Munich Cancer Registry

- Survival
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- *Deutsch*

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

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

Cancer statistics: Baseline statistics

C09: Tonsil cancer

Year of diagnosis	1998-2013
Patients	1,345
Diseases	1,353
Creation date	05/19/2015
Export date	12/30/2014
Population	4.64 m

http://www.tumorregister-muenchen.de/en/facts/base/base_C09__E.pdf

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

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

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

The foot notes describe the currentness of the data. The baseline statistics and survival data are updated annually. This yearly analysis comprises the Annual Report of the MCR. 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, May 2015

[#] 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 2014 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.

Some remarks regarding this cancer type

As a general rule, these few results from the TRM form the basis of sophisticated analyses. For head and neck tumors this is not the case. Therefore the results for head and neck tumors should be interpreted with caution. In part this is due to problems of classification because of limited specific details of locality. Additionally, with advanced tumors in a close topographic location it is often not possible to determine the exact ICD localization of a tumor.

ICD-10 codes (ICD-10 2015) used for specifying cancer site

Code	Description
C09.-	Malignant neoplasm of tonsil
C09.0	Tonsillar fossa
C09.1	Tonsillar pillar (anterior)(posterior)
C09.8	Overlapping lesion of tonsil
C09.9	Tonsil, unspecified

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	52	3	5.8	21.2	82.7	100.0	
1999	56			17.9	75.0	100.0	
2000	44			25.0	77.3	100.0	
2001	49	1	2.0	34.7	71.4	91.8	
2002	87			29.9	63.2	98.9	#
2003	104	1	1.0	28.8	72.1	97.1	
2004	91	1	1.1	28.6	64.8	98.9	
2005	93	3	3.2	32.3	58.1	97.8	
2006	96			27.1	60.4	95.8	
2007	96	9	9.4	25.0	46.9	89.6	# ##
2008	112	1	0.9	28.6	52.7	76.8	
2009	100	1	1.0	35.0	49.0	78.0	
2010	111	1	0.9	18.9	41.4	69.4	
2011	96			31.3	32.3	72.9	
2012	117	3	2.6	18.8	29.1	77.8	
2013	49	2	4.1	28.6	30.6	100.0	###
1998-2013	1353	26	1.9	27.0	54.2	88.2	

\# 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	52	40	12	76.9
1999	56	44	12	78.6
2000	44	33	11	75.0
2001	49	40	9	81.6
2002	87	72	15	82.8
2003	104	72	32	69.2
2004	91	77	14	84.6
2005	93	67	26	72.0
2006	96	69	27	71.9
2007	96	76	20	79.2
2008	112	75	37	67.0
2009	100	73	27	73.0
2010	111	84	27	75.7
2011	96	73	23	76.0
2012	117	88	29	75.2
2013	49	35	14	71.4
1998-2013	1353	1018	335	75.2

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 4.64 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	40	12	3.6	1.0	2.6	0.6	3.3	0.9	3.4	0.9
1999	44	12	3.9	1.0	2.7	0.5	3.6	0.7	3.9	0.9
2000	33	11	2.9	0.9	1.8	0.5	2.6	0.8	3.0	0.8
2001	40	9	3.5	0.7	2.2	0.5	3.1	0.7	3.4	0.7
2002	72	15	3.9	0.8	2.5	0.5	3.5	0.6	3.7	0.7
2003	72	32	3.8	1.6	2.5	0.9	3.5	1.3	3.8	1.5
2004	77	14	4.1	0.7	2.7	0.4	3.6	0.5	4.0	0.6
2005	67	26	3.5	1.3	2.3	0.8	3.1	1.1	3.3	1.2
2006	69	27	3.6	1.3	2.3	0.9	3.2	1.2	3.5	1.3
2007	76	20	3.4	0.9	2.1	0.5	3.0	0.7	3.3	0.8
2008	75	37	3.4	1.6	2.0	0.8	2.9	1.1	3.3	1.3
2009	73	27	3.3	1.2	2.0	0.7	2.8	0.9	3.1	1.0
2010	84	27	3.7	1.2	2.2	0.7	3.1	1.0	3.4	1.0
2011	73	23	3.2	1.0	1.9	0.6	2.6	0.8	2.9	0.9
2012	88	29	3.9	1.2	2.4	0.7	3.2	1.0	3.6	1.1
2013	35	14	1.5	0.6	1.0	0.3	1.3	0.5	1.4	0.5
1998-2013	1018	335	3.4	1.1	2.2	0.6	3.0	0.9	3.3	1.0

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	52	54.8	12.6	0.9	83.1	41.3	49.3	55.2	60.2	69.2
1999	56	60.2	11.4	37.1	91.7	47.1	52.3	59.1	65.8	75.2
2000	44	62.2	9.7	49.0	89.6	51.6	55.5	59.5	69.4	75.5
2001	49	59.3	10.0	41.3	88.3	46.7	53.0	57.9	64.8	74.5
2002	87	59.2	10.1	37.3	96.8	46.8	52.9	59.2	62.9	74.5
2003	104	60.7	9.9	41.4	87.5	49.7	53.8	58.7	66.0	75.0
2004	91	59.4	10.5	38.3	85.1	47.0	51.8	58.3	65.0	74.9
2005	93	61.1	9.6	41.9	103	50.6	54.0	60.9	65.7	71.2
2006	96	60.4	10.4	41.2	90.3	47.2	52.6	59.2	66.7	72.7
2007	96	61.2	11.6	39.1	91.6	47.7	52.3	61.0	69.2	77.6
2008	112	63.8	10.2	45.2	91.8	50.1	57.5	62.4	69.2	77.1
2009	100	63.0	11.4	40.8	95.5	50.0	54.2	61.8	69.6	79.7
2010	111	62.1	9.1	37.1	85.1	50.5	55.0	62.0	68.6	73.1
2011	96	62.0	10.0	44.9	91.7	49.9	53.9	60.8	69.0	75.2
2012	117	62.1	9.7	42.3	91.1	49.3	54.9	61.7	68.4	75.9
2013	49	61.6	9.7	33.2	85.7	52.3	55.3	61.6	67.4	73.5
1998-2013	1353	61.1	10.4	0.9	103	48.8	53.6	60.2	67.4	75.0

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	40	53.8	13.3	0.9	81.1	40.6	47.8	55.2	61.3	69.8
1999	44	57.6	10.3	37.1	85.7	46.4	50.4	55.6	63.9	68.2
2000	33	62.8	10.1	49.0	89.6	51.6	55.8	61.9	69.6	75.5
2001	40	59.1	8.6	42.0	81.2	48.8	53.8	58.1	64.7	70.0
2002	72	59.1	9.3	41.7	96.8	47.4	53.5	59.2	62.9	69.5
2003	72	59.5	9.3	41.4	87.5	49.3	53.6	58.4	64.8	73.5
2004	77	58.4	10.0	38.3	85.1	45.4	51.2	57.2	64.3	73.0
2005	67	60.8	7.6	41.9	79.5	51.6	55.6	61.5	65.6	70.4
2006	69	60.8	10.1	42.5	86.7	47.6	52.7	59.1	67.7	74.7
2007	76	60.7	11.2	39.1	91.6	47.2	52.3	61.0	69.2	75.7
2008	75	62.5	9.8	45.2	87.0	49.9	56.4	61.1	68.8	76.3
2009	73	63.0	10.4	40.8	90.7	50.9	54.8	62.9	69.4	75.7
2010	84	62.7	8.9	43.5	81.9	51.4	55.6	62.4	69.0	73.6
2011	73	62.2	10.2	44.9	89.2	49.8	53.6	61.1	69.4	75.2
2012	88	61.1	9.3	42.3	81.5	49.3	53.9	61.2	66.8	73.9
2013	35	61.4	8.7	33.2	82.4	53.2	55.6	61.6	67.2	70.7
1998-2013	1018	60.6	10.0	0.9	96.8	48.7	53.6	60.0	66.8	73.9

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	12	58.0	9.4	50.7	83.1	50.8	52.3	55.0	58.3	69.2
1999	12	69.4	11.2	52.1	91.7	57.2	60.1	69.9	74.9	82.4
2000	11	60.4	8.7	51.1	77.0	51.6	53.4	58.0	65.0	74.9
2001	9	59.9	15.3	41.3	88.3	41.3	49.6	53.6	73.0	88.3
2002	15	59.5	13.7	37.3	80.8	46.8	48.1	56.1	77.7	78.9
2003	32	63.4	10.8	43.7	84.2	52.6	56.4	61.3	72.0	81.3
2004	14	64.9	11.6	44.7	82.5	50.9	56.0	64.3	75.7	80.5
2005	26	61.9	13.7	44.9	103	48.0	52.6	59.3	67.0	81.2
2006	27	59.4	11.3	41.2	90.3	45.4	51.8	59.4	62.6	72.5
2007	20	63.0	13.1	44.2	89.4	48.2	52.5	60.8	69.9	84.2
2008	37	66.3	10.6	45.9	91.8	52.6	61.2	66.3	70.3	81.4
2009	27	62.9	14.2	43.2	95.5	47.6	53.8	58.7	71.1	85.9
2010	27	60.3	9.6	37.1	85.1	49.5	53.4	59.6	67.4	69.6
2011	23	61.4	9.6	49.9	91.7	51.9	54.7	58.6	64.9	70.9
2012	29	65.0	10.5	44.0	91.1	51.5	58.2	64.7	69.5	78.7
2013	14	62.3	12.3	44.7	85.7	45.0	53.2	61.2	69.5	78.5
1998-2013	335	62.6	11.6	37.1	103	49.5	53.9	61.1	69.3	80.5

Table 4

Age distribution by 5-year age group and gender for period 1998-2013 (incl. DCO)

Age at diagnosis Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
0-4	1	0.1	0.1	1	0.1	0.1			0.0
5-9	0	0.0	0.1			0.1			0.0
10-14	0	0.0	0.1			0.1			0.0
15-19	0	0.0	0.1			0.1			0.0
20-24	0	0.0	0.1			0.1			0.0
25-29	0	0.0	0.1			0.1			0.0
30-34	2	0.1	0.2	2	0.2	0.3			0.0
35-39	5	0.4	0.6	3	0.3	0.6	2	0.6	0.6
40-44	50	3.7	4.3	38	3.7	4.3	12	3.6	4.2
45-49	124	9.2	13.5	98	9.6	13.9	26	7.8	11.9
50-54	224	16.6	30.0	170	16.7	30.6	54	16.1	28.1
55-59	260	19.2	49.2	197	19.4	50.0	63	18.8	46.9
60-64	257	19.0	68.2	202	19.8	69.8	55	16.4	63.3
65-69	180	13.3	81.5	133	13.1	82.9	47	14.0	77.3
70-74	114	8.4	89.9	91	8.9	91.8	23	6.9	84.2
75-79	65	4.8	94.8	46	4.5	96.4	19	5.7	89.9
80-84	44	3.3	98.0	24	2.4	98.7	20	6.0	95.8
85+	27	2.0	100.0	13	1.3	100.0	14	4.2	100.0
All ages	1353	100.0		1018	100.0		335	100.0	

Included in the statistics are 34.3% multiple primaries in males and 31.6% in females.

Table 5

Age-specific incidence, DCO rate and proportion of all cancers
for period 1998-2013

Age at diagnosis Years	Males n	Females n	Males Age-spec. incid.	Females Age-spec. incid.	Males DCO rate n=18 %	Females DCO rate n=8 %	Males Prop.all cancers n=158258 %	Females Prop.all cancers n=153136 %
0- 4	1		0.1	0.0	100.0		0.3	
5- 9			0.0	0.0				
10-14			0.0	0.0				
15-19			0.0	0.0				
20-24			0.0	0.0				
25-29			0.0	0.0				
30-34	2		0.1	0.0			0.1	
35-39	3	2	0.1	0.1			0.1	0.1
40-44	38	12	1.4	0.5		8.3	1.2	0.2
45-49	97	25	4.1	1.1			1.8	0.3
50-54	170	53	8.4	2.6	0.6		2.0	0.5
55-59	196	63	10.7	3.3			1.4	0.5
60-64	200	54	11.3	2.9	2.0	1.9	0.9	0.3
65-69	132	47	8.4	2.7	3.0		0.5	0.2
70-74	91	23	7.1	1.5	2.2	4.3	0.3	0.1
75-79	46	19	5.6	1.6	6.5		0.2	0.1
80-84	24	20	4.8	2.1	8.3	10.0	0.2	0.1
85+	13	14	3.8	1.6	7.7	21.4	0.1	0.1
All ages	1013	332			1.8	2.4	0.6	0.2
Incidence								
Raw			3.4	1.1				
WS			2.1	0.6				
ES			2.9	0.9				
BRD-S			3.2	0.9				

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 1998-2013
MALES

Diagnosis	Observed n	Expected n	SIR	LCL 95%	UCL 95%		EAR	DCO %
C03-C06 Oral cavity	13	0.4	32.8	17.5	56.1	#	49.3	7.7
C09-C10 Oropharynx	4	0.5	7.8	2.1	20.0	#	13.6	
C12-C13 Hypopharynx	9	0.3	32.0	14.6	60.7	#	34.1	
C15 Oesophagus	14	0.7	20.8	11.3	34.8	#	52.1	7.1
C16 Stomach	4	1.2	3.5	0.9	8.9		11.1	25.0
C18 Colon	4	2.8	1.4	0.4	3.7		4.8	
C22 Liver	6	0.9	6.8	2.5	14.9	#	20.0	16.7
C25 Pancreas	3	1.1	2.8	0.6	8.2		7.6	33.3
C32 Larynx	13	0.4	31.5	16.8	53.9	#	49.2	15.4
C33-C34 Lung	26	3.8	6.8	4.4	9.9	#	86.7	7.7
C43 Malign. melanoma	2	1.4	1.4	0.2	5.2		2.3	
C61 Prostate	10	9.2	1.1	0.5	2.0		3.1	
C64 Kidney	3	1.2	2.5	0.5	7.3		7.1	
C67 Bladder	2	1.2	1.7	0.2	6.2		3.3	50.0
C73 Thyroid	2	0.3	6.9	0.8	24.9		6.7	
Other primaries	7	3.1	2.3	0.9	4.6		15.2	14.3
Not observed	0	3.6	0.0	0.0	1.0		-14.1	
All mult. primaries	122	32.0	3.8	3.2	4.6	#	352.0	9.0

Patients	719
Median age at second malignancy (years)	61.9
Person-years	2557
Mean observation time (years)	3.6
Median observation time (years)	2.3

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 1998-2013
FEMALES

Diagnosis	Observed n	Expected n	SIR	LCL 95%	UCL 95%		EAR	DCO %
C03-C06 Oral cavity	3	0.1	45.9	9.5	134.3	#	30.7	
C09-C10 Oropharynx	3	0.1	57.8	11.9	169.0	#	30.9	
C12-C13 Hypopharynx	3	0.0	212.5	43.8	621.0	#	31.3	
C15 Oesophagus	3	0.1	50.0	10.3	146.1	#	30.8	
C18 Colon	4	0.8	4.9	1.3	12.4	#	33.3	
C32 Larynx	2	0.0	94.4	11.4	340.9	#	20.7	
C33-C34 Lung	6	0.7	8.4	3.1	18.3	#	55.3	
C50 Breast	2	3.2	0.6	0.1	2.3		-12.4	
C53 Cervix uteri	2	0.1	14.0	1.7	50.4	#	19.4	
C56 Ovary	2	0.4	5.1	0.6	18.5		16.9	50.0
Other primaries	6	1.4	4.4	1.6	9.5	#	48.5	16.7
Not observed	0	2.7	0.0	0.0	1.4		-28.1	
All mult. primaries	36	9.5	3.8	2.6	5.2	#	277.3	5.6

Patients	237
Median age at second malignancy (years)	62.2
Person-years	955
Mean observation time (years)	4.0
Median observation time (years)	2.9

The occurrence of second malignancy is statistically significant.

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

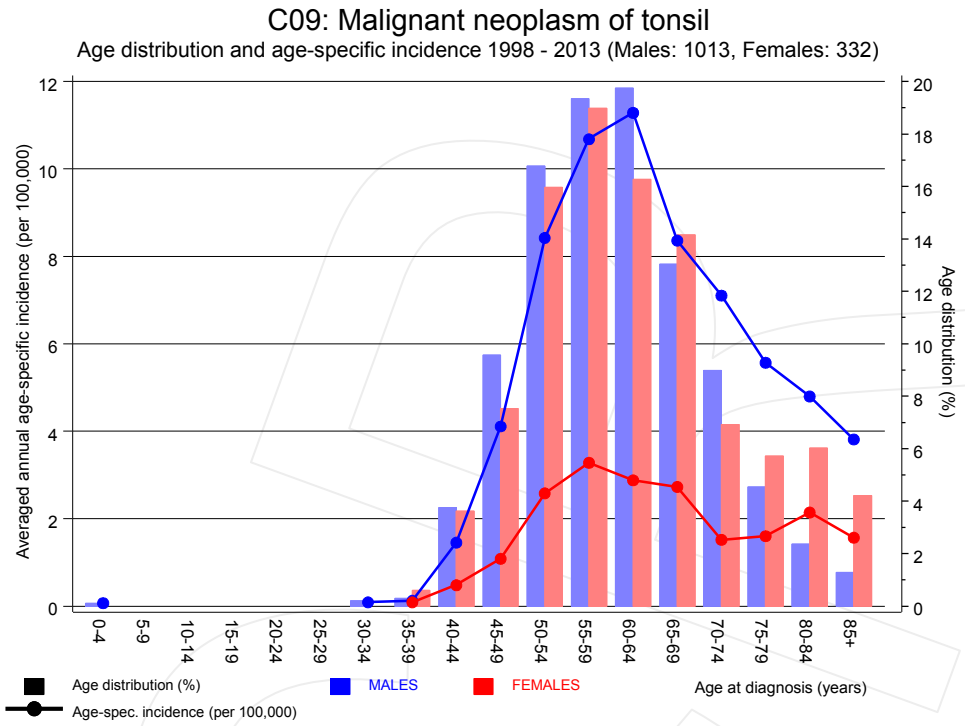


Figure 7. Age distribution and age-specific incidence

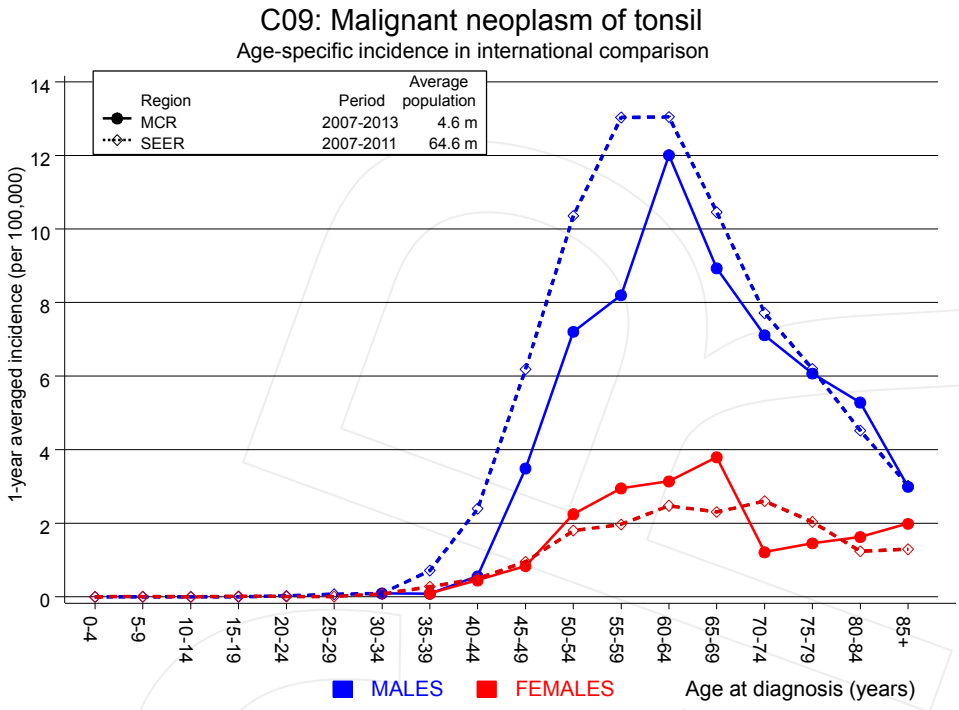


Figure 7a. Age-specific incidence in MCR registry areas compared to SEER (Surveillance, Epidemiology, and End Results, USA).

Reference:

Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Incidence - SEER 18 Regs Research Data, released April 2014, based on the November 2013 submission. http://www.seer.cancer.gov.

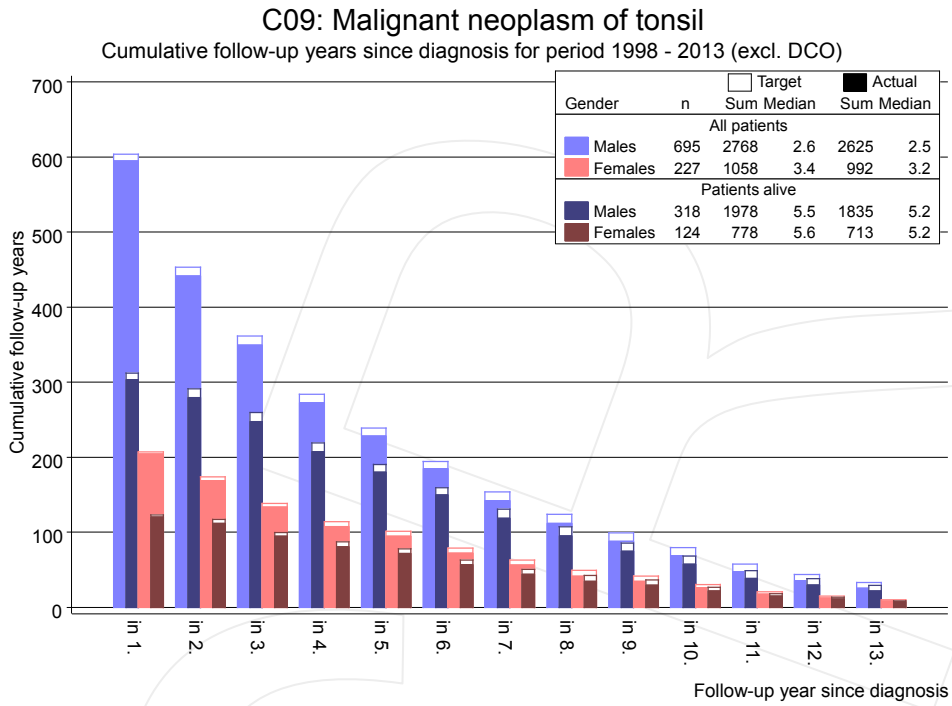
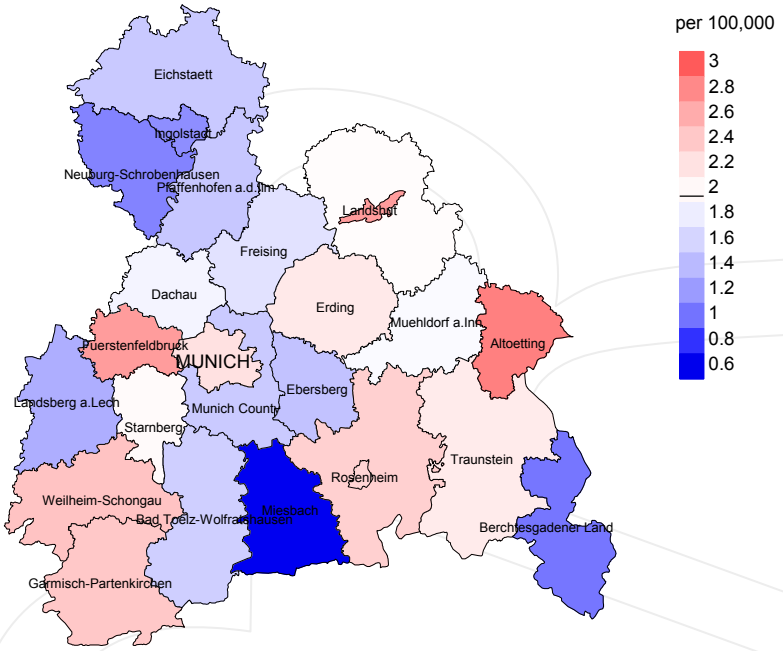


Figure 8. Cumulative follow-up years depending on time since diagnosis

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) 2007 - 2013: Males



Average incidence (world standard population) 2007 - 2013: Females

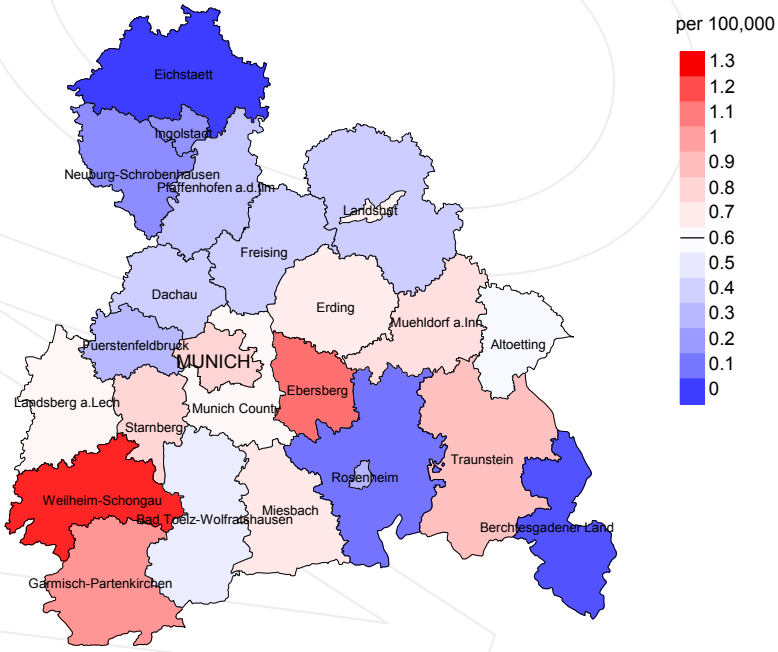
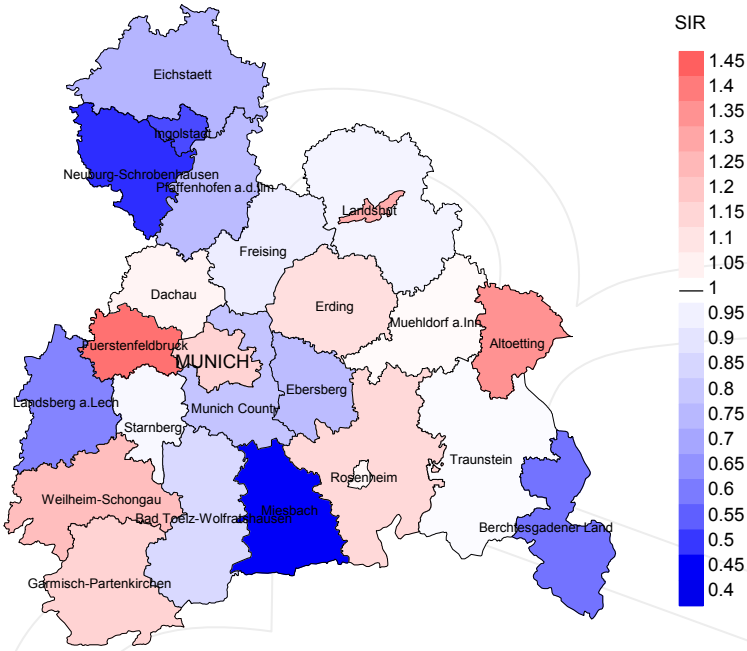


Figure 9a. Map of cancer incidence (world standard population, incl. DCO cases) by county averaged for period 2007 to 2013. According to their individual incidence rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 2.0/100,000 WS N=501, females 0.6/100,000 WS N=174).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 64,928 female residents (averaged) in the period from 2007 to 2013 a total of 8 women were identified with newly diagnosed tonsil cancer. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 1.1/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.3 and 2.7/100,000.

Standardized incidence ratio (SIR) 2007 - 2013: Males



Standardized incidence ratio (SIR) 2007 - 2013: Females

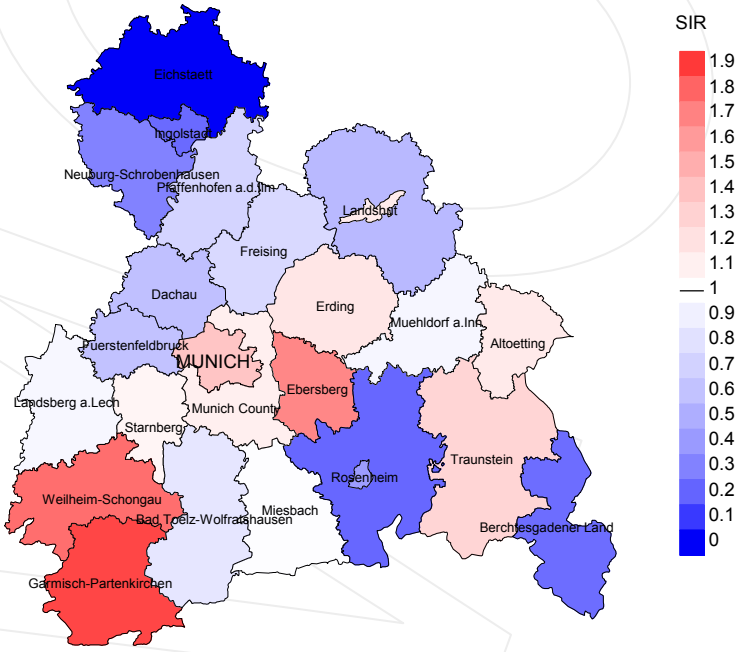


Figure 9b. Map of standardized incidence ratio (SIR, incl. DCO cases) by county averaged for period 2007 to 2013. According to their individual SIR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=501, females N=174).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 64,642 female residents (averaged) in the period from 2007 to 2013 a total of 8 women were identified with newly diagnosed tonsil cancer. Therefore, the mean standardized incidence ratio (SIR) for this cancer type in this area can be calculated at 1.68. Though, the value of this parameter may vary with an underlying probability of 99% between 0.54 and 3.90, 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 4.64 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	52	100.0	5.8	43	82.7	95.3
1999	56	100.0		42	75.0	78.6
2000	44	100.0		34	77.3	100.0
2001	49	91.8	2.0	35	71.4	91.4
2002	87	98.9		55	63.2	96.4
2003	104	97.1	1.0	75	72.1	96.0
2004	91	98.9	1.1	59	64.8	98.3
2005	93	97.8	3.2	54	58.1	98.1
2006	96	95.8		58	60.4	98.3
2007	96	89.6	9.4	45	46.9	95.6
2008	112	76.8	0.9	59	52.7	93.2
2009	100	78.0	1.0	49	49.0	95.9
2010	111	69.4	0.9	46	41.4	100.0
2011	96	72.9		31	32.3	90.3
2012	117	77.8	2.6	34	29.1	97.1
2013	49	100.0	4.1	15	30.6	73.3
1998-2013	1353	88.2	1.9	734	54.2	94.8

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 4.64 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	52	42	90.5	10	19.2
1999	56	38	78.9	10	17.9
2000	44	31	93.5	4	9.1
2001	49	33	97.0	12	24.5
2002	87	54	96.3	8	9.2
2003	104	60	96.7	16	15.4
2004	91	70	97.1	8	8.8
2005	93	66	95.5	15	16.1
2006	96	59	96.6	10	10.4
2007	96	71	98.6	16	16.7
2008	112	66	100.0	11	9.8
2009	100	63	98.4	14	14.0
2010	111	64	98.4	10	9.0
2011	96	64	98.4	11	11.5
2012	117	72	97.2	12	10.3
2013	49	79	96.2	8	16.3
1998-2013	1353	932	96.2	175	12.9

Table 10c

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 2.51 to 3.96 m as of 2002, and from 3.96 to 4.64 m as of 2007, respectively)

Year of death	Deaths n	Prop. cancer-related %	Prop. non-cancer-related %	Prop. cancer recorded on death certificate %
1998	42	73.8	26.2	89.5
1999	38	55.3	44.7	83.3
2000	31	83.9	16.1	93.1
2001	33	78.8	21.2	93.8
2002	54	72.2	27.8	80.8
2003	60	76.7	23.3	93.1
2004	70	84.3	15.7	92.6
2005	66	89.4	10.6	95.2
2006	59	78.0	22.0	86.0
2007	71	81.7	18.3	88.6
2008	66	68.2	31.8	77.3
2009	63	81.0	19.0	98.4
2010	64	75.0	25.0	88.9
2011	64	70.3	29.7	82.5
2012	72	83.3	16.7	88.6
2013	79	69.6	30.4	82.9
1998-2013	932	76.7	23.3	88.2

Table 11a

Medians 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 (non-cancer-related) Years	Age at death (according to death certificate) Years
1998	33	60.0	57.7	75.3	57.9
1999	28	62.9	59.9	70.6	59.9
2000	22	59.8	59.8	60.9	59.8
2001	26	62.7	62.2	67.6	64.2
2002	46	62.1	60.8	71.8	60.8
2003	48	61.9	61.6	62.3	61.4
2004	55	60.1	59.8	60.7	59.9
2005	54	62.3	61.8	63.9	61.9
2006	46	64.5	64.9	63.7	64.9
2007	63	65.4	60.7	77.3	62.5
2008	46	68.1	67.8	69.2	67.8
2009	49	61.7	60.2	67.2	61.7
2010	47	63.9	63.8	70.8	63.8
2011	51	68.3	62.4	73.0	64.1
2012	50	68.6	68.8	65.6	67.6
2013	57	65.7	62.9	67.9	63.7
1998-2013	721	63.4	62.1	68.6	62.5

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

Medians 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 (non-cancer-related) Years	Age at death (according to death certificate) Years
1998	9	72.7	71.3	77.9	72.7
1999	10	58.9	58.4	78.0	55.9
2000	9	70.7	65.1	74.0	70.7
2001	7	66.2	63.4	69.4	64.8
2002	8	66.0	66.0	65.6	73.4
2003	12	61.2	59.9	75.6	61.7
2004	15	73.8	73.8	67.3	71.5
2005	12	61.8	60.3	65.9	60.3
2006	13	72.8	70.5	75.1	72.8
2007	8	63.6	65.9	58.2	63.6
2008	20	67.6	67.4	79.1	67.4
2009	14	69.5	69.5	72.0	69.0
2010	17	64.5	61.9	71.1	64.1
2011	13	67.4	65.3	82.4	65.3
2012	22	70.6	65.9	77.6	65.9
2013	22	71.1	69.7	72.6	69.9
1998-2013	211	67.8	66.6	73.8	66.9

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	26	2.3	0.65	1.7	0.67	2.2	0.67	2.3	0.66
1999	18	1.6	0.41	1.0	0.38	1.4	0.39	1.7	0.43
2000	18	1.6	0.55	1.0	0.53	1.4	0.53	1.6	0.52
2001	21	1.8	0.53	1.2	0.52	1.6	0.51	1.9	0.55
2002	35	1.9	0.49	1.2	0.47	1.7	0.48	1.9	0.53
2003	39	2.1	0.54	1.3	0.51	1.8	0.52	2.1	0.55
2004	46	2.4	0.61	1.6	0.60	2.2	0.61	2.4	0.61
2005	48	2.5	0.73	1.6	0.70	2.2	0.71	2.4	0.74
2006	38	2.0	0.55	1.2	0.52	1.7	0.52	1.8	0.53
2007	51	2.3	0.67	1.4	0.65	2.0	0.67	2.2	0.67
2008	32	1.4	0.43	0.8	0.40	1.2	0.40	1.3	0.41
2009	42	1.9	0.58	1.2	0.59	1.6	0.59	1.8	0.58
2010	38	1.7	0.45	1.0	0.44	1.4	0.45	1.6	0.48
2011	37	1.6	0.52	0.9	0.49	1.3	0.51	1.5	0.54
2012	41	1.8	0.47	0.9	0.40	1.4	0.44	1.8	0.49
2013	41	1.8	1.21	1.0	1.04	1.4	1.11	1.6	1.16
1998-2013	571	1.9	0.56	1.2	0.54	1.6	0.55	1.8	0.57

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	0.42	0.2	0.29	0.3	0.31	0.4	0.41
1999	3	0.3	0.25	0.2	0.33	0.2	0.30	0.2	0.27
2000	8	0.7	0.73	0.4	0.67	0.5	0.67	0.6	0.77
2001	5	0.4	0.56	0.2	0.47	0.3	0.47	0.3	0.45
2002	4	0.2	0.27	0.1	0.22	0.2	0.25	0.2	0.23
2003	7	0.4	0.22	0.2	0.21	0.3	0.22	0.3	0.22
2004	13	0.7	0.93	0.3	0.80	0.4	0.81	0.6	0.91
2005	11	0.6	0.42	0.3	0.44	0.5	0.44	0.5	0.43
2006	8	0.4	0.30	0.2	0.21	0.3	0.23	0.3	0.27
2007	7	0.3	0.37	0.1	0.31	0.2	0.32	0.3	0.35
2008	13	0.6	0.35	0.3	0.32	0.4	0.33	0.4	0.32
2009	10	0.4	0.37	0.2	0.31	0.3	0.31	0.3	0.32
2010	10	0.4	0.38	0.2	0.35	0.3	0.37	0.4	0.39
2011	8	0.3	0.36	0.2	0.30	0.2	0.31	0.3	0.33
2012	19	0.8	0.66	0.4	0.58	0.6	0.60	0.6	0.60
2013	14	0.6	1.00	0.3	0.77	0.4	0.81	0.5	0.95
1998-2013	145	0.5	0.44	0.2	0.38	0.3	0.40	0.4	0.42

Table 13

Age distribution of age at death (cancer-related) for period 1998-2013
(**incl. multiple primaries**)

Age at death Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
0-4	1	0.1	0.1	1	0.2	0.2			0.0
5-9	0	0.0	0.1			0.2			0.0
10-14	0	0.0	0.1			0.2			0.0
15-19	0	0.0	0.1			0.2			0.0
20-24	0	0.0	0.1			0.2			0.0
25-29	0	0.0	0.1			0.2			0.0
30-34	0	0.0	0.1			0.2			0.0
35-39	2	0.3	0.4	2	0.3	0.5			0.0
40-44	19	2.6	3.1	17	3.0	3.5	2	1.4	1.4
45-49	39	5.4	8.5	33	5.7	9.2	6	4.1	5.5
50-54	89	12.4	20.8	78	13.6	22.8	11	7.6	13.1
55-59	141	19.6	40.4	112	19.5	42.3	29	20.0	33.1
60-64	130	18.1	58.5	109	19.0	61.2	21	14.5	47.6
65-69	107	14.9	73.3	86	15.0	76.2	21	14.5	62.1
70-74	76	10.6	83.9	59	10.3	86.4	17	11.7	73.8
75-79	53	7.4	91.3	39	6.8	93.2	14	9.7	83.4
80-84	33	4.6	95.8	24	4.2	97.4	9	6.2	89.7
85+	30	4.2	100.0	15	2.6	100.0	15	10.3	100.0
All ages	720	100.0		575	100.0		145	100.0	

Included in the statistics are 34.3% multiple primaries in males and 31.6% in females.

Table 14

Age-specific mortality (cancer-related) and proportion of all cancers
for period 1998-2013
(**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	1		0.1	1.00	0.0		3.0	
5- 9			0.0		0.0			
10-14			0.0		0.0			
15-19			0.0		0.0			
20-24			0.0		0.0			
25-29			0.0		0.0			
30-34			0.0		0.0			
35-39	2		0.1	0.67	0.0		0.5	
40-44	17	2	0.6	0.45	0.1	0.17	2.0	0.2
45-49	33	6	1.4	0.34	0.3	0.23	1.8	0.3
50-54	78	11	3.9	0.46	0.5	0.20	2.4	0.4
55-59	112	29	6.1	0.57	1.5	0.46	1.9	0.6
60-64	109	21	6.1	0.54	1.1	0.38	1.2	0.3
65-69	86	21	5.4	0.65	1.2	0.45	0.7	0.3
70-74	59	17	4.6	0.65	1.1	0.74	0.4	0.2
75-79	39	14	4.7	0.85	1.2	0.74	0.3	0.1
80-84	24	9	4.8	1.00	1.0	0.45	0.2	0.1
85+	15	15	4.4	1.15	1.7	1.07	0.2	0.1
All ages	575	145					0.7	0.2
Mortality								
Raw			1.9	0.56	0.5	0.43		
WS			1.2	0.54	0.2	0.38		
ES			1.6	0.55	0.3	0.39		
BRD-S			1.9	0.57	0.4	0.41		
PYLL-70								
per 100,000			19.2		3.6			
ES			17.4		3.1			
AYLL-70			11.7		10.6			

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

Table 15a

Multiple primaries in deaths in period 1998-2013
MALES

Diagnosis	Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C03-C06 Oral cavity	38	13.5	15	39.5	6	15.8	17	44.7
C09-C10 Oropharynx	15	5.3			7	46.7	8	53.3
C12-C13 Hypopharynx	24	8.5	8	33.3	13	54.2	3	12.5
C15 Oesophagus	27	9.6	7	25.9	2	7.4	18	66.7
C16 Stomach	7	2.5	2	28.6	2	28.6	3	42.9
C18 Colon	9	3.2	4	44.4	1	11.1	4	44.4
C22 Liver	10	3.5			2	20.0	8	80.0
C25 Pancreas	6	2.1					6	100.0
C32 Larynx	28	9.9	9	32.1	8	28.6	11	39.3
C33-C34 Lung	49	17.4	10	20.4	7	14.3	32	65.3
C43 Malign. melanoma	4	1.4	1	25.0			3	75.0
C44 Skin others	12	4.3	3	25.0	2	16.7	7	58.3
C61 Prostate	15	5.3	9	60.0	1	6.7	5	33.3
C64 Kidney	5	1.8	2	40.0	1	20.0	2	40.0
C67 Bladder	6	2.1	4	66.7			2	33.3
C73 Thyroid	3	1.1	1	33.3			2	66.7
C76-C79 CUP	4	1.4	2	50.0			2	50.0
C82-C85 NHL	3	1.1	1	33.3			2	66.7
Other primaries	17	6.0	6	35.3	1	5.9	10	58.8
All mult. primaries	282	100.0	84	29.8	53	18.8	145	51.4

Multiple primaries with number of cases 1 to 2 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 1998-2013
FEMALES

Diagnosis	Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C03-C06 Oral cavity	13	16.5	6	46.2	1	7.7	6	46.2
C09-C10 Oropharynx	3	3.8			1	33.3	2	66.7
C12-C13 Hypopharynx	1	1.3					1	100.0
C14 ENT cancer	1	1.3					1	100.0
C15 Oesophagus	4	5.1	1	25.0	1	25.0	2	50.0
C18 Colon	5	6.3	3	60.0	1	20.0	1	20.0
C21 Anus/canal	2	2.5	1	50.0			1	50.0
C22 Liver	1	1.3					1	100.0
C26 GI cancer	1	1.3					1	100.0
C30-C31 Sinuses	1	1.3					1	100.0
C32 Larynx	4	5.1	1	25.0			3	75.0
C33-C34 Lung	8	10.1	1	12.5			7	87.5
C44 Skin others	3	3.8					3	100.0
C50 Breast	11	13.9	9	81.8			2	18.2
C53 Cervix uteri	5	6.3	4	80.0			1	20.0
C54 Corpus uteri	2	2.5	2	100.0				
C56 Ovary	1	1.3					1	100.0
C67 Bladder	1	1.3					1	100.0
C68 Urethra	1	1.3	1	100.0				
C70-C72 CNS cancer	1	1.3					1	100.0
C76-C79 CUP	7	8.9	4	57.1			3	42.9
C82-C85 NHL	2	2.5	1	50.0			1	50.0
C91-C96 Leukaemia	1	1.3					1	100.0
All mult. primaries	79	100.0	34	43.0	4	5.1	41	51.9

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 1998-2013
(**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			0.0		0.0			
20-24			0.0		0.0			
25-29			0.0		0.0			
30-34			0.0		0.0			
35-39	2		0.1	1.00	0.0		0.5	
40-44	14	2	0.5	0.41	0.1	0.17	1.8	0.2
45-49	28	6	1.2	0.32	0.3	0.27	1.7	0.3
50-54	64	9	3.2	0.43	0.4	0.20	2.2	0.3
55-59	91	24	5.0	0.57	1.2	0.48	1.8	0.6
60-64	81	14	4.6	0.51	0.7	0.30	1.1	0.3
65-69	63	18	4.0	0.61	1.0	0.47	0.7	0.3
70-74	48	13	3.7	0.73	0.9	0.72	0.4	0.2
75-79	26	9	3.1	0.74	0.8	0.69	0.3	0.1
80-84	19	5	3.8	1.06	0.5	0.29	0.2	0.1
85+	12	11	3.5	1.09	1.2	0.92	0.2	0.1
All ages	448	111					0.7	0.2
Mortality								
Raw			1.5	0.54	0.4	0.40		
WS			0.9	0.52	0.2	0.36		
ES			1.3	0.53	0.3	0.37		
BRD-S			1.4	0.55	0.3	0.38		
PYLL-70								
per 100,000			15.3		3.0			
ES			13.8		2.6			
AYLL-70			12.0		10.9			

* See corresponding tables with multiple primaries.

Table 17

Age-specific mortality (cancer-related) and proportion of all cancers
for period 1998-2013
(**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			0.0		0.0			
20-24			0.0		0.0			
25-29			0.0		0.0			
30-34			0.0		0.0			
35-39	2		0.1	1.00	0.0		0.6	
40-44	13	2	0.5	0.43	0.1	0.20	1.7	0.2
45-49	21	4	0.9	0.27	0.2	0.20	1.4	0.3
50-54	53	9	2.6	0.40	0.4	0.22	2.0	0.4
55-59	70	17	3.8	0.49	0.9	0.43	1.5	0.5
60-64	64	9	3.6	0.44	0.5	0.21	1.0	0.2
65-69	50	17	3.2	0.56	1.0	0.49	0.6	0.3
70-74	35	9	2.7	0.59	0.6	0.56	0.4	0.1
75-79	20	4	2.4	0.59	0.3	0.36	0.2	0.1
80-84	13	5	2.6	0.81	0.5	0.29	0.2	0.1
85+	8	8	2.3	0.80	0.9	0.73	0.1	0.1
All ages	349	84					0.6	0.2
Mortality								
Raw			1.2	0.47	0.3	0.34		
WS			0.7	0.45	0.1	0.31		
ES			1.0	0.46	0.2	0.32		
BRD-S			1.1	0.47	0.2	0.33		
PYLL-70								
per 100,000			12.3		2.4			
ES			11.1		2.0			
AYLL-70			12.1		10.8			

* See corresponding tables with multiple primaries.

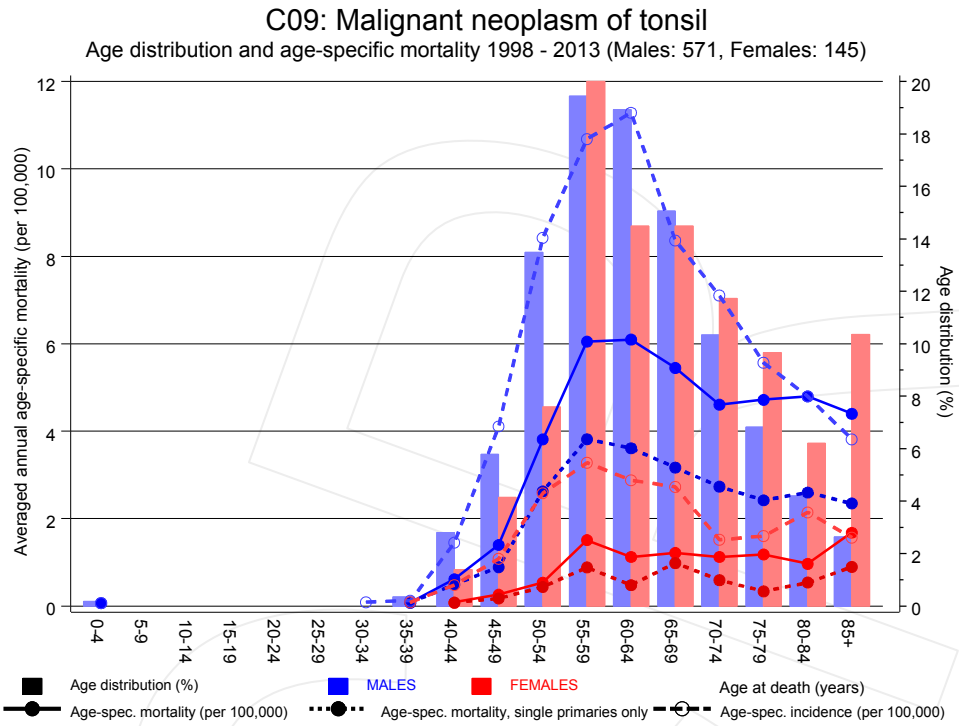
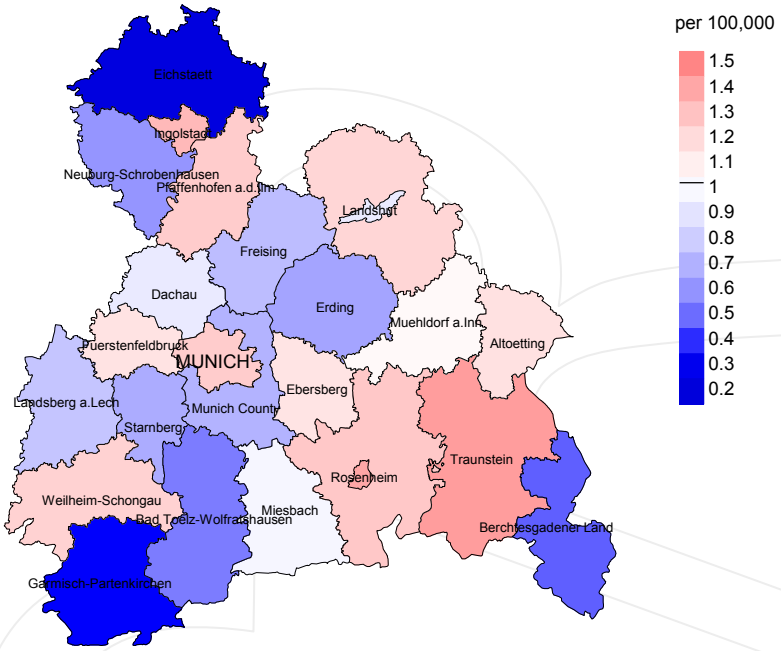


Figure 18. Distribution of age at death (bars) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

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

Average mortality (world standard population) 2007 - 2013: Males



Average mortality (world standard population) 2007 - 2013: Females

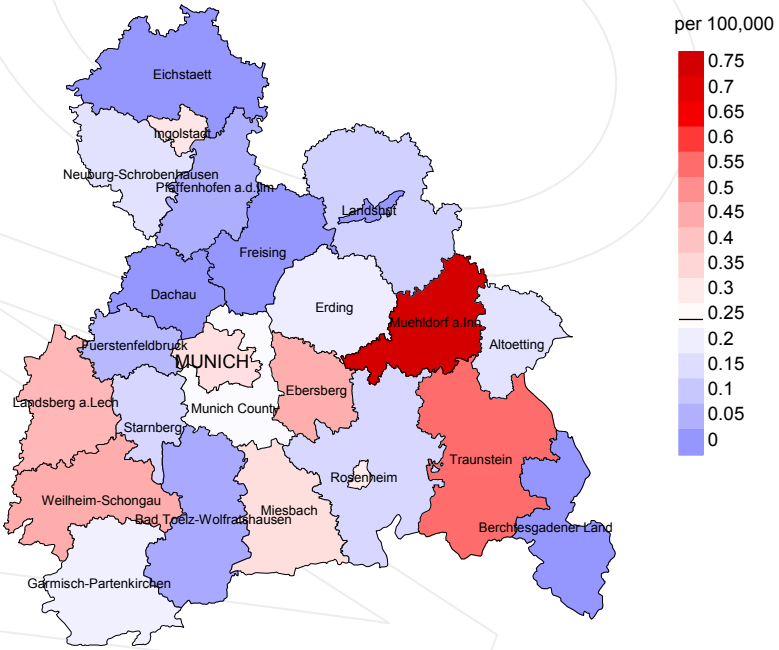


Figure 19a. Map of cancer mortality (world standard population) by county averaged for period 2007 to 2013. According to their individual mortality rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 1.0/100,000 WS N=280, females 0.2/100,000 WS N=81).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 64,928 female residents (averaged) in the period from 2007 to 2013 a total of 4 women died from tonsil cancer. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 0.4/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.1 and 1.6/100,000.

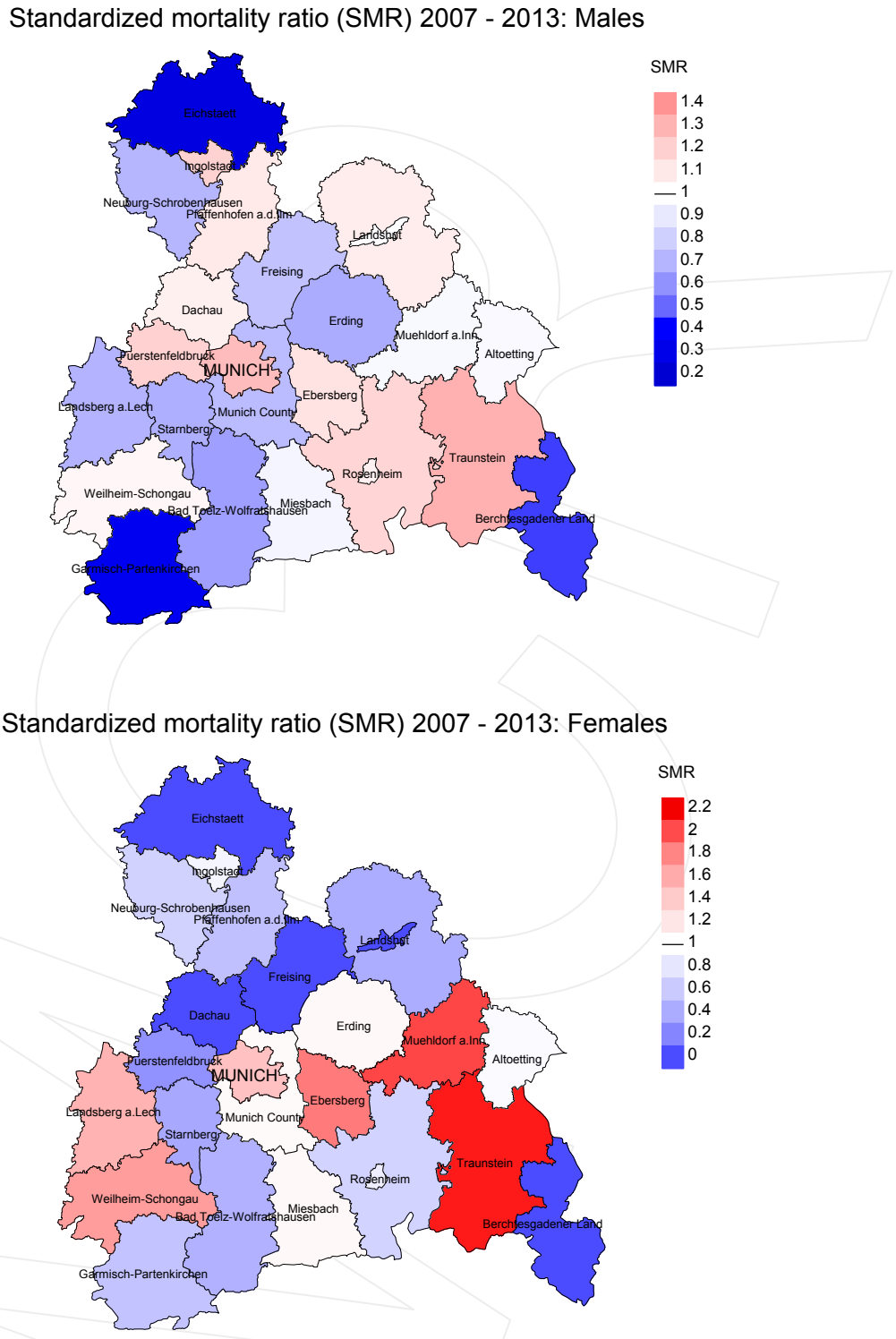


Figure 19b. Map of standardized mortality ratio (SMR, incl. DCO cases) by county averaged for period 2007 to 2013. According to their individual SMR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=280, females N=81).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 64,642 female residents (averaged) in the period from 2007 to 2013 a total of 4 women died from tonsil cancer. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 1.84. Though, the value of this parameter may vary with an underlying probability of 99% between 0.31 and 5.80, 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 cancer-related death for patients who have no therapeutic restrictions due to a previous or synchronous cancer. These statistics are comparable to studies that have exclusion criteria based on a second malignancy.

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

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

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

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

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

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

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

Shortcuts

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

Recommended Citation

Munich Cancer Registry. Baseline statistics C09: Tonsil cancer [Internet]. 2015 [updated 2015 May 19; cited 2015 Jul 1]. Available from: http://www.tumorregister-muenchen.de/en/facts/base/base_C09__E.pdf

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