# Munich Cancer Registry


- Incidence and Mortality
- Selection Matrix
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- *Deutsch*


## ICD-10 C91-C95: Leukaemias

## Survival

| | | |
|---|---|---|
| Year of diagnosis | 1988-1997 | 1998-2020 |
| Patients | 1,206 | 11,588 |
| Diseases | 1,209 | 11,683 |
| Cases evaluated | 1,053 | 6,572 |

| | |
|---|---|
| Creation date | 04/15/2022 |
| Database export | 12/20/2021 |
| Population | 4.92 m |



Munich Cancer Registry
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https://www.tumorregister-muenchen.de/en



https://www.tumorregister-muenchen.de/en/facts/surv/sC9195E-ICD-10-C91-C95-Leukaemias-survival.pdf

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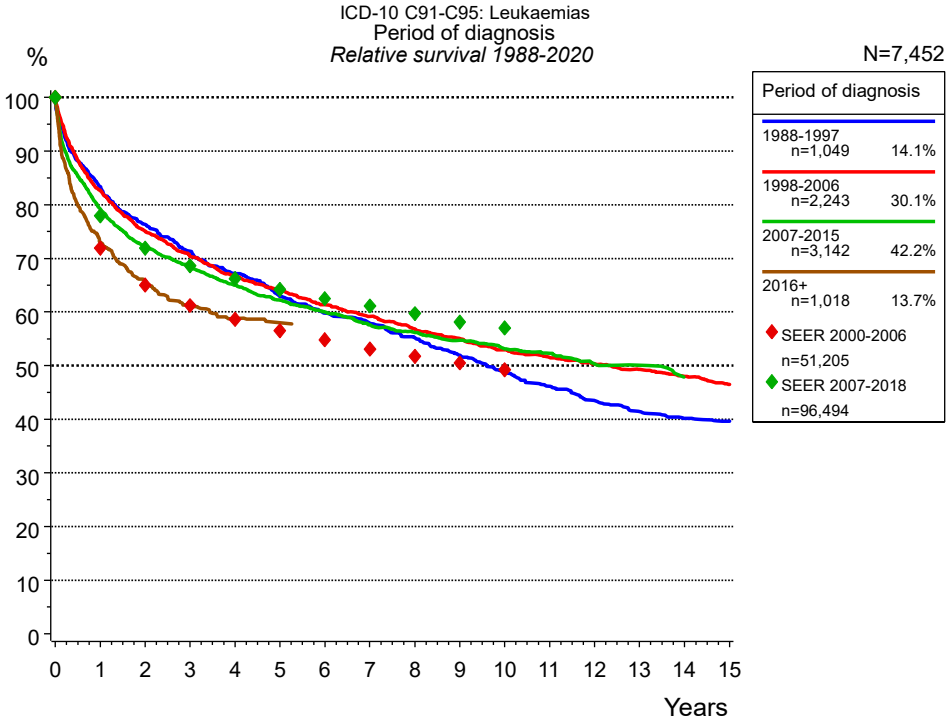


**Figure 1a.** Relative survival of patients with leukaemias by period of diagnosis. Included in the evaluation are 7,452 cases diagnosed between 1988 and 2020.

The survival results of the SEER program (Surveillance, Epidemiology, and End Results) of the American National Cancer Institute (NCI) are summarized as the period of diagnosis from 2000 to 2018, and are represented by colored diamonds in order to facilitate comparisons between MCR and SEER.

The presented survival curves are derived from clinical records with valid follow-up informations, which means that death certificate cases (DCO) cases are omitted from the analysis. With this one restriction, the MCR has provided population-based statistics since 1998, collecting data on all cancer cases in the region of southern Bavaria. Historical data of previous time periods can be heavily selected, therefore, univariate survival comparisons of the presented time periods must be carefully considered. Nonetheless, all calculable survival curves are depicted to facilitate the comparison of long time follow-up analyses of relative survival between particular cancers.

| | Period of diagnosis | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1988-1997 n=1,049 | | 1998-2006 n=2,243 | | 2007-2015 n=3,142 | | 2016+ n=1,018 | |
| Years | obs. % | rel. % | obs. % | rel. % | obs. % | rel. % | obs. % | rel. % |
| 0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| 1 | 81.7 | 83.4 | 80.9 | 82.7 | 77.4 | 79.2 | 71.3 | 73.0 |
| 2 | 73.6 | 76.3 | 72.1 | 75.1 | 69.2 | 72.2 | 63.2 | 65.8 |
| 3 | 67.6 | 71.3 | 66.5 | 70.4 | 64.1 | 68.2 | 57.6 | 61.2 |
| 4 | 62.5 | 67.2 | 61.9 | 66.6 | 60.0 | 65.0 | 54.3 | 58.8 |
| 5 | 57.5 | 62.9 | 58.5 | 64.1 | 56.4 | 62.3 | 53.0 | 58.0 |
| 6 | 53.6 | 59.8 | 55.0 | 61.4 | 53.3 | 60.0 | | |
| 7 | 51.1 | 57.9 | 52.2 | 59.2 | 50.3 | 57.6 | | |
| 8 | 47.9 | 55.2 | 49.3 | 56.8 | 48.2 | 56.2 | | |
| 9 | 44.4 | 51.9 | 46.9 | 55.0 | 46.2 | 54.7 | | |
| 10 | 41.0 | 48.8 | 44.4 | 52.9 | 44.0 | 53.1 | | |
| 11 | 38.2 | 46.1 | 42.4 | 51.5 | 42.5 | 52.3 | | |
| 12 | 35.4 | 43.4 | 40.7 | 50.3 | 40.1 | 50.3 | | |
| 13 | 33.2 | 41.4 | 39.2 | 49.3 | 39.1 | 50.1 | | |
| 14 | 31.7 | 40.2 | 37.5 | 48.0 | | | | |
| 15 | 30.9 | 39.6 | 35.6 | 46.5 | | | | |
| Median | 7.3 | | 7.8 | | 7.1 | | | |

**Table 1b.** Observed (obs.) and relative (rel.) survival of patients with leukaemias by period of diagnosis for period 1988-2020 (N=7,452).

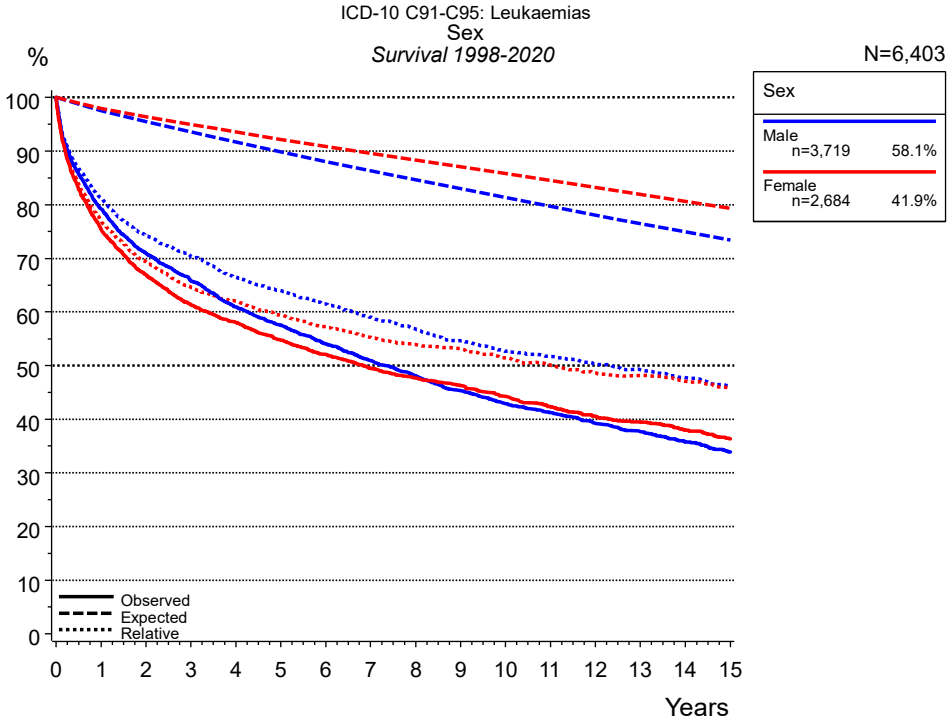


**Figure 2a.** Survival of patients with leukaemias by sex. Included in the evaluation are 6,403 cases diagnosed between 1998 and 2020.

| | Sex | | | |
|---|---|---|---|---|
| | Male n=3,719 | | Female n=2,684 | |
| Years | obs. % | rel. % | obs. % | rel. % |
| 0 | 100.0 | 100.0 | 100.0 | 100.0 |
| 1 | 79.2 | 81.2 | 75.5 | 77.0 |
| 2 | 70.9 | 74.3 | 66.9 | 69.4 |
| 3 | 65.8 | 70.3 | 61.3 | 64.6 |
| 4 | 60.9 | 66.4 | 58.0 | 62.0 |
| 5 | 57.6 | 64.0 | 54.8 | 59.4 |
| 6 | 54.1 | 61.4 | 52.1 | 57.3 |
| 7 | 50.9 | 59.0 | 49.5 | 55.2 |
| 8 | 48.1 | 56.8 | 47.7 | 53.9 |
| 9 | 45.3 | 54.6 | 46.2 | 53.1 |
| 10 | 42.9 | 52.7 | 44.2 | 51.5 |
| 11 | 41.2 | 51.7 | 42.4 | 50.1 |
| 12 | 39.2 | 50.2 | 40.5 | 48.7 |
| 13 | 37.7 | 49.2 | 39.5 | 48.1 |
| 14 | 35.8 | 47.7 | 38.0 | 47.1 |
| 15 | 33.9 | 46.1 | 36.4 | 45.8 |
| Median | 7.3 | | 6.8 | |

**Table 2b.** Observed (obs.) and relative (rel.) survival of patients with leukaemias by sex for period 1998-2020 (N=6,403).

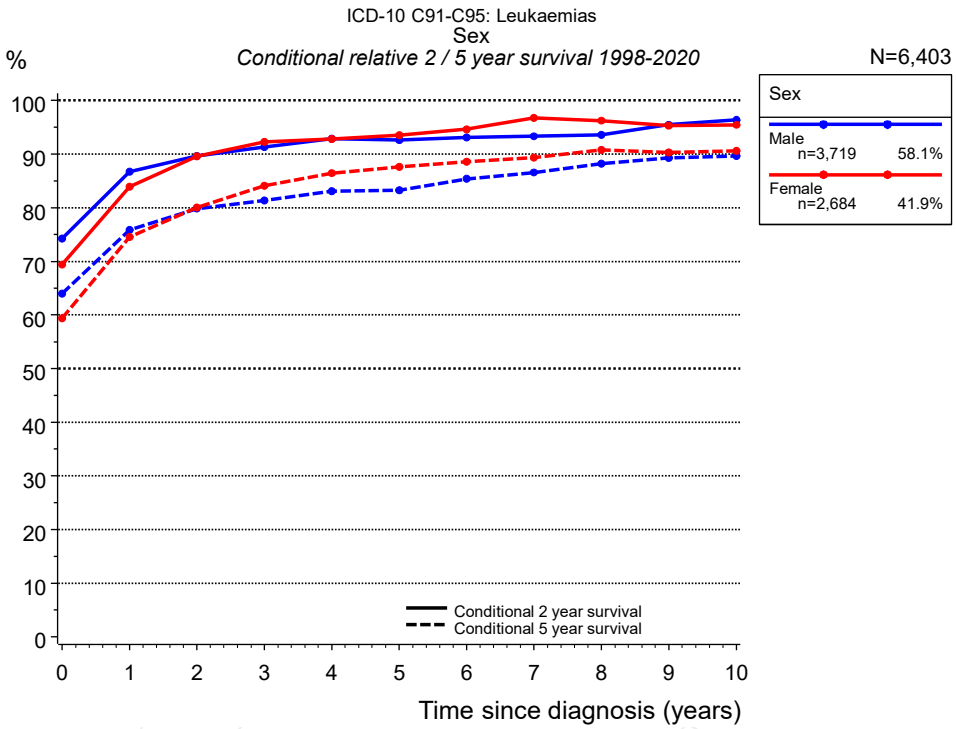


**Figure 2c.** Conditional relative 2 / 5-year survival of patients with leukaemias by sex. For 6,403 of 6,403 cases diagnosed between 1998 and 2020 valid data could be obtained for this item.

| | Sex | | | | | |
|---|---|---|---|---|---|---|
| | Male | | | Female | | |
| | | Cond. surv. % | | | Cond. surv. % | |
| Years | n | 2 yrs | 5 yrs | n | 2 yrs | 5 yrs |
| 0 | 3,719 | 74.3 | 64.0 | 2,684 | 69.4 | 59.4 |
| 1 | 2,842 | 86.7 | 75.8 | 1,952 | 83.9 | 74.6 |
| 2 | 2,484 | 89.6 | 79.8 | 1,684 | 89.6 | 80.0 |
| 3 | 2,253 | 91.3 | 81.4 | 1,490 | 92.3 | 84.1 |
| 4 | 2,025 | 92.8 | 83.0 | 1,364 | 92.8 | 86.4 |
| 5 | 1,814 | 92.6 | 83.3 | 1,223 | 93.5 | 87.6 |
| 6 | 1,609 | 93.1 | 85.4 | 1,103 | 94.6 | 88.6 |
| 7 | 1,429 | 93.3 | 86.6 | 1,002 | 96.7 | 89.4 |
| 8 | 1,257 | 93.5 | 88.3 | 918 | 96.2 | 90.7 |
| 9 | 1,094 | 95.5 | 89.3 | 812 | 95.3 | 90.3 |
| 10 | 938 | 96.3 | 89.7 | 708 | 95.4 | 90.6 |

**Table 2d.** Conditional relative 2 / 5-year survival of patients with leukaemias by sex for period 1998-2020 (N=6,403).

Conditional relative survival rates refer to the relative survival probability, in this case for 2 and 5 years after cancer diagnosis, compared to the age- and sex-matched population (=100 %) under the condition of being alive for a certain time period (x-axis in Figure 2a). The results illustrate to what extent the cancer induced mortality of particular subgroups declines in the subsequent years after detection of the malignancy. For instance, according to the presented survival statistics, patients in the subgroup sex="Male", who are alive at least 3 years after cancer diagnosis, the conditional relative 2-year survival rate is 91.3% (n=2,253).

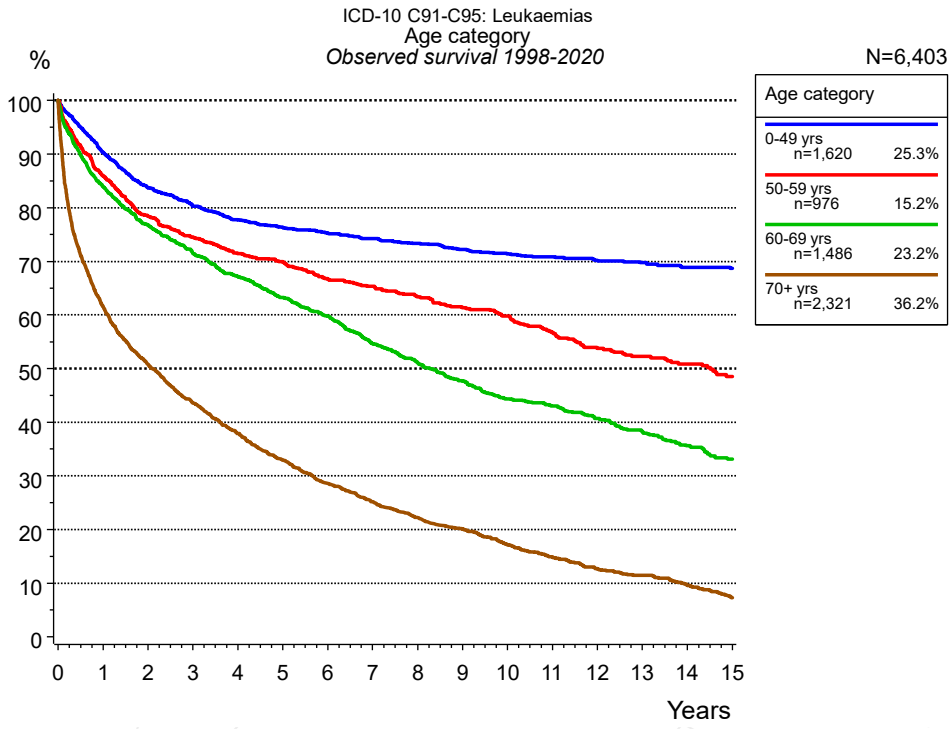


**Figure 3a.** Observed survival of patients with leukaemias by age category. Included in the evaluation are 6,403 cases diagnosed between 1998 and 2020.

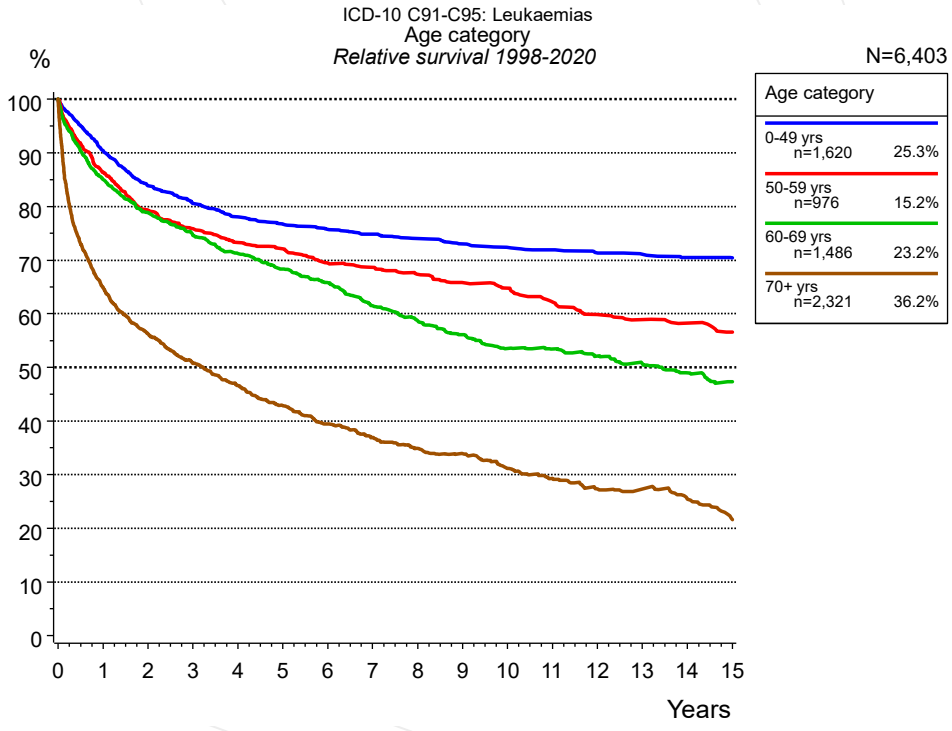


**Figure 3b.** Relative survival of patients with leukaemias by age category. Included in the evaluation are 6,403 cases diagnosed between 1998 and 2020.

| | Age category | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 0-49 yrs n=1,620 | | 50-59 yrs n=976 | | 60-69 yrs n=1,486 | | 70+ yrs n=2,321 | |
| Years | obs. % | rel. % | obs. % | rel. % | obs. % | rel. % | obs. % | rel. % |
| 0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| 1 | 90.3 | 90.4 | 85.9 | 86.4 | 83.9 | 85.0 | 61.6 | 64.9 |
| 2 | 83.7 | 83.8 | 78.5 | 79.3 | 76.8 | 78.9 | 50.8 | 56.3 |
| 3 | 80.4 | 80.6 | 74.6 | 75.8 | 71.5 | 74.6 | 43.6 | 50.8 |
| 4 | 77.8 | 78.0 | 71.5 | 73.3 | 67.1 | 71.3 | 37.9 | 46.6 |
| 5 | 76.4 | 76.7 | 69.9 | 72.1 | 63.3 | 68.3 | 32.9 | 42.8 |
| 6 | 75.2 | 75.7 | 66.7 | 69.5 | 59.8 | 65.8 | 28.6 | 39.5 |
| 7 | 74.2 | 74.8 | 65.3 | 68.6 | 54.7 | 61.4 | 25.2 | 36.9 |
| 8 | 73.3 | 74.0 | 63.4 | 67.3 | 51.1 | 58.7 | 22.2 | 34.9 |
| 9 | 72.2 | 73.0 | 61.3 | 65.8 | 47.7 | 56.1 | 20.1 | 33.9 |
| 10 | 71.4 | 72.4 | 59.7 | 64.7 | 44.4 | 53.5 | 17.1 | 31.2 |
| 11 | 70.8 | 71.8 | 56.7 | 62.2 | 43.0 | 53.4 | 14.9 | 29.3 |
| 12 | 70.2 | 71.3 | 53.7 | 59.9 | 40.7 | 52.1 | 12.7 | 27.4 |
| 13 | 69.7 | 71.0 | 52.2 | 58.9 | 38.3 | 50.7 | 11.5 | 27.3 |
| 14 | 68.9 | 70.4 | 50.8 | 58.2 | 35.6 | 49.0 | 9.7 | 25.5 |
| 15 | 68.7 | 70.4 | 48.5 | 56.6 | 33.1 | 47.3 | 7.3 | 21.6 |
| Median | | | 14.5 | | 8.3 | | 2.1 | |

**Table 3c.** Observed (obs.) and relative (rel.) survival of patients with leukaemias by age category for period 1998-2020 (N=6,403).

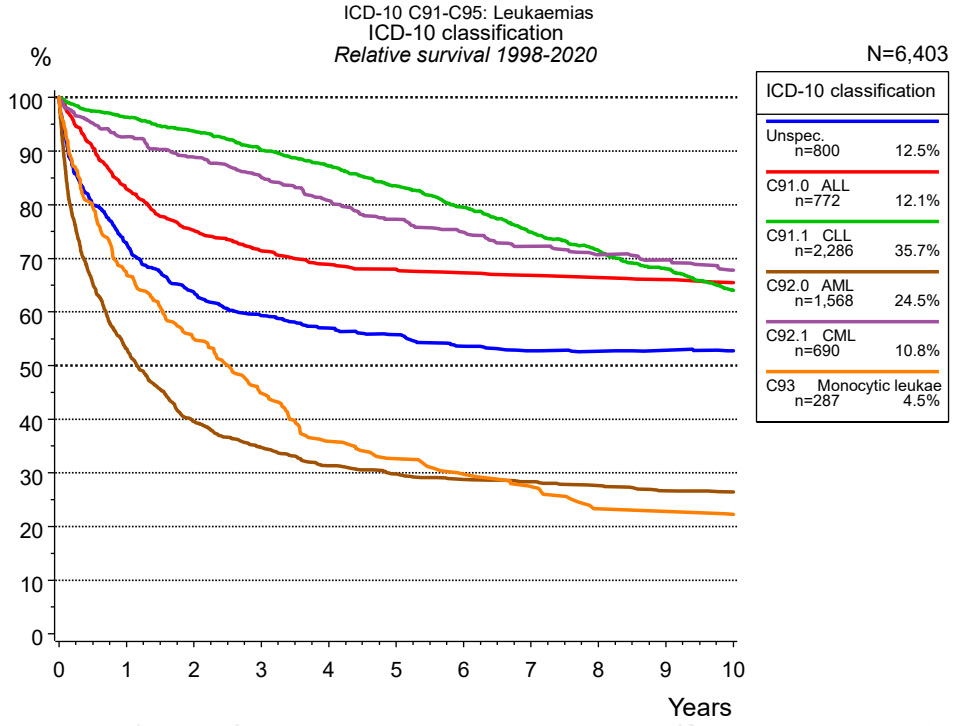


**Figure 4a.** Relative survival of patients with leukaemias by ICD-10 classification. Included in the evaluation are 6,403 cases diagnosed between 1998 and 2020.

| | ICD-10 classification | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Unspec. n=800 | | C91.0 ALL n=772 | | C91.1 CLL n=2,286 | | C92.0 AML n=1,568 | | C92.1 CML n=690 | | C93 Monocytic leukaemia n=287 | |
| Years | obs. % | rel. % | obs. % | rel. % | obs. % | rel. % | obs. % | rel. % | obs. % | rel. % | obs. % | rel. % |
| 0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| 1 | 71.3 | 72.8 | 82.5 | 82.9 | 93.7 | 96.3 | 51.8 | 53.1 | 91.0 | 92.7 | 65.1 | 67.1 |
| 2 | 61.4 | 63.6 | 74.8 | 75.2 | 88.8 | 93.7 | 38.0 | 39.6 | 85.8 | 88.9 | 52.1 | 55.0 |
| 3 | 56.4 | 59.3 | 70.9 | 71.4 | 83.2 | 90.2 | 33.0 | 34.7 | 81.0 | 85.1 | 41.5 | 44.9 |
| 4 | 53.6 | 57.0 | 68.2 | 68.9 | 78.4 | 87.2 | 29.4 | 31.4 | 75.7 | 80.8 | 32.5 | 35.9 |
| 5 | 51.7 | 55.8 | 67.2 | 67.9 | 73.1 | 83.5 | 27.7 | 29.8 | 71.3 | 77.3 | 29.0 | 32.6 |
| 6 | 49.0 | 53.6 | 66.2 | 67.3 | 67.7 | 79.5 | 26.4 | 28.8 | 68.2 | 74.9 | 26.2 | 29.7 |
| 7 | 47.5 | 52.7 | 65.8 | 66.8 | 62.1 | 74.9 | 25.8 | 28.4 | 64.9 | 72.2 | 23.6 | 27.4 |
| 8 | 46.8 | 52.6 | 65.3 | 66.5 | 57.7 | 71.5 | 24.8 | 27.6 | 62.5 | 70.7 | 19.8 | 23.3 |
| 9 | 46.2 | 52.8 | 64.8 | 66.0 | 53.3 | 68.1 | 23.7 | 26.6 | 61.0 | 69.7 | 19.2 | 22.8 |
| 10 | 45.4 | 52.7 | 64.1 | 65.5 | 48.7 | 64.0 | 23.4 | 26.4 | 58.4 | 67.9 | 18.5 | 22.2 |
| Median | 5.3 | | | | 9.7 | | 1.1 | | 16.1 | | 2.3 | |

**Table 4b.** Observed (obs.) and relative (rel.) survival of patients with leukaemias by ICD-10 classification for period 1998-2020 (N=6,403).

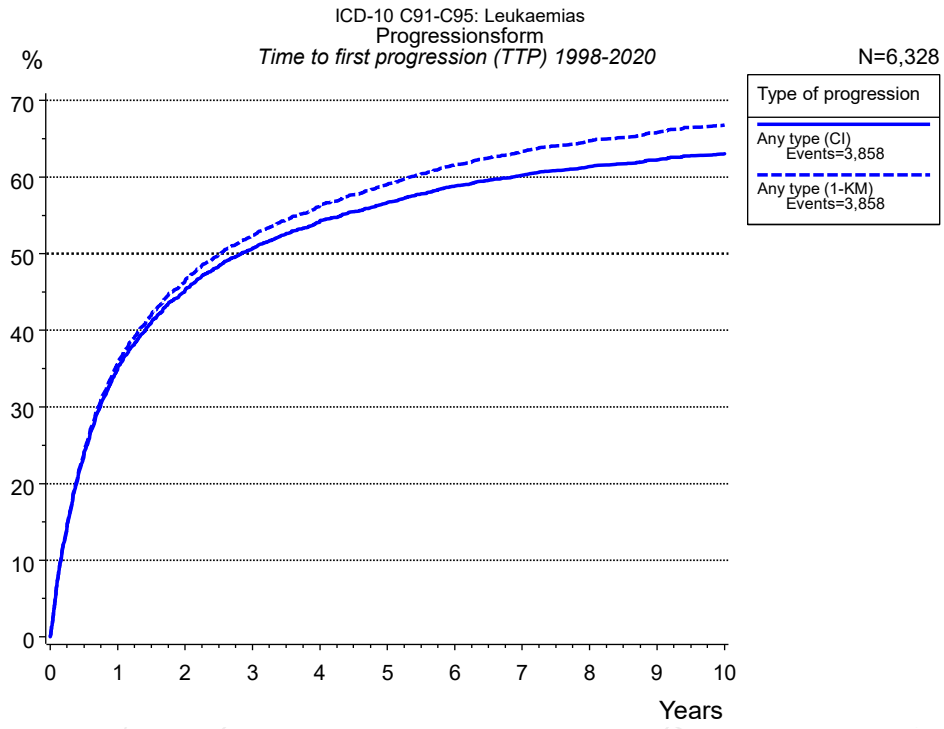


**Figure 5a.** Time to first progression of 6,328 patients with leukaemias diagnosed between 1998 and 2020 (in solid cancers M0 only) estimated by cumulative incidence function (CI, solid line) accounting for death as competing risk and by inverse Kaplan-Meier estimate (1-KM, dashed line). The frequency of events may be underestimated due to underreporting.

| Type of progression | | |
|---|---|---|
| | Any type (CI) | Any type (1-KM) |
| N | 6,328 | 6,328 |
| Events | 3,786 | 3,786 |
| compet. | 648 | |
| Years | % | % |
| 0 | 0.0 | 0.0 |
| 1 | 35.0 | 35.7 |
| 2 | 45.2 | 46.4 |
| 3 | 50.6 | 52.3 |
| 4 | 54.1 | 56.2 |
| 5 | 56.7 | 59.1 |
| 6 | 58.8 | 61.6 |
| 7 | 60.3 | 63.3 |
| 8 | 61.4 | 64.7 |
| 9 | 62.2 | 65.8 |
| 10 | 63.0 | 66.8 |

**Table 5b.** Time to first progression of patients with leukaemias for period 1998-2020 (N=6,328), also showing the total of progression events (Events) and of deaths as competing risk (compet.).

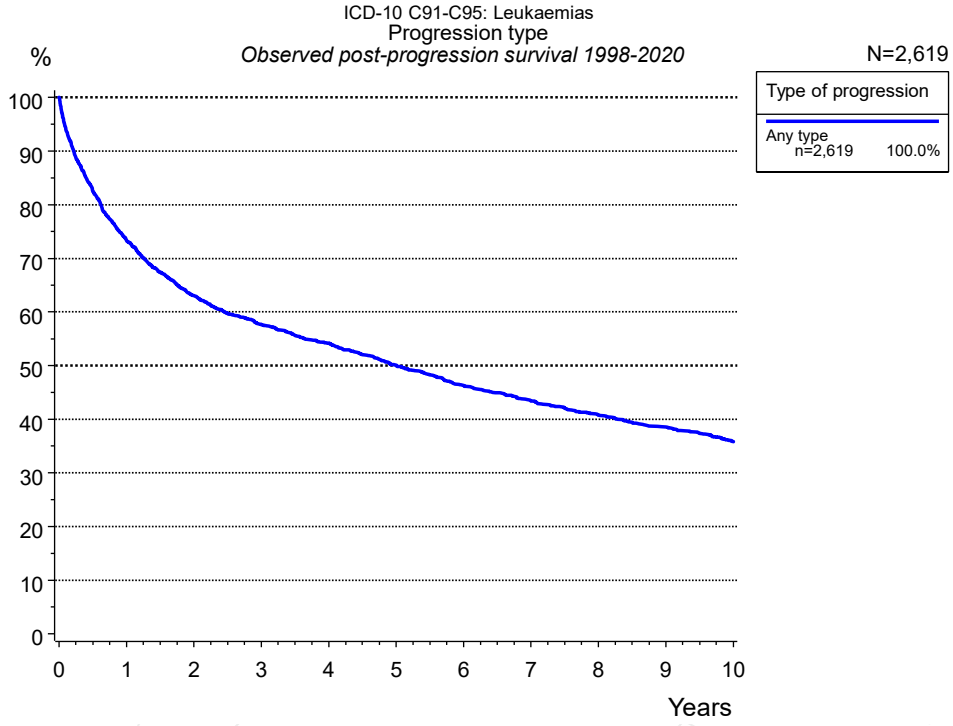


**Figure 5c.** Observed post-progression survival of 2,619 patients with leukaemias diagnosed between 1998 and 2020. These 2,619 patients with documented progression events during their course of disease represent 41.4 % of the totally 6,330 evaluated cases. Patients with cancer relapse documented via death certificates only were excluded (n=1,241, 19.6 %).

Medical record documentation often lacks the linguistic severity to distinguish between local relapse, regional lymph node metastasis and distant spread in solid cancers. Frequently, the statement “not specified” is the only information in registries regarding relapse of the disease. The category “Any type” denotes all cases who suffered from at least one relapse during the course of disease (incl. primary M1-status). Although, the real number of relapsed patients is likely to be much higher. The accumulated percentage of patients with local relapse or distant metastasis exceeds the 100 % value because patients are potientially considered in more than one subgroup.

| Type of progression | |
|---|---|
| | Any type n=2,619 |
| Years | % |
| 0 | 100.0 |
| 1 | 73.4 |
| 2 | 63.1 |
| 3 | 57.7 |
| 4 | 54.2 |
| 5 | 50.1 |
| 6 | 46.3 |
| 7 | 43.4 |
| 8 | 40.7 |
| 9 | 38.6 |
| 10 | 35.8 |

**Table 5d.** Observed post-progression survival of patients with leukaemias for period 1998-2020 (N=2,619).

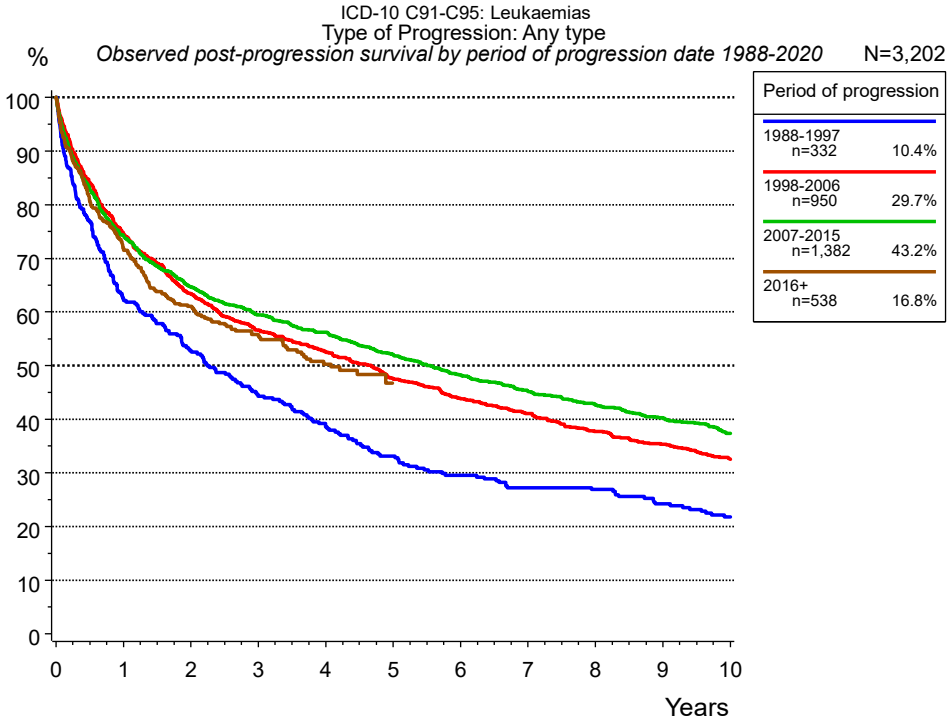


**Figure 5e.** Observed post-progression (any type) survival of 3,202 patients with leukaemias diagnosed between 1988 and 2020 by period of progression.

| | Period of progression | | | |
|---|---|---|---|---|
| | 1988-1997 n=332 | 1998-2006 n=950 | 2007-2015 n=1,382 | 2016+ n=538 |
| Years | % | % | % | % |
| 0 | 100.0 | 100.0 | 100.0 | 100.0 |
| 1 | 62.5 | 74.5 | 74.1 | 71.9 |
| 2 | 52.8 | 63.4 | 64.7 | 61.1 |
| 3 | 44.3 | 56.7 | 59.4 | 55.8 |
| 4 | 38.6 | 52.7 | 56.2 | 50.3 |
| 5 | 33.1 | 47.6 | 52.1 | 46.7 |
| 6 | 29.6 | 43.8 | 48.3 | |
| 7 | 27.3 | 41.0 | 45.2 | |
| 8 | 26.9 | 37.7 | 42.7 | |
| 9 | 24.2 | 35.3 | 40.3 | |
| 10 | 21.8 | 32.5 | 37.4 | |

**Table 5f.** Observed post-progression (any type) survival of patients with leukaemias for period 1988-2020 by period of progression (N=3,202).

**Shortcuts**

| | | |
|---|---|---|
| MCR | Munich Cancer Registry, Germany | |
| NCI | National Cancer Institute, USA | |
| SEER | Surveillance, Epidemiology, and End Results, USA | |
| UICC | Union for International Cancer Control, Geneva | |
| DCO | Death certificate only | Death certificate provides the only notification to the registry. |
| NA | Not available | |
| NOS | Not otherwise specified | |
| OS | Overall/Observed survival | Overall/Observed survival (Kaplan-Meier estimate)<br>Date of entry: diagnosis<br>Event: death from any cause |
| RS | Relative survival | Survival compared to “general population”,<br>ratio of observed to expected survival (Ederer II method),<br>reflecting cancer specific survival |
| AS | Assembled survival | Assembled chart of<br>observed, expected, relative survival |
| CS | Conditional survival | Survival probability under the condition of surviving<br>a given period of time |
| TTP | Time to progression | Time to first progression / relapse<br>Date of entry: diagnosis<br>Event: (progression / relapse): first local-, lymph node recurrence, distant metastasis or unspecified progression |
| | 1-KM | 1 minus Kaplan-Meier estimator<br>(“inverse” Kaplan-Meier estimator) |
| | CI | Cumulative incidence<br>Death as competing risk (according to Kalbfleisch und Prentice) |
| PPS | Post-progression survival | Survival since first progression / relapse (Kaplan-Meier estimate)<br>Date of entry (progression / relapse): first local-, lymph node recurrence, distant metastasis or unspecified progression<br>Event: death from any cause |

**Recommended Citation**

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