-49	96	5.8	17.9	47	5.2	13.8	49	6.6	22.9
50-54	134	8.1	26.0	73	8.0	21.9	61	8.3	31.2
55-59	173	10.5	36.5	109	12.0	33.8	64	8.7	39.8
60-64	250	15.2	51.7	158	17.4	51.2	92	12.5	52.3
65-69	254	15.4	67.1	162	17.8	69.0	92	12.5	64.8
70-74	207	12.6	79.7	115	12.6	81.6	92	12.5	77.2
75-79	180	10.9	90.6	101	11.1	92.7	79	10.7	87.9
80-84	103	6.3	96.8	48	5.3	98.0	55	7.5	95.4
85+	52	3.2	100.0	18	2.0	100.0	34	4.6	100.0
All ages	1648	100.0		910	100.0		738	100.0	

Included in the statistics are 36.3% multiple primaries in males and 25.7% in females.

Table 5

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

Age at diagnosis Years	Males n	Females n	Males Age-spec. incid.	Females Age-spec. incid.	Males DCO rate n=0 %	Females DCO rate n=0 %	Males Prop.all cancers n=132509 %	Females Prop.all cancers n=129521 %
0- 4			0.0	0.0				
5- 9			0.0	0.0				
10-14		3	0.0	0.2				2.0
15-19	4	10	0.3	0.8			1.4	4.2
20-24	1	11	0.1	0.7			0.2	2.5
25-29	12	13	0.7	0.8			1.5	1.4
30-34	14	21	0.7	1.1			1.1	1.2
35-39	18	30	0.8	1.5			0.9	0.9
40-44	30	32	1.3	1.5			1.1	0.6
45-49	47	49	2.4	2.6			1.0	0.7
50-54	73	61	4.4	3.6			1.0	0.7
55-59	109	64	7.0	3.9			0.9	0.5
60-64	155	91	10.2	5.7			0.8	0.6
65-69	160	92	11.7	6.2			0.7	0.6
70-74	114	92	11.1	7.5			0.5	0.6
75-79	100	77	14.8	7.7			0.6	0.5
80-84	47	55	11.6	6.9			0.4	0.4
85+	18	34	6.5	4.6			0.2	0.2
All ages	902	735			0.0	0.0	0.7	0.6
Incidence								
Raw			3.6	2.8				
WS			2.1	1.6				
ES			3.0	2.1				
BRD-S			3.5	2.5				

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 6a

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

Diagnosis		Observed n	Expected n	SIR	LCL 95%	UCL 95%		EAR	DCO %
C16	Stomach	5	1.2	4.2	1.3	9.7	#	17.5	
C17	Small intestine	2	0.1	13.9	1.7	50.4	#	8.5	
C18	Colon	16	2.9	5.5	3.2	9.0	#	60.3	
C19-C20	Rectum	11	1.8	6.2	3.1	11.1	#	42.4	
C22	Liver	4	0.8	4.7	1.3	12.1	#	14.5	25.0
C23-C24	Bile	2	0.3	7.2	0.9	26.2		7.9	
C25	Pancreas	6	1.0	5.8	2.1	12.6	#	22.8	
C33-C34	Lung	7	3.7	1.9	0.8	3.9		15.1	14.3
C43	Malign. melanoma	3	1.2	2.4	0.5	7.1		8.1	
C61	Prostate	17	8.9	1.9	1.1	3.1	#	37.4	
C64	Kidney	7	1.1	6.3	2.5	13.0	#	27.1	
C67	Bladder	2	1.2	1.7	0.2	6.2		3.8	
C73	Thyroid	2	0.2	8.5	1.0	30.8	#	8.1	
C76-C79	CUP	2	0.5	4.1	0.5	14.7		6.9	
C82-C85	NHL	4	1.2	3.5	0.9	8.9		13.1	
C91-C96	Leukaemia	2	0.4	4.6	0.6	16.5		7.2	100.0
Other primaries		6	1.0	5.9	2.2	12.8	#	22.9	
Not observed		0	3.0	0.0	0.0	1.2		-13.6	
All mult. primaries		98	30.6	3.2	2.6	3.9	#	310.2	4.1

Patients	650
Mean age at second malignancy (years)	68.5
Person-years	2174
Mean observation time (years)	3.3
Median observation time (years)	2.4

The occurrence of second malignancy is statistically significant.

Observed second primaries with count 1 are pooled in category "Other primaries".

Table 6b

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

Diagnosis		Observed n	Expected n	SIR	LCL 95%	UCL 95%		EAR	DCO %
C16	Stomach	5	0.7	7.6	2.5	17.8	#	23.0	40.0
C18	Colon	9	1.8	5.0	2.3	9.4	#	38.1	
C19-C20	Rectum	5	0.8	6.2	2.0	14.5	#	22.2	20.0
C25	Pancreas	5	0.8	6.6	2.2	15.5	#	22.5	
C33-C34	Lung	3	1.3	2.4	0.5	6.9		9.1	
C43	Malign. melanoma	2	0.7	3.1	0.4	11.1		7.1	
C50	Breast	10	5.8	1.7	0.8	3.2		22.4	
C54	Corpus uteri	2	1.0	1.9	0.2	7.0		5.1	
C56	Ovary	2	0.8	2.6	0.3	9.2		6.4	
C64	Kidney	3	0.4	6.7	1.4	19.5	#	13.5	33.3
C82-C85	NHL	3	0.7	4.4	0.9	12.9		12.3	
Other primaries		4	0.7	5.5	1.5	14.1	#	17.3	
Not observed		0	3.1	0.0	0.0	1.2		-16.4	
All mult. primaries		53	18.5	2.9	2.1	3.7	#	182.6	7.5

Patients	498
Mean age at second malignancy (years)	68.0
Person-years	1889
Mean observation time (years)	3.8
Median observation time (years)	2.8

The occurrence of second malignancy is statistically significant.

Observed second malignancy with count 1 are pooled in category "Other primaries".

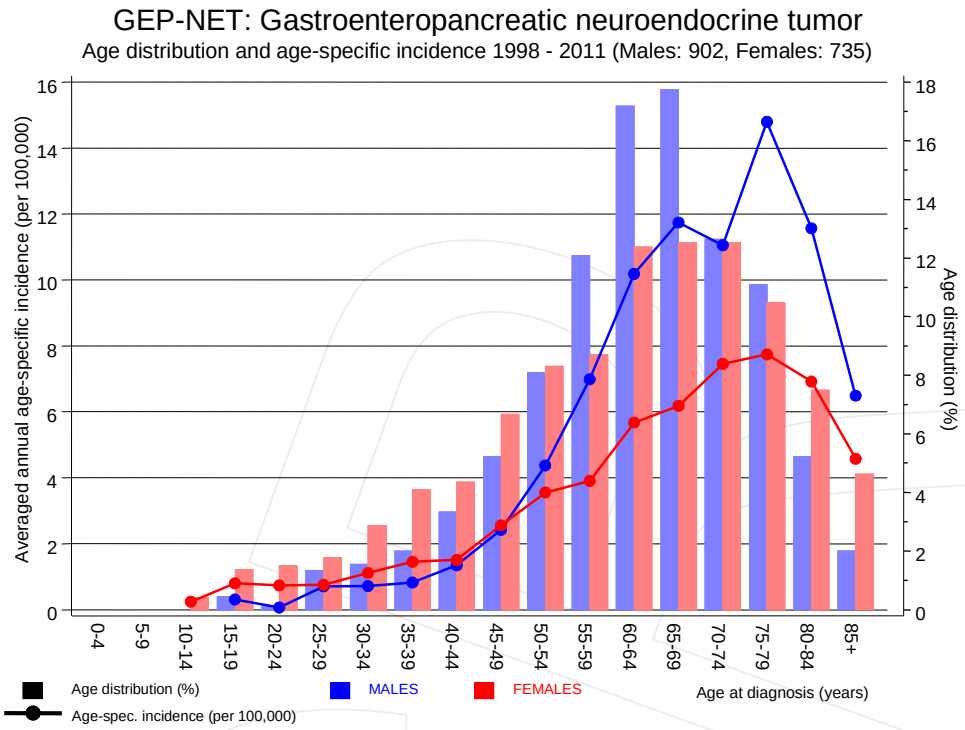


Figure 7. Age distribution and age-specific incidence

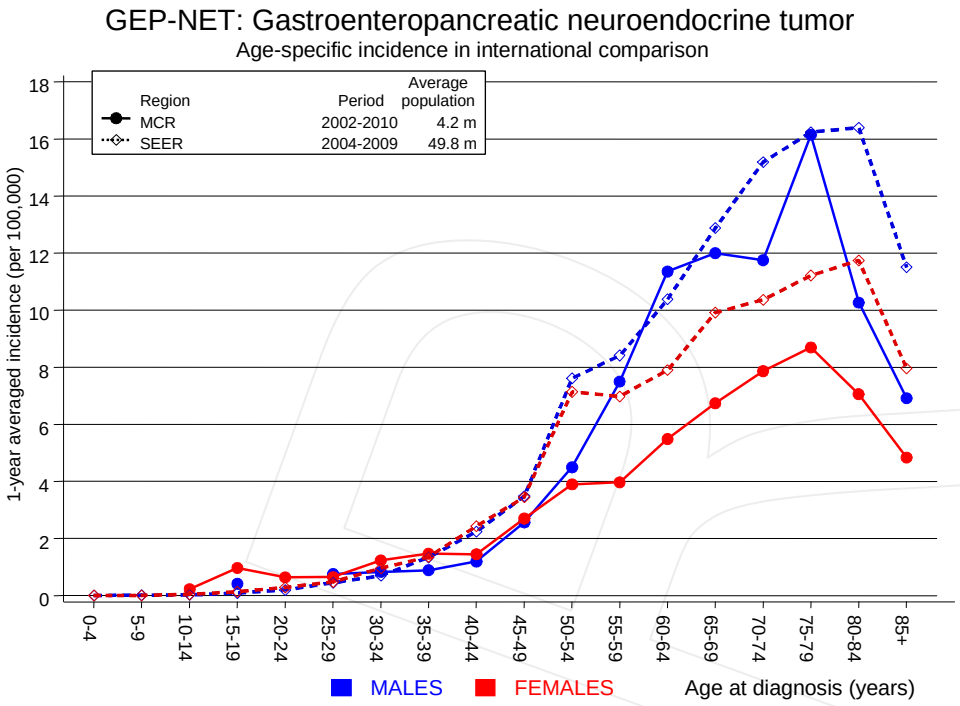


Figure 7a. Age-specific incidence in MCR registry areas compared to SEER (Surveillance, Epidemiology, and End Results, USA).

Reference:

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

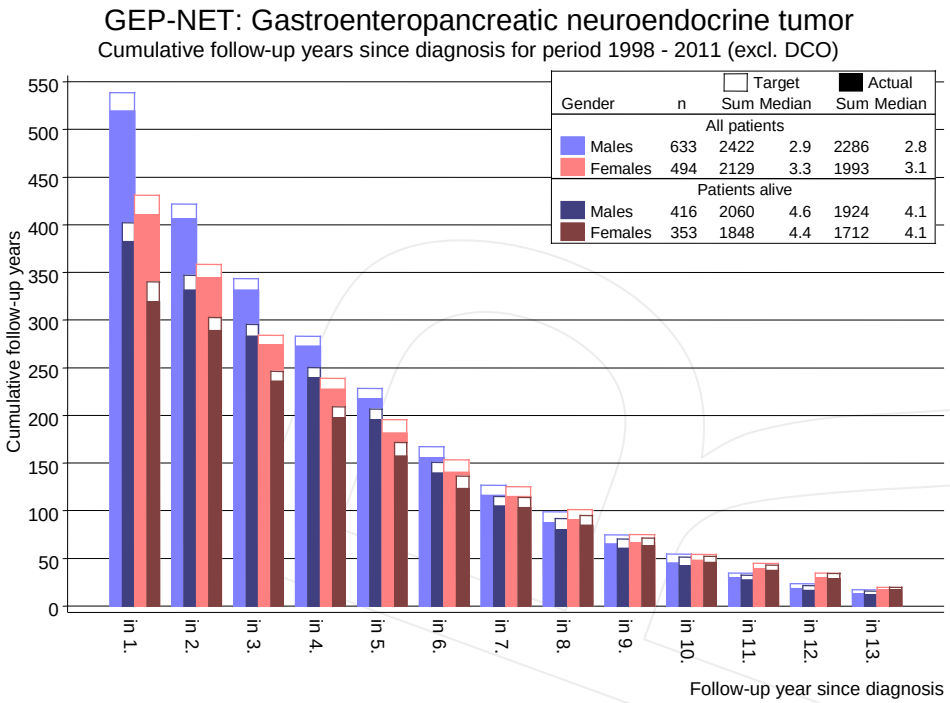
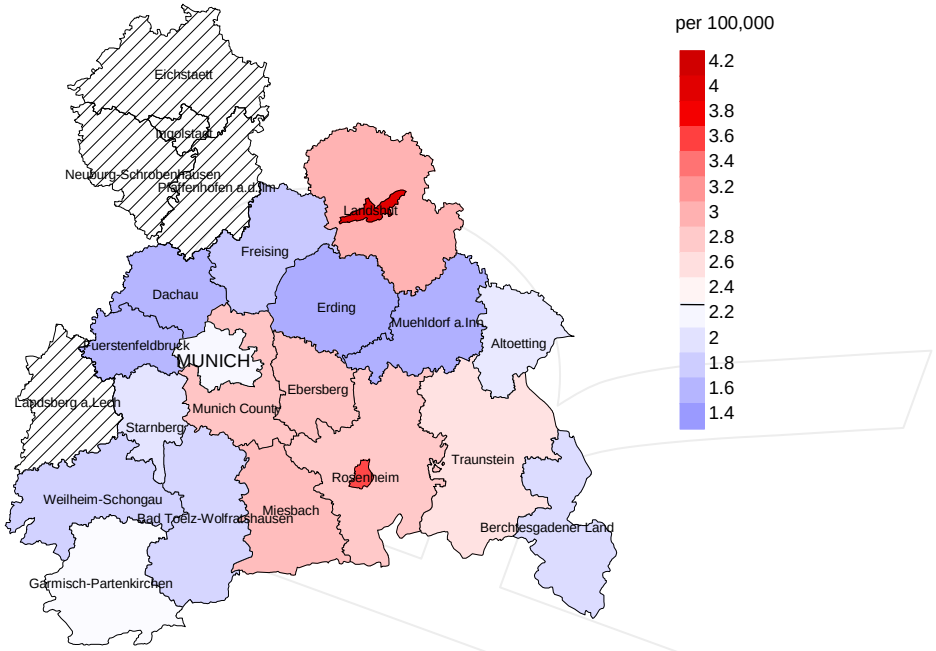


Figure 8. Cumulative follow-up years depending on time since diagnosis

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: Males



Average incidence (world standard population) 2003 - 2008: Females

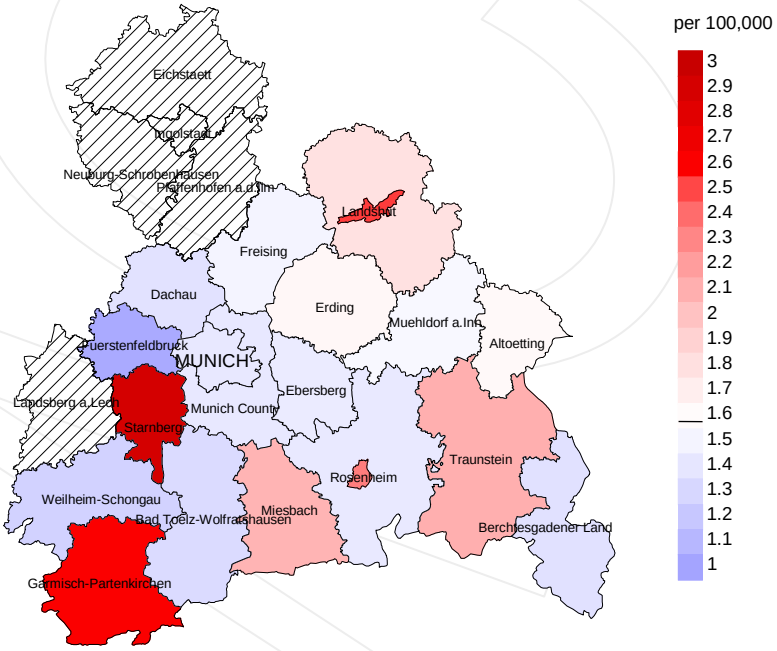
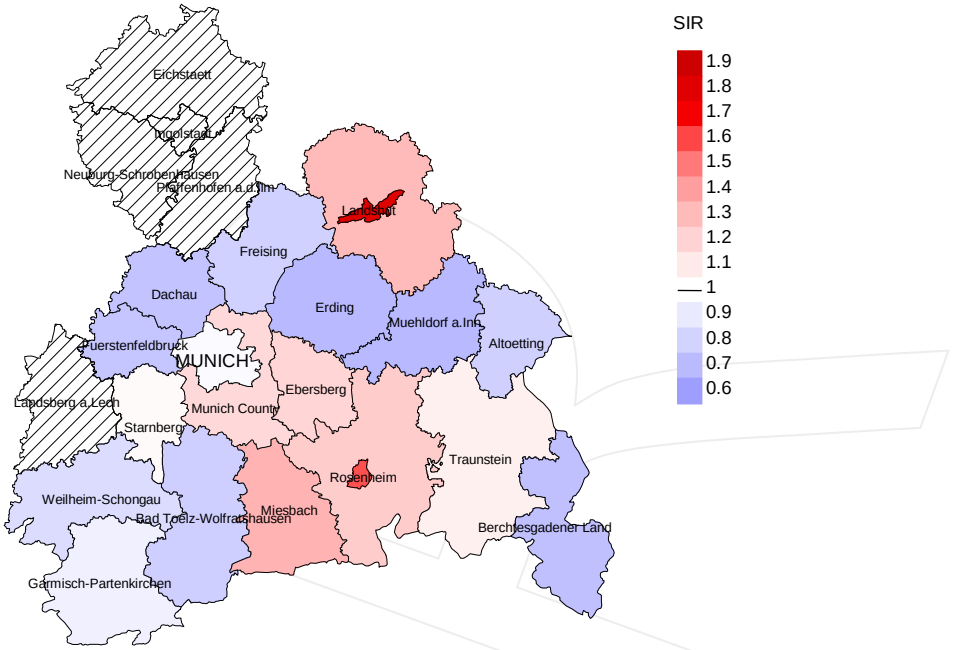


Figure 9a. Map of cancer incidence (world standard population, incl. DCO cases) by county averaged for period 2003 to 2008. According to their individual incidence rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 2.3/100,000 WS N=444, females 1.6/100,000 WS N=338). 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 11 women were identified with newly diagnosed gastr.ent.pancr. neuroend. tumor. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 1.4/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.5 and 3.3/100,000.

Standardized incidence ratio (SIR) 2003 - 2008: Males



Standardized incidence ratio (SIR) 2003 - 2008: Females

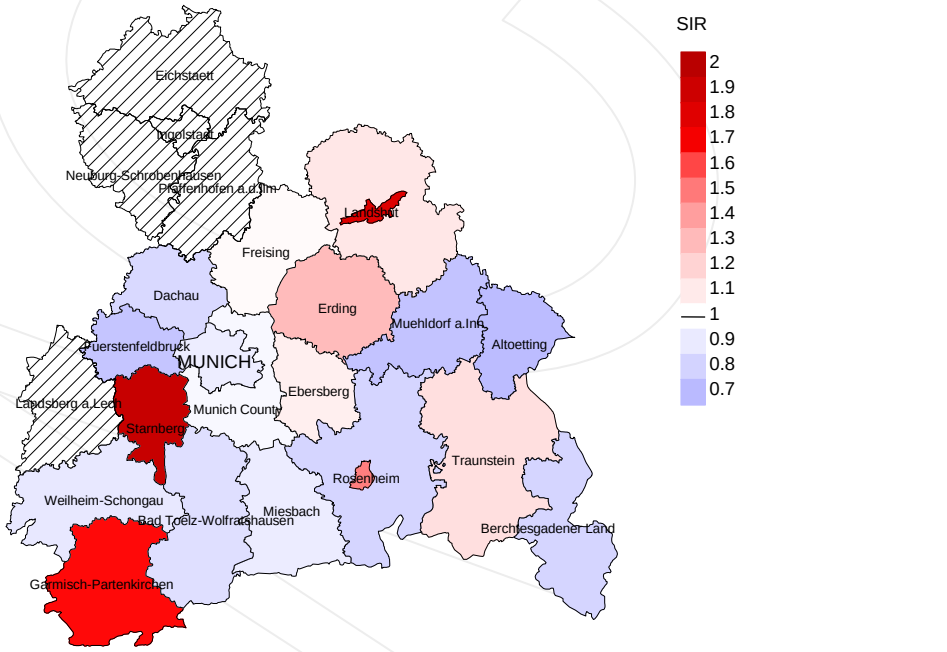


Figure 9b. Map of standardized incidence ratio (SIR, incl. DCO cases) by county averaged for period 2003 to 2008. According to their individual SIR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=444, females N=338). 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 11 women were identified with newly diagnosed gastr.ent.pancr. neuroend. tumor. Therefore, the mean standardized incidence ratio (SIR) for this cancer type in this area can be calculated at 1.07. Though, the value of this parameter may vary with an underlying probability of 99% between 0.42 and 2.22, 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	55	100.0		32	58.2	90.6
1999	62	91.9		29	46.8	100.0
2000	48	97.9		21	43.8	90.5
2001	53	100.0		25	47.2	96.0
2002	92	96.7		39	42.4	97.4
2003	93	94.6		44	47.3	100.0
2004	121	93.4		50	41.3	98.0
2005	117	93.2		51	43.6	98.0
2006	145	91.0		59	40.7	98.3
2007	173	80.3		70	40.5	95.7
2008	169	68.0		58	34.3	98.3
2009	172	75.0		61	35.5	98.4
2010	188	94.1		45	23.9	95.6
2011	160	69.4		21	13.1	95.2
1998-2011	1648	85.8		605	36.7	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	55	11	81.8	5	9.1
1999	62	16	100.0	7	11.3
2000	48	23	95.7	6	12.5
2001	53	15	100.0	3	5.7
2002	92	29	100.0	11	12.0
2003	93	41	97.6	14	15.1
2004	121	43	100.0	11	9.1
2005	117	54	94.4	20	17.1
2006	145	51	96.1	15	10.3
2007	173	72	97.2	21	12.1
2008	169	83	96.4	23	13.6
2009	172	79	98.7	27	15.7
2010	188	84	97.6	23	12.2
2011	160	66	97.0	14	8.8
1998-2011	1648	667	97.2	200	12.1

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	11	81.8	18.2	66.7
1999	16	87.5	12.5	93.8
2000	23	69.6	30.4	77.3
2001	15	80.0	20.0	86.7
2002	29	86.2	13.8	89.7
2003	41	70.7	29.3	82.5
2004	43	74.4	25.6	79.1
2005	54	70.4	29.6	80.4
2006	51	86.3	13.7	89.8
2007	72	83.3	16.7	84.3
2008	83	86.7	13.3	93.8
2009	79	70.9	29.1	78.2
2010	84	76.2	23.8	78.0
2011	66	83.3	16.7	89.1
1998-2011	667	78.9	21.1	84.1

Table 11a

Means of age at death according to the grouping in Table 10
MALES

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	5	69.0	71.4	59.3	68.5
1999	12	67.8	65.6	78.7	66.3
2000	16	68.4	65.4	81.2	65.4
2001	12	70.1	67.1	84.8	68.5
2002	21	67.2	65.9	92.4	67.1
2003	20	71.5	69.6	75.1	70.6
2004	19	70.2	67.9	73.5	68.5
2005	33	72.6	72.2	74.0	72.8
2006	29	72.2	71.3	77.8	71.3
2007	37	70.0	70.2	69.0	70.2
2008	56	67.9	66.9	76.1	67.2
2009	49	69.4	68.2	72.1	68.1
2010	51	71.3	70.0	76.1	69.8
2011	38	69.4	68.9	72.8	68.1
1998-2011	398	69.9	68.8	74.7	68.9

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 11b

Means of age at death according to the grouping in Table 10
FEMALES

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	6	82.4	81.2	88.1	82.2
1999	4	78.9	78.9		78.9
2000	7	71.1	66.0	75.0	71.6
2001	3	77.4	69.9	92.2	69.9
2002	8	74.1	73.3	75.4	71.6
2003	21	69.8	67.0	78.6	67.7
2004	24	70.6	70.0	74.9	71.2
2005	21	76.7	72.5	83.5	74.0
2006	22	75.5	75.4	75.6	75.7
2007	35	68.3	67.0	73.3	68.3
2008	27	74.4	71.7	86.4	74.2
2009	30	72.3	68.5	82.6	70.5
2010	33	70.7	66.1	82.9	68.9
2011	28	70.6	67.6	81.6	69.6
1998-2011	269	72.3	69.8	80.3	71.3

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 12a

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	4	0.4	0.13	0.2	0.13	0.3	0.15	0.5	0.17
1999	10	0.9	0.31	0.6	0.29	0.8	0.31	1.0	0.33
2000	13	1.1	0.57	0.7	0.58	1.1	0.59	1.2	0.57
2001	10	0.9	0.36	0.5	0.33	0.7	0.34	1.0	0.40
2002	20	1.1	0.39	0.6	0.36	0.9	0.37	1.1	0.40
2003	13	0.7	0.27	0.4	0.25	0.6	0.27	0.8	0.30
2004	11	0.6	0.16	0.3	0.15	0.5	0.17	0.6	0.17
2005	25	1.3	0.38	0.7	0.32	1.0	0.36	1.4	0.41
2006	25	1.3	0.28	0.6	0.24	1.0	0.27	1.4	0.31
2007	32	1.4	0.30	0.7	0.24	1.1	0.26	1.4	0.30
2008	50	2.2	0.59	1.3	0.56	1.8	0.58	2.2	0.60
2009	34	1.5	0.36	0.8	0.33	1.2	0.35	1.4	0.36
2010	40	1.8	0.43	0.9	0.39	1.3	0.41	1.8	0.46
2011	33	1.5	0.37	0.7	0.34	1.1	0.36	1.4	0.37
1998-2011	320	1.3	0.35	0.7	0.32	1.0	0.34	1.3	0.37

Table 12b

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	5	0.4	0.20	0.1	0.08	0.2	0.12	0.4	0.21
1999	4	0.3	0.13	0.1	0.08	0.2	0.09	0.2	0.10
2000	3	0.2	0.12	0.1	0.11	0.2	0.12	0.2	0.10
2001	2	0.2	0.08	0.1	0.08	0.1	0.08	0.2	0.08
2002	5	0.3	0.12	0.1	0.09	0.2	0.10	0.2	0.10
2003	16	0.8	0.36	0.4	0.30	0.6	0.31	0.7	0.33
2004	21	1.1	0.40	0.5	0.29	0.7	0.33	0.9	0.37
2005	13	0.7	0.25	0.3	0.19	0.4	0.21	0.5	0.24
2006	19	0.9	0.35	0.3	0.23	0.5	0.26	0.7	0.32
2007	28	1.2	0.45	0.6	0.39	0.8	0.41	1.0	0.42
2008	22	0.9	0.26	0.4	0.18	0.5	0.21	0.8	0.24
2009	22	0.9	0.29	0.4	0.22	0.6	0.25	0.7	0.25
2010	24	1.0	0.25	0.5	0.22	0.7	0.22	0.9	0.25
2011	22	0.9	0.31	0.4	0.24	0.6	0.27	0.8	0.29
1998-2011	206	0.8	0.28	0.3	0.21	0.5	0.23	0.6	0.26

Table 13

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

Age at death Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
15-19	1	0.2	0.2	1	0.3	0.3			0.0
20-24	0	0.0	0.2			0.3			0.0
25-29	3	0.6	0.8	1	0.3	0.6	2	1.0	1.0
30-34	3	0.6	1.3			0.6	3	1.4	2.4
35-39	7	1.3	2.7	2	0.6	1.2	5	2.4	4.8
40-44	9	1.7	4.4	3	0.9	2.2	6	2.9	7.7
45-49	10	1.9	6.3	3	0.9	3.1	7	3.4	11.1
50-54	31	5.9	12.1	22	6.9	10.0	9	4.3	15.5
55-59	42	8.0	20.1	29	9.0	19.0	13	6.3	21.7
60-64	66	12.5	32.6	45	14.0	33.0	21	10.1	31.9
65-69	93	17.6	50.2	67	20.9	53.9	26	12.6	44.4
70-74	80	15.2	65.3	52	16.2	70.1	28	13.5	58.0
75-79	84	15.9	81.3	51	15.9	86.0	33	15.9	73.9
80-84	61	11.6	92.8	30	9.3	95.3	31	15.0	88.9
85+	38	7.2	100.0	15	4.7	100.0	23	11.1	100.0
All ages	528	100.0		321	100.0		207	100.0	

Included in the statistics are 36.3% multiple primaries in males and 25.7% in females.

Table 14

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

Age at death Years	Males n	Females n	Males Age-spec. mortal.	MI-index	Females Age-spec. mortal.	MI-index	Males Prop.all cancers %	Females Prop.all cancers %
0- 4			0.0		0.0			
5- 9			0.0		0.0			
10-14			0.0		0.0			
15-19	1		0.1	0.25	0.0		2.6	
20-24			0.0		0.0			
25-29	1	2	0.1	0.08	0.1	0.15	1.1	2.0
30-34		3	0.0		0.2	0.14		1.5
35-39	2	5	0.1	0.11	0.2	0.17	0.5	1.1
40-44	3	6	0.1	0.10	0.3	0.19	0.4	0.6
45-49	3	7	0.2	0.06	0.4	0.14	0.2	0.4
50-54	22	9	1.3	0.30	0.5	0.15	0.8	0.3
55-59	29	13	1.9	0.27	0.8	0.20	0.6	0.3
60-64	45	21	3.0	0.28	1.3	0.23	0.6	0.4
65-69	67	26	4.9	0.41	1.7	0.28	0.6	0.4
70-74	52	28	5.0	0.45	2.3	0.30	0.5	0.3
75-79	51	33	7.5	0.50	3.3	0.42	0.5	0.4
80-84	30	31	7.4	0.63	3.9	0.56	0.3	0.3
85+	15	23	5.4	0.83	3.1	0.68	0.2	0.2
All ages	321	207					0.5	0.3
Mortality								
Raw			1.3	0.35	0.8	0.28		
WS			0.7	0.32	0.3	0.21		
ES			1.0	0.34	0.5	0.23		
BRD-S			1.3	0.37	0.6	0.26		
PYLL-70								
per 100,000			6.9		5.4			
ES			6.2		4.7			
AYLL-70			9.0		13.3			

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

Table 15a

Multiple primaries in deaths in period 1998-2011
MALES

Diagnosis		Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C09-C10	Oropharynx	1	0.8	1	100.0				
C15	Oesophagus	1	0.8					1	100.0
C16	Stomach	3	2.3					3	100.0
C17	Small intestine	15	11.6			6	40.0	9	60.0
C18	Colon	13	10.1			11	84.6	2	15.4
C19-C20	Rectum	7	5.4			4	57.1	3	42.9
C21	Anus/canal	1	0.8					1	100.0
C22	Liver	4	3.1			1	25.0	3	75.0
C23-C24	Bile	2	1.6			1	50.0	1	50.0
C25	Pancreas	7	5.4			2	28.6	5	71.4
C32	Larynx	2	1.6	2	100.0				
C33-C34	Lung	9	7.0	2	22.2	2	22.2	5	55.6
C38,C45	Mesothelioma	1	0.8					1	100.0
C43	Malign. melanoma	3	2.3	2	66.7			1	33.3
C44	Skin others	5	3.9	3	60.0			2	40.0
C46,C49	Soft tissue	2	1.6	1	50.0			1	50.0
C50	Breast	1	0.8	1	100.0				
C61	Prostate	26	20.2	19	73.1	3	11.5	4	15.4
C62	Testis	2	1.6	2	100.0				
C64	Kidney	5	3.9	2	40.0	2	40.0	1	20.0
C65	Renal pelvis	2	1.6					2	100.0
C66	Ureter	1	0.8					1	100.0
C67	Bladder	7	5.4	5	71.4			2	28.6
C70-C72	CNS cancer	1	0.8			1	100.0		
C76-C79	CUP	1	0.8			1	100.0		
C82-C85	NHL	4	3.1	1	25.0	1	25.0	2	50.0
C91-C96	Leukaemia	3	2.3					3	100.0
All mult. primaries		129	100.0	41	31.8	35	27.1	53	41.1

Multiple primaries with number of cases n<1 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 15b

Multiple primaries in deaths in period 1998-2011
FEMALES

Diagnosis		Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C15	Oesophagus	1	1.4					1	100.0
C16	Stomach	4	5.4					4	100.0
C17	Small intestine	4	5.4			3	75.0	1	25.0
C18	Colon	8	10.8			3	37.5	5	62.5
C19-C20	Rectum	4	5.4			2	50.0	2	50.0
C25	Pancreas	2	2.7			1	50.0	1	50.0
C33-C34	Lung	7	9.5	3	42.9			4	57.1
C43	Malign. melanoma	2	2.7	2	100.0				
C50	Breast	17	23.0	14	82.4			3	17.6
C51	Vulva	2	2.7	2	100.0				
C54	Corpus uteri	4	5.4	2	50.0	2	50.0		
C56	Ovary	7	9.5	2	28.6	5	71.4		
C64	Kidney	2	2.7	1	50.0			1	50.0
C67	Bladder	3	4.1	3	100.0				
C70-C72	CNS cancer	1	1.4					1	100.0
C73	Thyroid	1	1.4	1	100.0				
C76-C79	CUP	1	1.4					1	100.0
C82-C85	NHL	3	4.1	2	66.7			1	33.3
C91-C96	Leukaemia	1	1.4					1	100.0
All mult. primaries		74	100.0	32	43.2	16	21.6	26	35.1

ICD-10 C44 (Other malignant neoplasms of skin) is not systematically recorded by MCR and therefore not considered for evaluation as a particular primary but at least as a 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	Males n	Females n	Males Age-spec. mortal.	MI-index	Females Age-spec. mortal.	MI-index	Males Prop.all cancers %	Females Prop.all cancers %
0- 4			0.0		0.0			
5- 9			0.0		0.0			
10-14			0.0		0.0			
15-19	1		0.1	0.25	0.0		2.9	
20-24			0.0		0.0			
25-29	1	2	0.1	0.08	0.1	0.17	1.2	2.1
30-34		2	0.0		0.1	0.11		1.1
35-39	2	3	0.1	0.12	0.1	0.11	0.6	0.7
40-44	2	6	0.1	0.07	0.3	0.20	0.3	0.7
45-49	3	6	0.2	0.07	0.3	0.13	0.2	0.4
50-54	22	8	1.3	0.35	0.5	0.15	0.9	0.4
55-59	20	11	1.3	0.23	0.7	0.22	0.4	0.3
60-64	37	20	2.4	0.29	1.2	0.26	0.6	0.4
65-69	55	18	4.0	0.44	1.2	0.28	0.7	0.3
70-74	37	21	3.6	0.44	1.7	0.30	0.4	0.3
75-79	33	22	4.9	0.58	2.2	0.37	0.4	0.3
80-84	19	23	4.7	0.76	2.9	0.52	0.3	0.3
85+	10	16	3.6	0.91	2.2	0.55	0.2	0.2
All ages	242	158					0.4	0.3
Mortality								
Raw			1.0	0.35	0.6	0.26		
WS			0.5	0.31	0.3	0.20		
ES			0.8	0.33	0.4	0.22		
BRD-S			1.0	0.36	0.5	0.24		
PYLL-70								
per 100,000			5.9		4.6			
ES			5.3		3.9			
AYLL-70			9.3		13.6			

* 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	Males n	Females n	Males Age-spec. mortal.	MI-index	Females Age-spec. mortal.	MI-index	Males Prop.all cancers %	Females Prop.all cancers %
0- 4			0.0		0.0			
5- 9			0.0		0.0			
10-14			0.0		0.0			
15-19	1		0.1	0.25	0.0		2.9	
20-24			0.0		0.0			
25-29	1	2	0.1	0.08	0.1	0.17	1.3	2.2
30-34		2	0.0		0.1	0.11		1.2
35-39	2	3	0.1	0.12	0.1	0.12	0.6	0.8
40-44	2	6	0.1	0.07	0.3	0.20	0.3	0.8
45-49	3	5	0.2	0.07	0.3	0.11	0.2	0.4
50-54	22	8	1.3	0.37	0.5	0.16	1.0	0.4
55-59	20	9	1.3	0.24	0.5	0.19	0.5	0.3
60-64	37	19	2.4	0.33	1.2	0.27	0.6	0.5
65-69	49	14	3.6	0.44	0.9	0.24	0.7	0.3
70-74	27	21	2.6	0.36	1.7	0.31	0.4	0.4
75-79	28	21	4.1	0.53	2.1	0.36	0.4	0.3
80-84	19	21	4.7	0.83	2.6	0.49	0.4	0.3
85+	8	15	2.9	0.80	2.0	0.52	0.2	0.2
All ages	219	146					0.5	0.3
Mortality								
Raw			0.9	0.34	0.6	0.25		
WS			0.5	0.31	0.3	0.19		
ES			0.7	0.33	0.4	0.21		
BRD-S			0.9	0.35	0.5	0.23		
PYLL-70								
per 100,000			5.8		4.3			
ES			5.3		3.7			
AYLL-70			9.6		14.2			

* See corresponding tables with multiple primaries.

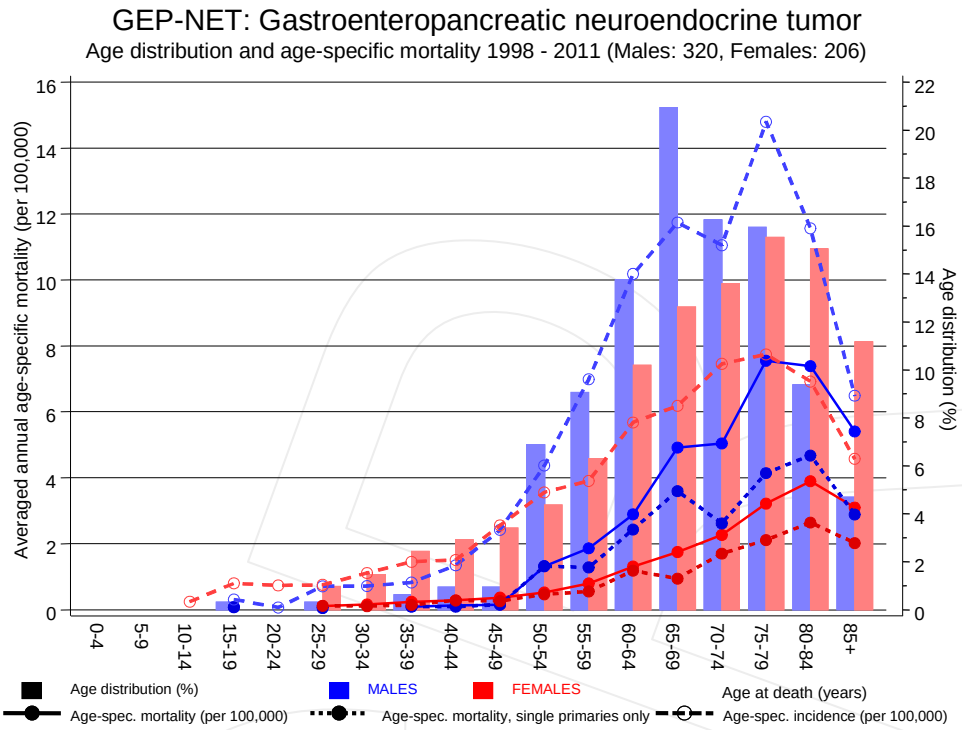
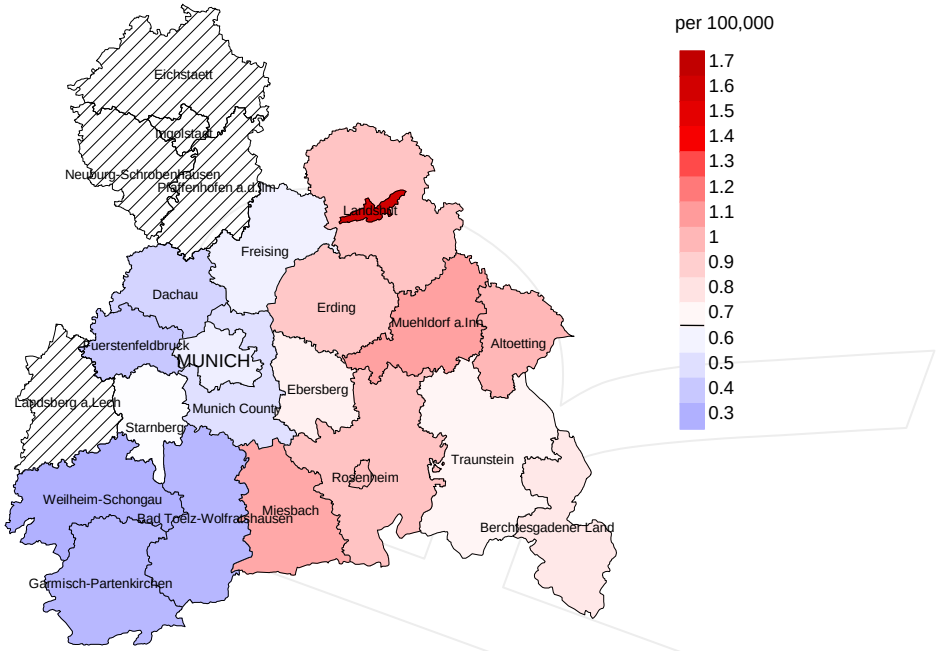


Figure 18. Distribution of age at death (bars) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

The difference between age at diagnosis (Table 3) and age at gastr.ent.pancr. neuroend. tumor-related death (see Table 10) should be considered.

Average mortality (world standard population) 2003 - 2008: Males



Average mortality (world standard population) 2003 - 2008: Females

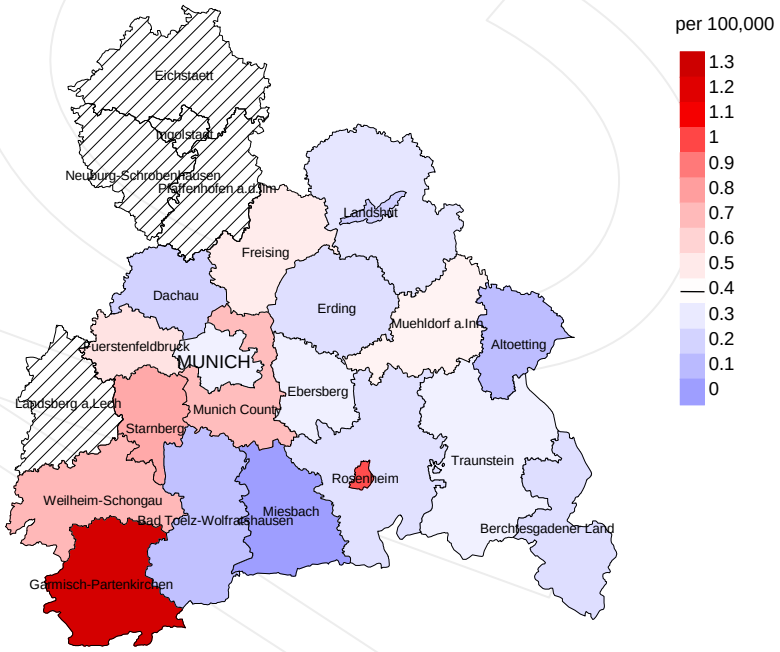
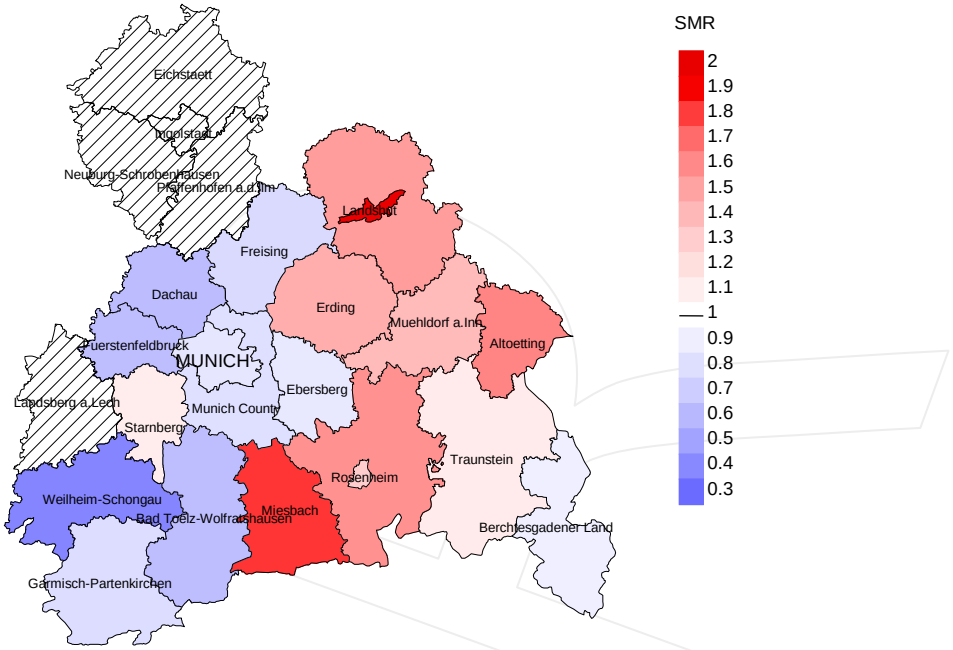


Figure 19a. Map of cancer mortality (world standard population) by county averaged for period 2003 to 2008. According to their individual mortality rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 0.7/100,000 WS N=147, females 0.4/100,000 WS N=113). 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 3 women died from gastr.ent.pancr. neuroend. tumor. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 0.3/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.0 and 1.5/100,000.

Standardized mortality ratio (SMR) 2003 - 2008: Males



Standardized mortality ratio (SMR) 2003 - 2008: Females

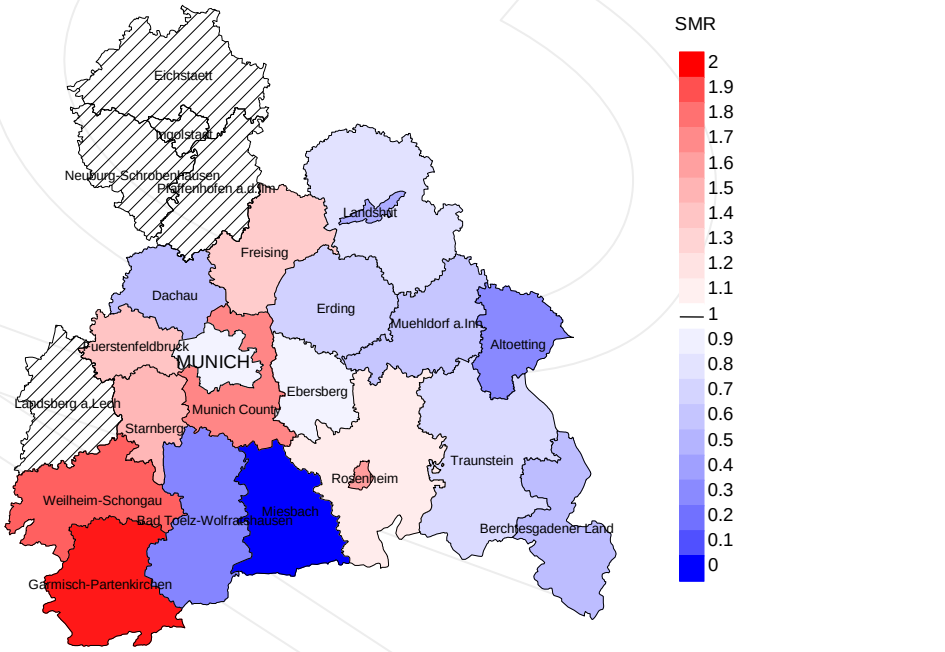


Figure 19b. Map of standardized mortality ratio (SMR, incl. DCO cases) by county averaged for period 2003 to 2008. According to their individual SMR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=147, females N=113). 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 3 women died from gastr.ent.pancr. neuroend. tumor. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 0.91. Though, the value of this parameter may vary with an underlying probability of 99% between 0.10 and 3.34, 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

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