

# Munich Cancer Registry



- ▶ Survival
- ▶ Selection Matrix
- ▶ Homepage
- ▶ *Deutsch*

## ICD-10 C22.1: Cholangiocarcinoma

### Incidence and Mortality

Year of diagnosis	1998-2016
Patients	859
Diseases	859
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/bC221\\_E-ICD-10-C22.1-Cholangiocarcinoma-incidence-and-mortality.pdf](https://www.tumorregister-muenchen.de/en/facts/base/bC221_E-ICD-10-C22.1-Cholangiocarcinoma-incidence-and-mortality.pdf)

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**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<sup>#</sup>, with a total of 4.69 million inhabitants, account for the frequency of cancer diseases<sup>##</sup> 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<sup>###</sup> 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](mailto:tumor@ibe.med.uni-muenchen.de).

Munich Cancer Registry, August 2018

<sup>#</sup> 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).

<sup>##</sup> 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.

<sup>###</sup> 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
C22.-	Malignant neoplasm of liver and intrahepatic bile ducts

... in case of coexisting one of the following ...

### Morphology codes (ICD-O-3 2014) used for specifying cancer site

Code	Description
8160/3	Cholangiocarcinoma
8161/3	Bile duct cystadenocarcinoma
8162/3	Klatskin tumor

## INCIDENCE

Table 1

Cases with invasive cancer by year of diagnosis, proportions of further malignancies, deaths, and active follow-up (ALL PATIENTS)

Year of diagnosis	All cases n	Prop. at least 1 further malign. prior + synchron. %	Prop. at least 1 further malign. after %	Prop. deaths %	Prop. actively followed %
1998	7	0.0	4.3	100.0	100.0
1999	3	10.0	4.3	100.0	100.0
2000	6	6.3	4.3	83.3	100.0
2001	5	9.5	4.2	100.0	100.0
2002	27	6.3	4.3	96.3	100.0 #
2003	25	9.6	4.4	100.0	100.0
2004	30	11.7	4.3	90.0	100.0
2005	24	11.8	4.3	95.8	100.0
2006	41	14.9	4.5	87.8	95.1
2007	35	15.8	4.6	88.6	97.1 #
2008	76	15.1	4.5	89.5	97.4
2009	62	14.4	3.9	91.9	95.2
2010	65	14.5	3.1	83.1	90.8
2011	66	15.7	3.6	87.9	92.4
2012	88	15.9	3.7	87.5	92.0
2013	95	15.6	4.1	84.2	93.7
2014	72	16.4	3.5	80.6	95.8
2015	81	16.5	3.1	65.4	97.5
2016	51	16.8	6.0	43.1	74.5 ##
1998-2016	859	16.8	4.3	83.2	94.2

859 cases diagnosed 1998-2016 are related to a total of 859 patients. Currently, in 183 (21.3 %) of these 859 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 150 / 18 / 15 (17.5 % / 2.1 % / 1.7 %) 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 72 cases has been diagnosed, of which 16.4 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 3.5 % 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 with invasive cancer by year of diagnosis, proportions of further malignancies, deaths, and active follow-up (MALES)

Year of diagnosis	Males n	Males %	Prop. at least 1 further malign. prior + synchron. %	Prop. at least 1 further malign. after %	Prop. deaths %	Prop. actively followed %
1998	4	57.1	0.0	4.2	100.0	100.0
1999	1	33.3	20.0	4.2	100.0	100.0
2000	5	83.3	10.0	4.2	80.0	100.0
2001	3	60.0	7.7	4.0	100.0	100.0
2002	16	59.3	6.9	4.1	93.8	100.0 #
2003	22	88.0	11.8	4.2	100.0	100.0
2004	22	73.3	13.7	4.2	86.4	100.0
2005	16	66.7	12.4	4.2	93.8	100.0
2006	23	56.1	13.4	4.3	87.0	95.7
2007	16	45.7	12.5	4.6	93.8	100.0 #
2008	42	55.3	11.8	4.5	97.6	100.0
2009	33	53.2	11.8	3.5	97.0	100.0
2010	32	49.2	13.2	3.9	87.5	96.9
2011	37	56.1	15.4	4.4	89.2	91.9
2012	44	50.0	15.8	5.1	95.5	95.5
2013	57	60.0	15.0	5.9	82.5	93.0
2014	40	55.6	16.0	5.3	85.0	97.5
2015	46	56.8	16.6	4.1	63.0	97.8
2016	29	56.9	17.0	6.9	44.8	69.0 ##
1998-2016	488	56.8	17.0	4.2	85.5	95.5

488 cases diagnosed 1998-2016 are related to a total of 488 patients. Currently, in 103 (21.1 %) of these 488 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 81 / 11 / 11 (16.6 % / 2.3 % / 2.3 %) 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 40 cases has been diagnosed, of which 16.0 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 5.3 % 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 with invasive cancer by year of diagnosis, proportions of further malignancies, deaths, and active follow-up (FEMALES)

Year of diagnosis	Females n	Females %	Prop. at least 1 further malign. prior + synchron. %	Prop. at least 1 further malign. after %	Prop. deaths %	Prop. actively followed %
1998	3	42.9	0.0	4.4	100.0	100.0
1999	2	66.7	0.0	4.4	100.0	100.0
2000	1	16.7	0.0	4.5	100.0	100.0
2001	2	40.0	12.5	4.5	100.0	100.0
2002	11	40.7	5.3	4.5	100.0	100.0 #
2003	3	12.0	4.5	4.6	100.0	100.0
2004	8	26.7	6.7	4.4	100.0	100.0
2005	8	33.3	10.5	4.5	100.0	100.0
2006	18	43.9	17.9	4.6	88.9	94.4
2007	19	54.3	21.3	4.5	84.2	94.7 #
2008	34	44.7	20.2	4.5	79.4	94.1
2009	29	46.8	18.1	4.3	86.2	89.7
2010	33	50.8	16.4	2.2	78.8	84.8
2011	29	43.9	16.0	2.6	86.2	93.1
2012	44	50.0	16.0	1.8	79.5	88.6
2013	38	40.0	16.3	1.6	86.8	94.7
2014	32	44.4	16.9	1.2	75.0	93.8
2015	35	43.2	16.3	1.9	68.6	97.1
2016	22	43.1	16.4	4.8	40.9	81.8 ##
1998-2016	371	43.2	16.4	4.4	80.3	92.5

371 cases diagnosed 1998-2016 are related to a total of 371 patients. Currently, in 80 (21.6 %) of these 371 patients more than one malignancy of any cancer type has been registered. Hereby, groups of 69 / 7 / 4 (18.6 % / 1.9 % / 1.1 %) 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 32 cases has been diagnosed, of which 16.9 % previously and/or concurrently (synchronously) had at least one other malignancy of any cancer type. In 1.2 % 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  
(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	4	3	0.4	0.3	0.3	0.1	0.3	0.2	0.4	0.2
1999	1	2	0.1	0.2	0.0	0.1	0.1	0.1	0.1	0.2
2000	5	1	0.4	0.1	0.2	0.1	0.4	0.1	0.5	0.1
2001	3	2	0.3	0.2	0.2	0.1	0.2	0.1	0.2	0.2
2002	16	11	0.9	0.6	0.5	0.3	0.7	0.4	0.8	0.5
2003	22	3	1.2	0.2	0.7	0.1	0.9	0.1	1.1	0.1
2004	22	8	1.2	0.4	0.7	0.2	1.0	0.3	1.2	0.4
2005	16	8	0.8	0.4	0.5	0.1	0.7	0.2	0.8	0.3
2006	23	18	1.2	0.9	0.7	0.5	0.9	0.7	1.1	0.7
2007	16	19	0.7	0.8	0.4	0.4	0.6	0.6	0.7	0.6
2008	42	34	1.9	1.5	1.0	0.7	1.4	1.0	1.8	1.3
2009	33	29	1.5	1.2	0.7	0.6	1.1	0.8	1.5	1.1
2010	32	33	1.4	1.4	0.7	0.6	1.1	0.9	1.3	1.2
2011	37	29	1.7	1.2	0.8	0.5	1.2	0.8	1.5	1.0
2012	44	44	1.9	1.9	1.0	0.9	1.5	1.3	1.8	1.6
2013	57	38	2.5	1.6	1.3	0.7	1.8	1.0	2.2	1.3
2014	40	32	1.7	1.3	0.8	0.7	1.2	0.9	1.6	1.1
2015	46	35	1.9	1.4	1.0	0.6	1.4	0.9	1.8	1.2
2016	29	22	1.2	0.9	0.6	0.4	0.9	0.6	1.1	0.7
1998-2016	488	371	1.3	1.0	0.7	0.5	1.0	0.7	1.3	0.8

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)

Year of diagnosis	Cases n	Std.		Median				Median		
		Mean	dev.	Min.	Max.	10%	25%	50%	75%	90%
1998	7	62.5	13.5	41.1	78.8	41.1	49.4	62.2	73.8	78.8
1999	3	54.2	17.3	35.7	69.9	35.7	35.7	57.1	69.9	69.9
2000	6	66.0	6.9	59.2	76.8	59.2	59.9	64.7	70.5	76.8
2001	5	61.2	14.3	37.1	74.7	37.1	62.0	65.7	66.4	74.7
2002	27	63.3	13.4	29.3	81.3	42.6	58.1	62.4	74.0	78.2
2003	25	63.9	13.3	31.9	83.8	40.1	61.3	66.3	71.1	78.5
2004	30	64.6	10.2	46.4	85.2	52.3	55.9	64.3	73.8	79.2
2005	24	68.1	12.2	36.7	91.9	57.9	59.7	66.7	76.2	84.8
2006	41	64.6	9.5	41.8	88.7	53.2	60.8	65.6	70.6	73.0
2007	35	66.3	11.9	39.4	87.1	47.1	59.9	67.3	73.5	80.1
2008	76	67.5	12.5	32.9	88.7	48.5	60.7	68.7	77.3	82.5
2009	62	69.8	10.0	40.1	90.0	57.0	63.9	71.4	76.6	81.0
2010	65	69.0	9.6	47.4	90.8	56.4	62.0	70.4	75.4	78.7
2011	66	69.9	11.5	36.8	92.1	54.2	63.5	70.9	78.1	84.8
2012	88	67.2	10.8	35.2	90.7	52.0	60.9	69.1	74.9	79.2
2013	95	68.6	9.4	43.8	88.1	54.5	63.5	69.8	75.7	79.7
2014	72	67.8	10.8	30.0	84.4	53.9	61.4	70.1	76.1	78.8
2015	81	69.0	10.2	34.6	87.8	56.1	62.6	70.8	76.7	79.5
2016	51	67.9	10.6	38.5	84.5	54.1	60.0	71.0	77.5	80.0
1998–2016	859	67.6	11.0	29.3	92.1	53.4	61.3	69.2	75.6	80.5

Table 3a

Age distribution parameters by year of diagnosis (MALES)

Year of diagnosis	Cases n	Std.		Median				Median		
		Mean	dev.	Min.	Max.	10%	25%	50%	75%	90%
1998	4	55.8	13.1	41.1	70.6	41.1	45.3	55.8	66.4	70.6
1999	1	57.1		57.1	57.1	57.1	57.1	57.1	57.1	57.1
2000	5	65.7	7.7	59.2	76.8	59.2	59.9	62.1	70.5	76.8
2001	3	54.9	15.6	37.1	65.7	37.1	37.1	62.0	65.7	65.7
2002	16	63.5	9.9	42.6	81.3	49.2	58.6	62.2	72.6	74.0
2003	22	63.1	13.9	31.9	83.8	40.1	59.7	64.4	70.9	78.5
2004	22	64.6	9.9	46.4	80.9	54.0	55.9	64.1	73.8	78.0
2005	16	65.0	11.5	36.7	84.8	55.3	59.1	63.8	72.2	79.6
2006	23	63.1	9.4	41.8	81.5	51.8	55.9	65.4	67.4	73.0
2007	16	65.5	12.3	39.4	86.9	47.1	60.0	67.0	72.8	79.4
2008	42	66.6	11.0	40.2	84.6	50.5	58.6	67.5	73.2	81.3
2009	33	70.8	10.3	44.6	90.0	59.2	63.9	72.2	77.6	82.9
2010	32	68.1	11.0	47.4	90.8	56.2	57.7	68.9	75.1	78.7
2011	37	69.1	10.5	36.8	88.4	54.2	63.8	71.2	74.6	82.2
2012	44	67.7	11.1	38.6	90.7	54.3	60.2	69.1	75.3	80.6
2013	57	68.6	10.1	43.8	88.1	54.5	63.7	69.2	75.7	80.6
2014	40	68.8	10.4	40.6	83.5	54.3	62.7	71.2	76.3	78.8
2015	46	68.6	10.6	34.6	87.8	56.1	61.4	70.5	77.3	81.2
2016	29	68.5	10.2	45.3	84.5	53.3	60.6	71.0	78.1	81.0
1998–2016	488	67.2	10.9	31.9	90.8	53.3	60.4	68.3	74.9	80.4



Table 3b

Age distribution parameters by year of diagnosis (FEMALES)

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	Median				
						10%	25%	50%	75%	90%
1998	3	71.5	8.7	61.8	78.8	61.8	61.8	73.8	78.8	78.8
1999	2	52.8	24.2	35.7	69.9	35.7	35.7	52.8	69.9	69.9
2000	1	67.3		67.3	67.3	67.3	67.3	67.3	67.3	67.3
2001	2	70.6	5.9	66.4	74.7	66.4	66.4	70.6	74.7	74.7
2002	11	63.1	18.0	29.3	79.9	34.9	48.3	69.7	77.4	78.2
2003	3	70.1	3.4	66.3	72.8	66.3	66.3	71.1	72.8	72.8
2004	8	64.6	11.8	49.7	85.2	49.7	54.7	64.9	71.5	85.2
2005	8	74.1	12.1	58.1	91.9	58.1	65.6	71.2	84.8	91.9
2006	18	66.6	9.4	52.2	88.7	53.2	61.2	67.4	72.2	81.1
2007	19	66.9	11.8	41.0	87.1	43.0	59.9	69.3	73.8	81.2
2008	34	68.6	14.3	32.9	88.7	45.8	62.5	72.4	79.1	82.6
2009	29	68.7	9.7	40.1	82.7	55.9	64.8	70.1	76.3	81.0
2010	33	70.0	7.9	52.1	89.3	59.6	63.6	70.6	75.7	78.3
2011	29	70.9	12.9	42.5	92.1	52.5	62.4	69.0	80.8	86.4
2012	44	66.7	10.6	35.2	81.2	51.8	60.9	69.1	74.3	77.9
2013	38	68.7	8.4	49.5	82.4	54.5	62.5	71.7	75.6	79.4
2014	32	66.6	11.4	30.0	84.4	53.9	61.1	69.7	73.8	78.1
2015	35	69.5	9.6	45.8	84.8	50.6	66.5	71.1	75.9	79.2
2016	22	67.1	11.4	38.5	82.1	54.1	59.9	70.6	75.7	80.0
1998-2016	371	68.2	11.1	29.3	92.1	53.9	62.1	70.1	76.1	80.5

Table 4

Age distribution by 5-year age group and sex for period 2007-2016

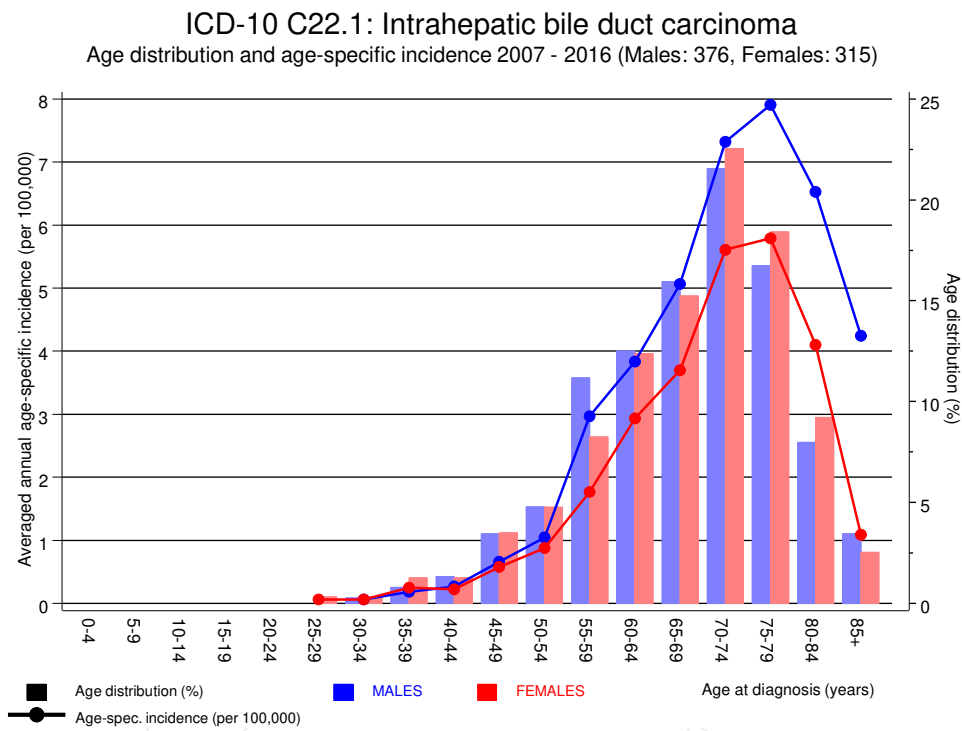
Age at diagnosis Years	Cases n	Males			Females				
		%	Cum.%	n	%	Cum.%	n	%	Cum.%
0-4									
5-9									
10-14									
15-19									
20-24									
25-29	1	0.1	0.1		0.0		1	0.3	0.3
30-34	2	0.3	0.4	1	0.3	0.3	1	0.3	0.6
35-39	7	1.0	1.4	3	0.8	1.1	4	1.3	1.9
40-44	9	1.3	2.7	5	1.3	2.4	4	1.3	3.2
45-49	24	3.5	6.2	13	3.5	5.9	11	3.5	6.7
50-54	33	4.8	11.0	18	4.8	10.6	15	4.8	11.4
55-59	68	9.8	20.8	42	11.2	21.8	26	8.3	19.7
60-64	86	12.4	33.3	47	12.5	34.3	39	12.4	32.1
65-69	108	15.6	48.9	60	16.0	50.3	48	15.2	47.3
70-74	152	22.0	70.9	81	21.5	71.8	71	22.5	69.8
75-79	121	17.5	88.4	63	16.8	88.6	58	18.4	88.3
80-84	59	8.5	97.0	30	8.0	96.5	29	9.2	97.5
85+	21	3.0	100.0	13	3.5	100.0	8	2.5	100.0
All ages	691	100.0		376	100.0		315	100.0	

Table 5

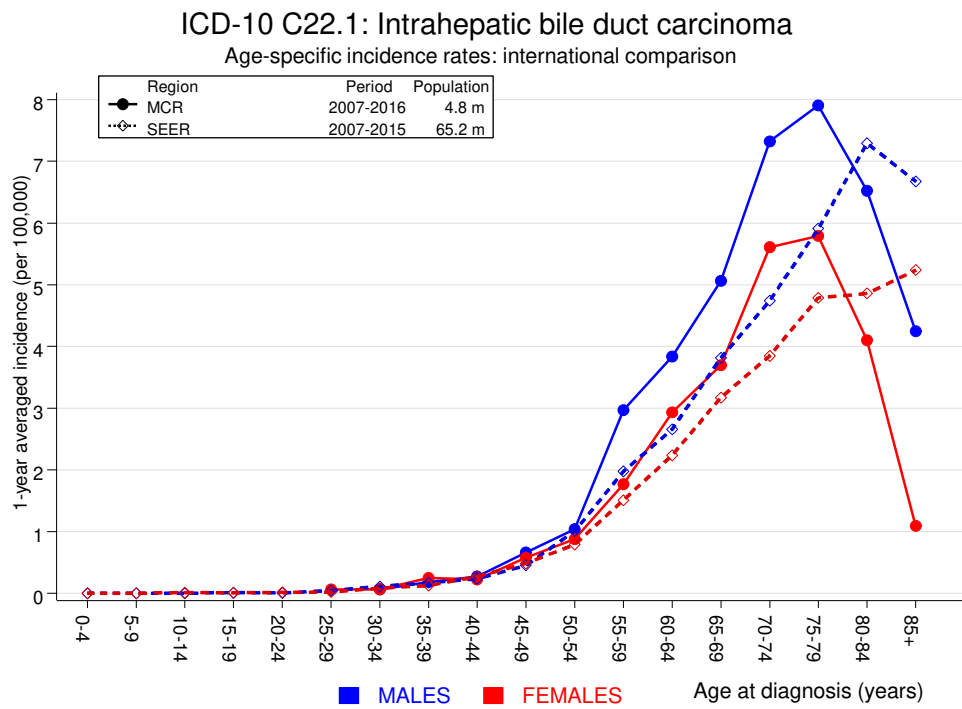
Age-specific incidence and proportion of all cancers  
for period 2007-2016

Age at diagnosis Years	Males n	Females n	Males Age- spec. incid.	Females Age- spec. incid.	Males Prop.all cancers n=113978 %	Females Prop.all cancers n=112253 %
0- 4						
5- 9						
10-14						
15-19						
20-24						
25-29		1		0.1		0.1
30-34	1	1	0.1	0.1	0.1	0.1
35-39	3	4	0.2	0.3	0.2	0.2
40-44	5	4	0.3	0.2	0.2	0.1
45-49	13	11	0.7	0.6	0.3	0.2
50-54	18	15	1.0	0.9	0.3	0.2
55-59	42	26	3.0	1.8	0.5	0.3
60-64	47	39	3.8	2.9	0.4	0.3
65-69	60	48	5.1	3.7	0.3	0.3
70-74	81	71	7.3	5.6	0.4	0.5
75-79	63	58	7.9	5.8	0.4	0.4
80-84	30	29	6.5	4.1	0.3	0.3
85+	13	8	4.2	1.1	0.2	0.1
All ages	376	315			0.3	0.3
Incidence						
Raw			1.6	1.3		
WS			0.8	0.6		
ES			1.2	0.9		
BRD-S			1.5	1.1		

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=68.4 yrs, median=69.9 yrs; females: mean=68.4 yrs, median=70.4 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 %
C03–C06 Oral cavity	2	0.1	28.0	3.4	101.1 #	38.3	
C15 Oesophagus	2	0.2	12.4	1.5	44.8 #	36.6	
C18 Colon	3	0.8	3.9	0.8	11.3	44.2	
C23–C24 Bile	2	0.1	24.8	3.0	89.6 #	38.2	
C33–C34 Lung	2	1.0	2.0	0.2	7.4	20.2	50.0
C61 Prostate	3	2.3	1.3	0.3	3.8	13.2	66.7
C67 Bladder	2	0.4	5.5	0.7	20.0	32.6	50.0
C82–C85 NHL	6	0.3	18.1	6.6	39.3 #	112.7	33.3
Others, specified	4	0.9	4.2	1.1	10.8 #	60.7	25.0
Not observed	0	2.2	0.0	0.0	1.7	-44.0	
All further malignancies	26	8.3	3.1	2.1	4.6 #	352.6	26.9
Patients		456					
Median age at next malignancy (years)		69.8					
Person-years		503					
Mean observation time (years)		1.1					
Median observation time (years)		0.6					

# 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

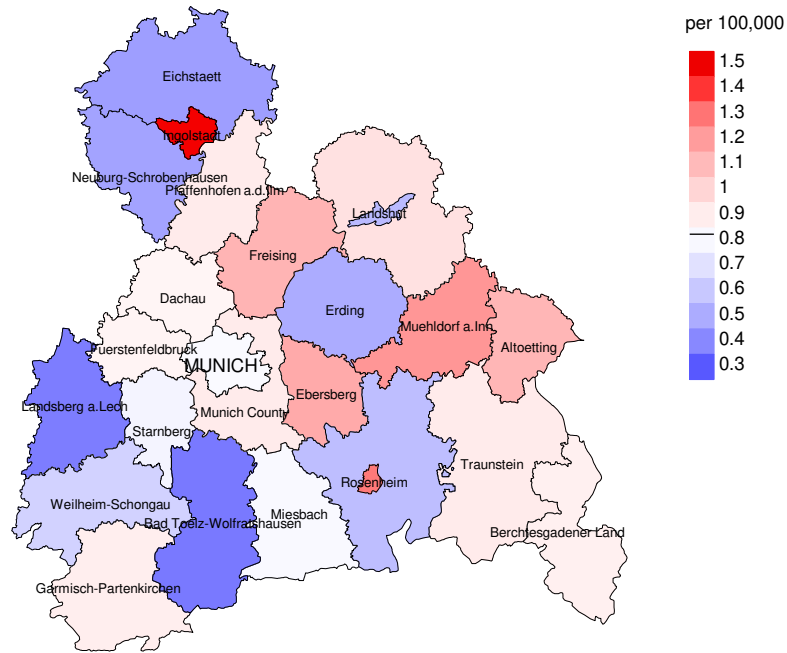
FEMALES

Diagnosis	Observed n	Expected n	SIR	CI 95%	CI 95%	EAR	DCO %
C18 Colon	9	0.4	21.7	9.9	41.1 #	203.2	33.3
C33–C34 Lung	2	0.4	5.2	0.6	18.8	38.2	
C50 Breast	5	1.4	3.5	1.1	8.2 #	84.8	20.0
C64 Kidney	2	0.1	17.1	2.1	61.7 #	44.6	50.0
Others, specified	7	0.9	7.9	3.2	16.3 #	144.8	
Not observed	0	1.4	0.0	0.0	2.6	-34.2	
All further malignancies	25	4.7	5.4	3.5	7.9 #	481.3	20.0
Patients		352					
Median age at next malignancy (years)		74.6					
Person-years		423					
Mean observation time (years)		1.2					
Median observation time (years)		0.5					

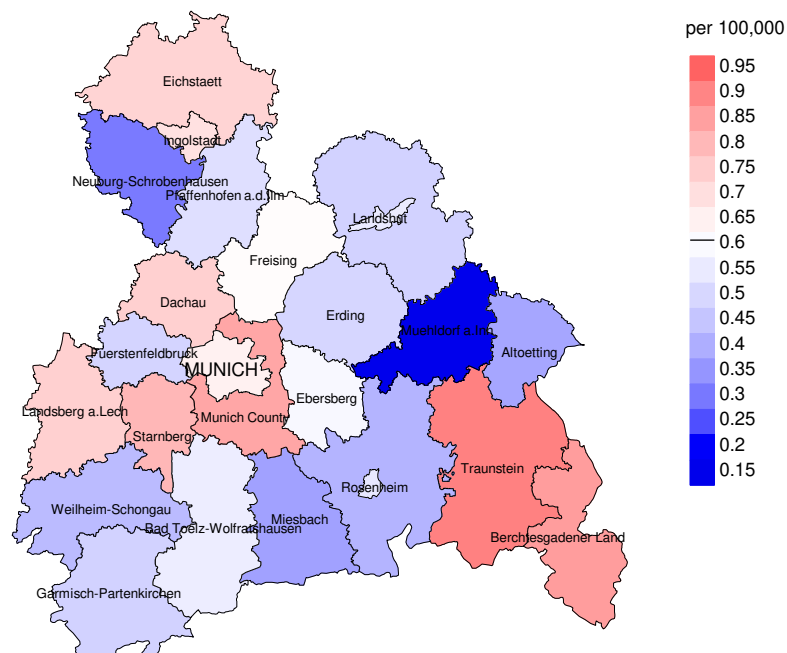
# The occurrence of further malignancy listed is statistically significant.

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

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



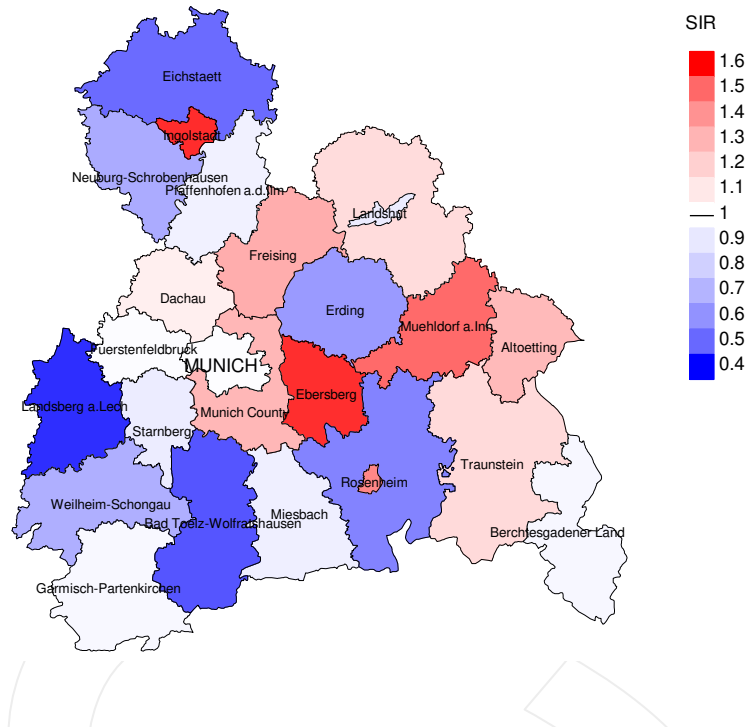
Average incidence (world standard population) 2007 - 2016: Females



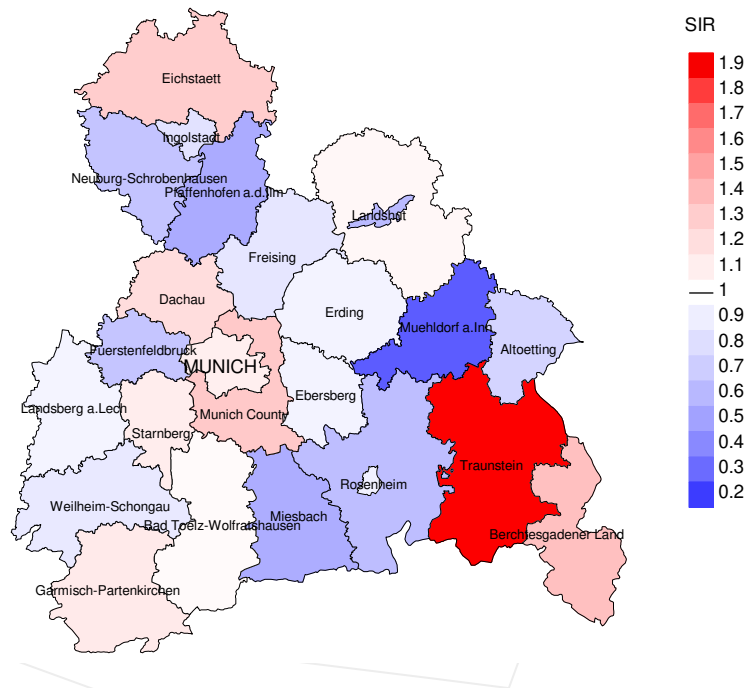
**Figure 8a.** Map of cancer incidence (world standard population) by county averaged for period 2007 to 2016. According to their individual incidence rates, the counties are displayed in different red and blue hues, being the fine white color attributed to the population mean (males 0.8/100,000 WS N=376, females 0.6/100,000 WS N=315).

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 8 women were identified with newly diagnosed cholangiocarcinoma. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 0.6/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.2 and 1.7/100,000.

Standardized incidence ratio (SIR) 2007 - 2016: Males



Standardized incidence ratio (SIR) 2007 - 2016: Females



**Figure 8b.** Map of standardized incidence ratio (SIR) 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=376, females N=315).

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 8 women were identified with newly diagnosed cholangiocarcinoma. Therefore, the mean standardized incidence ratio (SIR) for this cancer type in this area can be calculated at 0.93. Though, the value of this parameter may vary with an underlying probability of 99% between 0.30 and 2.15, and is therefore not statistically striking.



**MORTALITY**

Table 9a

Annual cohorts: Incident cancers, follow-up status,  
and deaths among the annual cohorts

(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 %	Deaths n	Prop. deaths %	Prop. deaths with death certific. %
1998	7	100.0	7	100.0	85.7
1999	3	100.0	3	100.0	66.7
2000	6	100.0	5	83.3	80.0
2001	5	100.0	5	100.0	80.0
2002	27	100.0	26	96.3	100.0
2003	25	100.0	25	100.0	92.0
2004	30	100.0	27	90.0	100.0
2005	24	100.0	23	95.8	95.7
2006	41	95.1	36	87.8	100.0
2007	35	97.1	31	88.6	100.0
2008	76	97.4	68	89.5	100.0
2009	62	95.2	57	91.9	96.5
2010	65	90.8	54	83.1	100.0
2011	66	92.4	58	87.9	98.3
2012	88	92.0	77	87.5	100.0
2013	95	93.7	80	84.2	97.5
2014	72	95.8	58	80.6	100.0
2015	81	97.5	53	65.4	90.6
2016	51	74.5	22	43.1	81.8
1998-2016	859	94.2	715	83.2	97.1

Table 9b

Annual cohorts of incident cancers and deaths,  
and cases deceased within the same year of being diagnosed with cancer

(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	Deaths in same year n	Prop. deaths in same year %
1998	7	4	3	42.9
1999	3	6	3	100.0
2000	6	4	2	33.3
2001	5	3	1	20.0
2002	27	16	13	48.1
2003	25	20	8	32.0
2004	30	21	12	40.0
2005	24	21	10	41.7
2006	41	37	20	48.8
2007	35	21	11	31.4
2008	76	47	30	39.5
2009	62	57	22	35.5
2010	65	58	26	40.0
2011	66	59	26	39.4
2012	88	56	26	29.5
2013	95	74	36	37.9
2014	72	80	28	38.9
2015	81	75	29	35.8
2016	51	59	21	41.2
1998-2016	859	718	327	38.1

Table 9c

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

(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	4	100.0		100.0
1999	6	83.3	16.7	100.0
2000	4	75.0	25.0	100.0
2001	3	100.0		100.0
2002	16	100.0		100.0
2003	20	90.0	10.0	94.7
2004	21	100.0		100.0
2005	21	90.5	9.5	89.5
2006	37	100.0		100.0
2007	21	100.0		100.0
2008	47	95.7	4.3	100.0
2009	57	98.2	1.8	100.0
2010	58	98.3	1.7	98.3
2011	59	94.9	5.1	98.3
2012	56	96.4	3.6	100.0
2013	74	100.0		100.0
2014	80	96.3	3.8	96.2
2015	75	92.0	8.0	97.3
2016	59	84.7	15.3	96.4
1998-2016	718	95.4	4.6	98.3

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	3	62.3	62.3		62.3
1999	2	49.3	49.3		49.3
2000	2	74.6	74.6		74.6
2001	3	60.9	60.9		60.9
2002	9	58.2	58.2		58.7
2003	14	64.0	64.2	61.7	64.2
2004	15	65.0	65.0		65.0
2005	14	66.5	66.8	62.2	66.8
2006	24	65.6	65.6		65.6
2007	11	72.4	72.4		72.4
2008	27	69.2	69.2	71.7	69.2
2009	33	69.5	69.8	66.3	69.5
2010	39	71.3	71.2	90.9	71.2
2011	32	71.0	69.8	81.5	69.8
2012	34	72.2	72.6	69.2	72.6
2013	38	71.1	71.1		70.5
2014	44	67.2	67.2	52.3	67.2
2015	43	71.6	71.3	77.6	71.4
2016	33	73.2	70.5	78.8	72.0
1998–2016	420	69.1	69.0	74.4	69.0

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	1	78.8	78.8		78.8
1999	4	66.4	62.3	74.6	66.4
2000	2	72.6	77.4	67.7	77.4
2001					
2002	7	70.2	70.2		70.2
2003	6	57.7	57.7		57.7
2004	6	73.8	73.8		73.8
2005	7	66.3	66.4	65.3	66.4
2006	13	67.7	67.7		67.7
2007	10	70.0	70.0		70.0
2008	20	71.3	71.3		71.3
2009	24	71.0	71.0		71.2
2010	19	74.9	74.9		74.9
2011	27	68.2	68.2	76.4	69.3
2012	22	70.0	69.6	92.3	70.0
2013	36	71.5	71.5		71.5
2014	36	69.6	69.6	59.7	69.6
2015	32	72.8	71.8	78.6	72.2
2016	26	75.1	74.9	75.2	75.1
1998–2016	298	71.1	70.9	75.2	71.2

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	3	0.3	0.75	0.2	0.76	0.3	0.75	0.3	0.76
1999	2	0.2	2.00	0.1	2.55	0.2	2.20	0.1	2.07
2000	2	0.2	0.40	0.1	0.38	0.2	0.43	0.2	0.53
2001	3	0.3	1.00	0.2	0.98	0.2	1.00	0.2	1.03
2002	9	0.5	0.56	0.3	0.61	0.4	0.58	0.4	0.53
2003	12	0.6	0.55	0.4	0.54	0.5	0.55	0.6	0.55
2004	15	0.8	0.68	0.5	0.64	0.6	0.63	0.8	0.63
2005	13	0.7	0.81	0.4	0.84	0.6	0.82	0.6	0.77
2006	24	1.3	1.04	0.7	1.03	1.0	1.03	1.1	1.03
2007	11	0.5	0.69	0.3	0.65	0.4	0.70	0.5	0.77
2008	25	1.1	0.60	0.6	0.59	0.8	0.59	1.1	0.62
2009	32	1.4	0.97	0.7	1.06	1.1	1.02	1.4	0.92
2010	38	1.7	1.19	0.8	1.10	1.2	1.12	1.6	1.24
2011	31	1.4	0.84	0.7	0.88	1.0	0.88	1.3	0.87
2012	33	1.5	0.75	0.7	0.69	1.0	0.71	1.3	0.74
2013	38	1.7	0.67	0.8	0.62	1.2	0.64	1.5	0.66
2014	43	1.8	1.08	0.9	1.15	1.3	1.11	1.7	1.08
2015	39	1.6	0.85	0.8	0.82	1.2	0.82	1.5	0.83
2016	27	1.1	0.93	0.6	0.97	0.8	0.96	1.0	0.93
1998-2016	400	1.1	0.82	0.6	0.81	0.8	0.82	1.1	0.82

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	1	0.1	0.33	0.0	0.18	0.0	0.24	0.1	0.33
1999	3	0.3	1.50	0.2	1.30	0.2	1.34	0.2	1.43
2000	1	0.1	1.00	0.0	0.38	0.0	0.57	0.1	0.96
2001									
2002	7	0.4	0.64	0.2	0.52	0.2	0.58	0.3	0.58
2003	6	0.3	2.00	0.2	2.25	0.2	2.06	0.3	2.10
2004	6	0.3	0.75	0.1	0.60	0.2	0.67	0.3	0.73
2005	6	0.3	0.75	0.1	1.02	0.2	0.93	0.2	0.82
2006	13	0.6	0.72	0.3	0.65	0.5	0.68	0.5	0.73
2007	10	0.4	0.53	0.2	0.53	0.3	0.51	0.3	0.53
2008	20	0.9	0.59	0.3	0.52	0.5	0.55	0.7	0.55
2009	24	1.0	0.83	0.5	0.83	0.7	0.80	0.8	0.81
2010	19	0.8	0.58	0.3	0.52	0.5	0.53	0.7	0.57
2011	25	1.1	0.86	0.5	0.96	0.7	0.93	0.9	0.90
2012	21	0.9	0.48	0.4	0.46	0.6	0.46	0.7	0.46
2013	36	1.5	0.95	0.7	0.91	1.0	0.92	1.2	0.94
2014	34	1.4	1.06	0.7	1.01	1.0	1.05	1.2	1.06
2015	30	1.2	0.86	0.5	0.83	0.7	0.83	1.0	0.85
2016	23	0.9	1.05	0.3	0.78	0.5	0.86	0.7	0.98
1998-2016	285	0.7	0.77	0.3	0.72	0.5	0.74	0.6	0.75

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									
10-14									
15-19									
20-24									
25-29									
30-34									
35-39	6	1.1	1.1	2	0.6	0.6	4	1.7	1.7
40-44	7	1.3	2.3	5	1.6	2.2	2	0.8	2.5
45-49	16	2.9	5.2	11	3.5	5.7	5	2.1	4.5
50-54	19	3.4	8.6	14	4.4	10.1	5	2.1	6.6
55-59	47	8.4	17.0	30	9.5	19.6	17	7.0	13.6
60-64	76	13.6	30.6	43	13.6	33.1	33	13.6	27.3
65-69	83	14.8	45.4	47	14.8	47.9	36	14.9	42.1
70-74	123	22.0	67.4	65	20.5	68.5	58	24.0	66.1
75-79	106	19.0	86.4	62	19.6	88.0	44	18.2	84.3
80-84	50	8.9	95.3	23	7.3	95.3	27	11.2	95.5
85+	26	4.7	100.0	15	4.7	100.0	11	4.5	100.0
All ages	559	100.0		317	100.0		242	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	Males Prop.all cancers %	Females Prop.all cancers %
0- 4								
5- 9								
10-14								
15-19								
20-24								
25-29								
30-34								
35-39	2	4	0.1	0.67	0.3	1.00	1.0	1.4
40-44	5	2	0.3	1.00	0.1	0.50	1.0	0.3
45-49	11	5	0.6	0.85	0.3	0.45	1.0	0.4
50-54	14	5	0.8	0.78	0.3	0.33	0.7	0.3
55-59	30	17	2.1	0.71	1.2	0.65	0.9	0.6
60-64	43	33	3.5	0.91	2.5	0.85	0.9	0.9
65-69	47	36	4.0	0.78	2.8	0.75	0.6	0.7
70-74	65	58	5.9	0.80	4.6	0.82	0.7	0.9
75-79	62	44	7.8	0.98	4.4	0.76	0.7	0.6
80-84	23	27	5.0	0.77	3.8	0.93	0.3	0.4
85+	15	11	4.9	1.15	1.5	1.38	0.2	0.1
All ages	317	242					0.6	0.5
Mortality								
Raw			1.4	0.84	1.0	0.77		
WS			0.7	0.83	0.4	0.73		
ES			1.0	0.84	0.6	0.73		
BRD-S			1.3	0.85	0.8	0.75		
PYLL-70								
per 100,000			7.5		4.7			
ES			6.4		3.9			
AYLL-70			9.9		9.2			



Table 14a

Further malignancies in deaths in period 1998–2016  
MALES

Diagnosis	Total n	Total %↓	Pre n	Pre ←%	Syn- chron ±30d n	Syn- chron ±30d ←%	Post n	Post ←%
C03–C06 Oral cavity	2	2.3	1	50.0			1	50.0
C09–C10 Oropharynx	2	2.3	2	100.0				
C12–C13 Hypopharynx	3	3.5	3	100.0				
C15 Oesophagus	2	2.3			1	50.0	1	50.0
C16 Stomach	1	1.2					1	100.0
C18 Colon	12	14.0	9	75.0	1	8.3	2	16.7
C19–C20 Rectum	4	4.7	4	100.0				
C22 Liver	1	1.2			1	100.0		
C23–C24 Bile	3	3.5	1	33.3	2	66.7		
C32 Larynx	1	1.2	1	100.0				
C33–C34 Lung	2	2.3					2	100.0
C43 Malign. melanoma	4	4.7	3	75.0	1	25.0		
C44 Skin others	6	7.0	5	83.3			1	16.7
C61 Prostate	25	29.1	21	84.0	3	12.0	1	4.0
C62 Testis	1	1.2	1	100.0				
C64 Kidney	3	3.5	3	100.0				
C67 Bladder	6	7.0	4	66.7	1	16.7	1	16.7
C69 Eye melanoma	1	1.2	1	100.0				
C73 Thyroid	2	2.3	2	100.0				
C82–C85 NHL	4	4.7	2	50.0			2	50.0
C90 Mult. myeloma	1	1.2	1	100.0				
All further malignancies	86	100.0	64	74.4	10	11.6	12	14.0

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 further malignancy.

Table 14b

Further malignancies in deaths in period 1998-2016  
FEMALES

Diagnosis	Total n	Total %↓	Pre n	Pre ←%	Syn- chron ±30d n	Syn- chron ±30d ←%	Post n	Post ←%
C16 Stomach	3	5.1	2	66.7	1	33.3		
C18 Colon	8	13.6	1	12.5	4	50.0	3	37.5
C19-C20 Rectum	1	1.7			1	100.0		
C22 Liver	1	1.7					1	100.0
C25 Pancreas	1	1.7					1	100.0
C30-C31 Sinuses	1	1.7	1	100.0				
C33-C34 Lung	3	5.1	1	33.3	1	33.3	1	33.3
C43 Malign. melanoma	1	1.7	1	100.0				
C44 Skin others	6	10.2	6	100.0				
C50 Breast	16	27.1	14	87.5	1	6.3	1	6.3
C51 Vulva	1	1.7					1	100.0
C53 Cervix uteri	2	3.4	2	100.0				
C54 Corpus uteri	5	8.5	5	100.0				
C56 Ovary	2	3.4	1	50.0			1	50.0
C64 Kidney	5	8.5	2	40.0	1	20.0	2	40.0
C81 Hodgkin lymphoma	1	1.7	1	100.0				
C82-C85 NHL	2	3.4			2	100.0		
All further malignancies	59	100.0	37	62.7	11	18.6	11	18.6

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 further malignancy.

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	Males Prop.all cancers %	Females Prop.all cancers %
0- 4								
5- 9								
10-14								
15-19								
20-24								
25-29								
30-34								
35-39	2	4	0.1	0.67	0.3	1.00	1.1	1.6
40-44	5	2	0.3	1.00	0.1	0.50	1.1	0.3
45-49	11	4	0.6	0.92	0.2	0.40	1.0	0.4
50-54	13	4	0.8	0.76	0.2	0.29	0.7	0.2
55-59	27	16	1.9	0.75	1.1	0.70	0.9	0.7
60-64	38	28	3.1	0.90	2.1	0.88	0.9	0.9
65-69	36	33	3.0	0.82	2.5	0.77	0.6	0.8
70-74	55	51	5.0	0.81	4.0	0.86	0.8	1.0
75-79	48	33	6.0	1.00	3.3	0.79	0.7	0.6
80-84	16	21	3.5	0.89	3.0	0.91	0.3	0.4
85+	9	6	2.9	0.82	0.8	1.50	0.2	0.1
All ages	260	202					0.6	0.5
Mortality								
Raw			1.1	0.85	0.9	0.78		
WS			0.6	0.84	0.4	0.73		
ES			0.8	0.84	0.6	0.74		
BRD-S			1.1	0.86	0.7	0.76		
PYLL-70								
per 100,000			6.9		4.2			
ES			5.9		3.5			
AYLL-70			10.5		9.2			

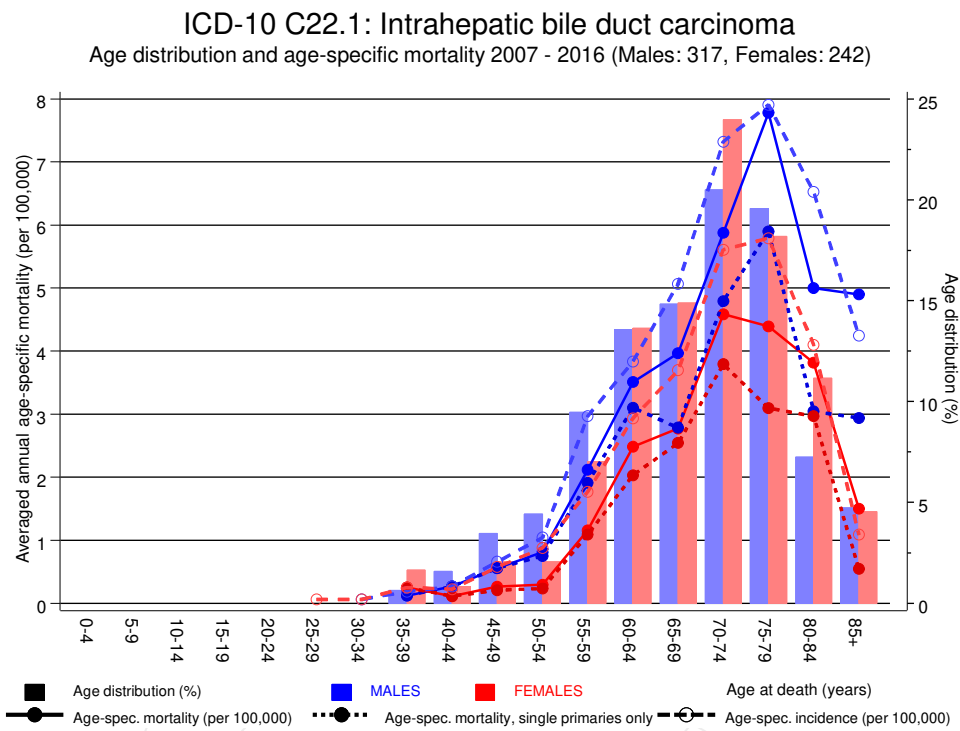
\* See corresponding tables with multiple malignancies.

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	Males Prop.all cancers %	Females Prop.all cancers %
0- 4						
5- 9						
10-14						
15-19						
20-24						
25-29						
30-34						
35-39	2	4	0.1	0.67	1.1	1.6
40-44	5	2	0.3	1.00	1.1	0.3
45-49	11	4	0.6	0.92	1.1	0.4
50-54	13	4	0.8	0.76	0.7	0.2
55-59	27	16	1.9	0.82	0.9	0.7
60-64	38	27	3.1	0.93	0.9	0.9
65-69	33	33	2.8	0.85	0.6	0.8
70-74	53	48	4.8	0.80	0.8	0.9
75-79	47	31	5.9	1.02	0.7	0.6
80-84	14	21	3.0	0.82	0.3	0.4
85+	9	4	2.9	0.82	0.2	0.1
All ages	252	194			0.6	0.5
Mortality						
Raw			1.1	0.87		
WS			0.6	0.86		
ES			0.8	0.86		
BRD-S			1.0	0.87		
PYLL-70						
per 100,000			6.9			4.2
ES			5.9			3.5
AYLL-70			10.7			9.2

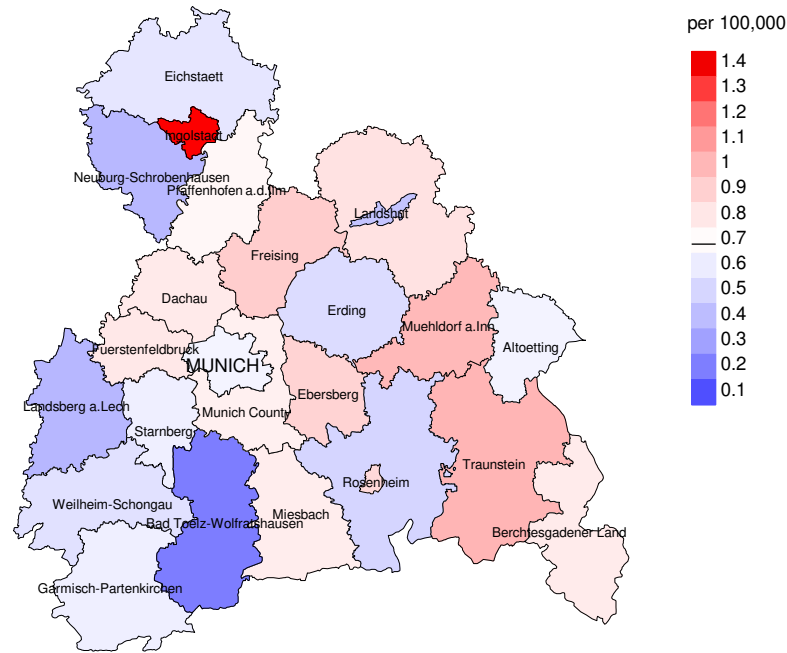
\* See corresponding tables with multiple malignancies.



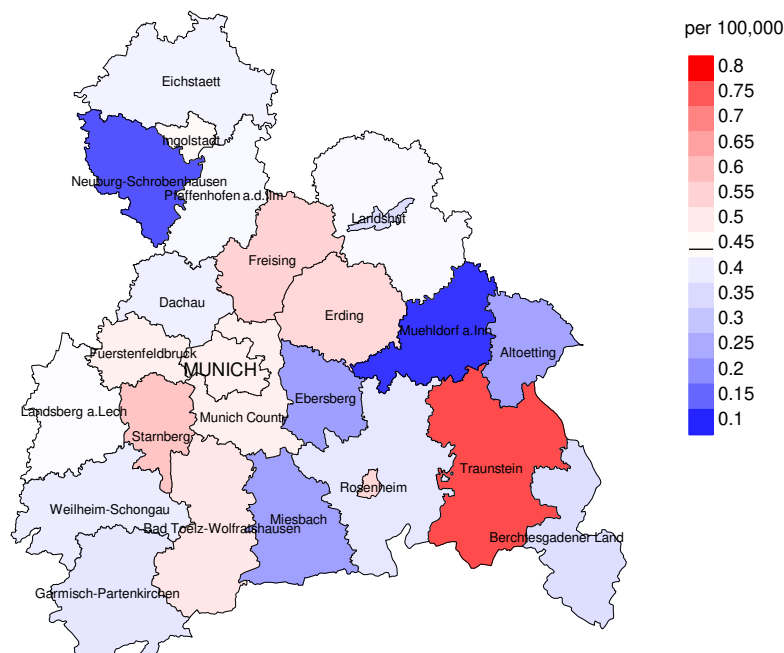
**Figure 17.** Distribution of age at death (bars; males: mean=68.2 yrs, median=69.8 yrs; females: mean=69.4 yrs, median=70.5 yrs) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

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

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



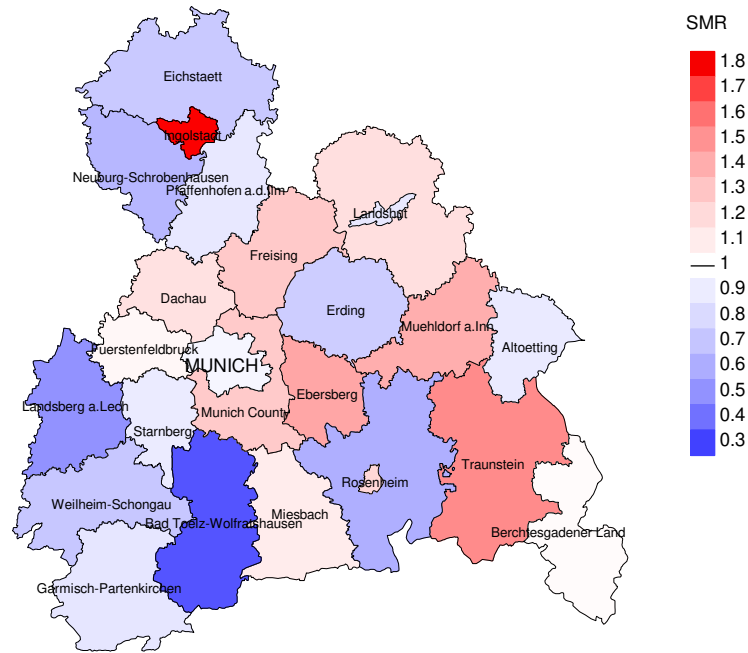
Average mortality (world standard population) 2007 - 2016: Females



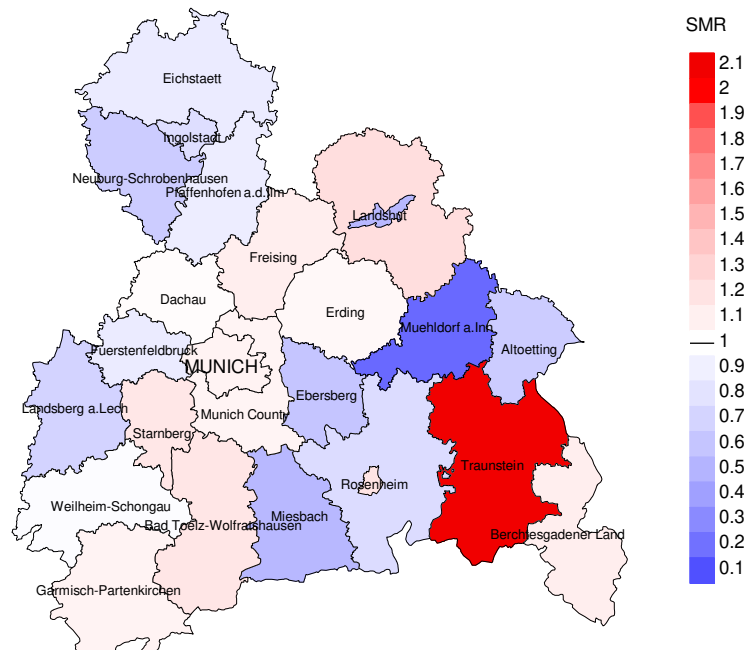
**Figure 18a.** Map of cancer mortality (world standard population) by county averaged for period 2007 to 2016. According to their individual mortality rates, the counties are displayed in different red and blue hues, being the fine white color attributed to the population mean (males 0.7/100,000 WS N=317, females 0.4/100,000 WS N=242).

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 4 women died from cholangiocarcinoma. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 0.2/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.0 and 1.2/100,000.

Standardized mortality ratio (SMR) 2007 - 2016: Males



Standardized mortality ratio (SMR) 2007 - 2016: Females



**Figure 18b.** Map of standardized mortality ratio (SMR) 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=317, females N=242).

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 4 women died from cholangiocarcinoma. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 0.61. Though, the value of this parameter may vary with an underlying probability of 99% between 0.10 and 1.91, 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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