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Change in the age structure of newly diagnosed cancer patients in private practices between 2010 and 2022

Summary

The aim of the present study was to determine the age of new cancer patients in 2010 and 2022 and to assess changes in the proportion of early-onset cancers in the total number of cancer cases in private practices. In this retrospective cross-sectional study, adult patients (≥18 years) with a first cancer diagnosis in 557 private practices in Germany in 2010 or 2022 were included from the Disease Analyzer database (IQVIA). We analysed the mean age at first cancer diagnosis and the proportions of three age groups (18-49, 50-65 and >65) in 2010 and 2022. In summary, our data suggest that among patients in private practices, the mean age at cancer diagnosis has increased significantly over the last decade and the proportion of patients with cancer at a younger age has decreased.

Keywords

Cancer, oncology, time trends, age, cross-sectional study

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Cancer is one of the most common causes of death worldwide and will be responsible for almost 10 million deaths in 2020. In the same year, about 19 million new cases of cancer were diagnosed worldwide [1]. The incidence of all cancers increased between 1998 and 2012 in most countries and in all age groups worldwide [2]. However, at least in Europe, the USA and part of Asia, this trend was in line with demographic changes and population ageing [3,4]. Cancer risk increases with age, and more than 60% of cancers are diagnosed in people aged 65 or older [5]. However, recent studies suggest a sharp increase in the incidence of cancer in adults under 50 years of age [6-15]. In young people diagnosed with cancer, the disease is often more advanced at the time of diagnosis than in older people, partly due to delayed diagnosis [16].

>> In the United Kingdom (UK), cancer incidence rates increased by 22% in 25- to 49-year-olds in 2016-2018 compared with 1993-1995, while they increased by 13% and 9% in 50- to 74-year-olds and 75-year-olds and older, respectively [10]. Sung et al. reported on new cancer trends among young adults in the US. Specifically, from 1995 to 2014, cancer incidence increased for six of 12 cancers (multiple myeloma, colorectal carcinoma, uterine carcinoma, gallbladder, kidney and pancreatic cancers) among people aged 25 to 49 years [8].

In the US, colorectal cancer rates increased in individuals aged 20 to 49 years from 2001 to 2017, with the fastest increase observed from 2012 to 2017 [6]. Gu et al. reported an increase in global incidence and mortality rates of colorectal cancer in young age over the last three decades [11]. In the Netherlands, the incidence of colorectal cancer at a younger age also increased by 0.7-2.1% in the last decades [12]. For Germany, Tanaka et al. obtained data on colorectal cancer incidence from the German Centre for Cancer Registry Data, showing an annual increase in colorectal cancer incidence at younger ages of 1.2% in men and 1.3% in women [14]. Finally, Vuik et al. accessed data on 144 million people aged 20-49 years from 20 European countries and showed that between 2004 and 2016, colorectal cancer incidence increased by 7.9%, 4.9% and 1.6% per year in the 20-29, 30-39 and 40-49 age groups, respectively [15].

Although large epidemiological studies from different countries have been conducted and are of great scientific value, the studies from Germany are limited. In addition, several of the cited studies focused on colorectal cancer or cancer overall, with incomplete data on changes in the incidence of other cancers. The aim of the present study was to determine the age of new cancer patients in 2010 and 2022 and to assess changes in the proportion of younger-aged cancers in total cancer cases in general practices.

Methods

This study is based on data from the Disease Analyzer database (IQVIA), which contains basic demographic data, diagnoses and drug prescriptions obtained directly and anonymously from computer systems in GP and specialist practices [17]. The database covers about 3-6% of all outpatient practices in Germany. It has already been shown that the practices included in the Disease Analyzer database are representative of the practising physicians in Germany [17]. Finally, this database has already been used in previous studies focusing on cancer [18-20]. The database used contains only anonymised data that comply with the provisions of the applicable data protection laws.

This retrospective cross-sectional study included adult patients (≥18 years) with a first documented cancer diagnosis (ICD-10: C00-C97) in 557 private practices in Germany in 2010 or 2022. These practices included 305 general practitioners and internists, 50 dermatologists, 95 gynaecologists, 34 urologists, 54 ENT specialists, eight pulmonologists and 11 gastroenterologists. Only practices that provided continuous data in 2010 and 2022 were included to allow comparison of the two time periods.

We analysed the mean age at first cancer diagnosis and the proportions of the three age groups (18-49, 50-65 and >65) in 2010 and 2022. Differences between the mean age in 2010 and 2022 were tested using Wilcoxon rank tests, and the proportions of the three age groups in 2010 and 2022 were tested using chi-square tests. These analyses were performed for cancer overall as well as for eight major cancer groups separately, including digestive organs, respiratory organs, skin, female breast, female genital organs, prostate, urinary tract, lymphoma and leukaemia. A P-value of <0.05 was considered statistically significant. Analyses were performed using SAS version 9.4.

Results

Table 1 shows the patient numbers available for analysis. A total of 38,857 patients were first diagnosed with cancer in 2010 and

36,636 in 2022. The most common cancer was skin cancer (12,331 in 2010 and 12,952 in 2022), followed by breast cancer (4,593 in 2010 and 4,503 in 2022) and cancer of the digestive organs (4,271 in 2010 and 3,443 in 2022).

Figure 1 shows the mean age at first documented cancer diagnosis in 2010 and 2022. The mean age of people at first cancer diagnosis was significantly lower in 2010 (64.0 years, standard deviation (StA): 14.6

years) compared to 2022 (67.9, StA: 14.7, p<0.001). The average age at first cancer diagnosis increased significantly in patients with all cancer types. The largest increase was observed for breast cancer from 55.2 (StA: 18.1) years in 2010 to 63.2 (StA: 15.2) years in 2022, p<0.001, followed by skin cancer from 63.4 (StA: 15.2) years in 2010 to 68.2 (StA: 15.3) years in 2022, p<0.001) and lymphoma from 62.2 (StA: 16.2) years in 2010 to 65.8 (StA: 16.2) years in 2022, p<0.001 (Fig. 1).

Patient:innen mit dokumentierter Krebserstdiagnose

Variable	2010	2022
Krebs insgesamt	38857	36636
Krebsarten		
Verdauungsorgane	4271	3443
Atmungsorgane	1684	1699
Haut	12331	12952
Brust	4593	4503
weibliche Geschlechtsorgane	1609	1219
Prostata	3465	3527
Harnwege	2137	2158
Lymphome	1121	1268
Leukämien	566	626
andere Krebsarten	7080	5241
Fachgebiete		
Allgemeinmediziner:innen	11149	12285
Dermatolog:innen	13759	14467
Urolog:innen	4988	5296
Gynäkolog:innen	4261	3055
Gastroenterolog:innen	1933	1178
HNO-Ärzt:innen	1858	1801
Pneumolog:innen	909	554
Geschlecht		
weiblich	19982	19733
männlich	18875	18903
Altersgruppe		
18–49	6737	4223
50–65	10819	11217
>65	21301	23196

Tab. 1: Patients with a documented initial cancer diagnosis in 2010 and 2022 in the Disease Analyzer database.

All differences between 2010 and 2022 are significant at p<0.001.

Figure 2 shows the proportions of the three age groups among patients with new cancer diagnoses. The proportion of cancers diagnosed at age 50 fell significantly from 17.3% in 2010 to 10.9% in 2022 (p<0.001). The largest relative decrease was observed in prostate cancer (1.7% to 0.8%, p<0.001), followed by cancer of the female genital organs (37.6% to 18.4%, p<0.001) and skin cancer (21.4% to 11.8%, p<0.001, Figure 2). Interestingly, we observed an increase in the proportion of new cancer diagnoses in the age group 50-65 years (27.8% to 29.0%, p<0.001 for cancer overall, 27.3% to 36.4%, p<0.001 for breast cancer, 25.4% to 29.1%, p<0.001 for leukaemia, 25.2% to 27.6%, p<0.001 for skin cancer, and 36.0% to 38.8%, p<0.001 for breast cancer, Figure 2). Finally, the proportion of patients aged over 65 years also increased from 54.8% in 2010 to 60.0% in 2022 (p<0.001). The largest increase in this age group was observed for cancers of the female genital organs (35.1% to 45.2%, p<0.001), skin cancer (53.4% to 60.6%, p<0.001) and lymphoma (50.8% to 56.4%, p<0.001).

Discussion

The results of our study, which analysed 75,493 patients with a new cancer diagnosis, show that the average age at the time of cancer diagnosis and the proportion of patients younger than 50 years at diagnosis have decreased significantly compared to 2010. At the same time, the proportion of cancer patients aged 50 to 65 has increased. However, the results refer exclusively to the figures from private practices.

This study did not confirm earlier reports about an increase in extremely young cancer patients. Emrich & Kraywinkel and colleagues showed that among patients with rectal cancer, the incidence in the age groups 20-29, 30-39 and 40-49 years increased significantly between 2003 and 2016 in Germany. However, only about 7% of patients were under 50 years of age [21]. Similarly, Vuik et al. demonstrated that from 2004 to 2016, colorectal cancer incidence increased by 7.9% per year in people aged 20-29 years, by 4.9% in people aged 30-39 years and by 1.6% in people aged 40-49 years [15]. The differences between our data and the earlier data are not easily explained. The different methods may have played a role. While the earlier studies were classic epidemiological register studies, the analyses presented here examined data from 305 general practitioners and internists, 50 dermatologists, 95 gynaecologists, 34 urologists, 54 ENT specialists, eight pneumologists and 11 gastroenterologists in Germany. It can therefore be assumed that different collectiveswere studied, which could explain the differences. Interestingly, however, our data are very consistent; the trend towards older age is evident in all tumour types examined and is supported by the lower proportion of very young patients and the increase in middle-aged patients. The fact that only practices that continuously provided data in 2010 and 2022 were used also speaks for the integrity of our data.

In Germany, all new cancer cases are systematically registered in population-based cancer registries according to federal and state law. The data from the cancer registries of the federal states are reported annually to the German Centre for Cancer Registry Data at the Robert Koch Institute (RKI), which regularly conducts analyses on cancer incidence, prevalence and survival rates. The results are

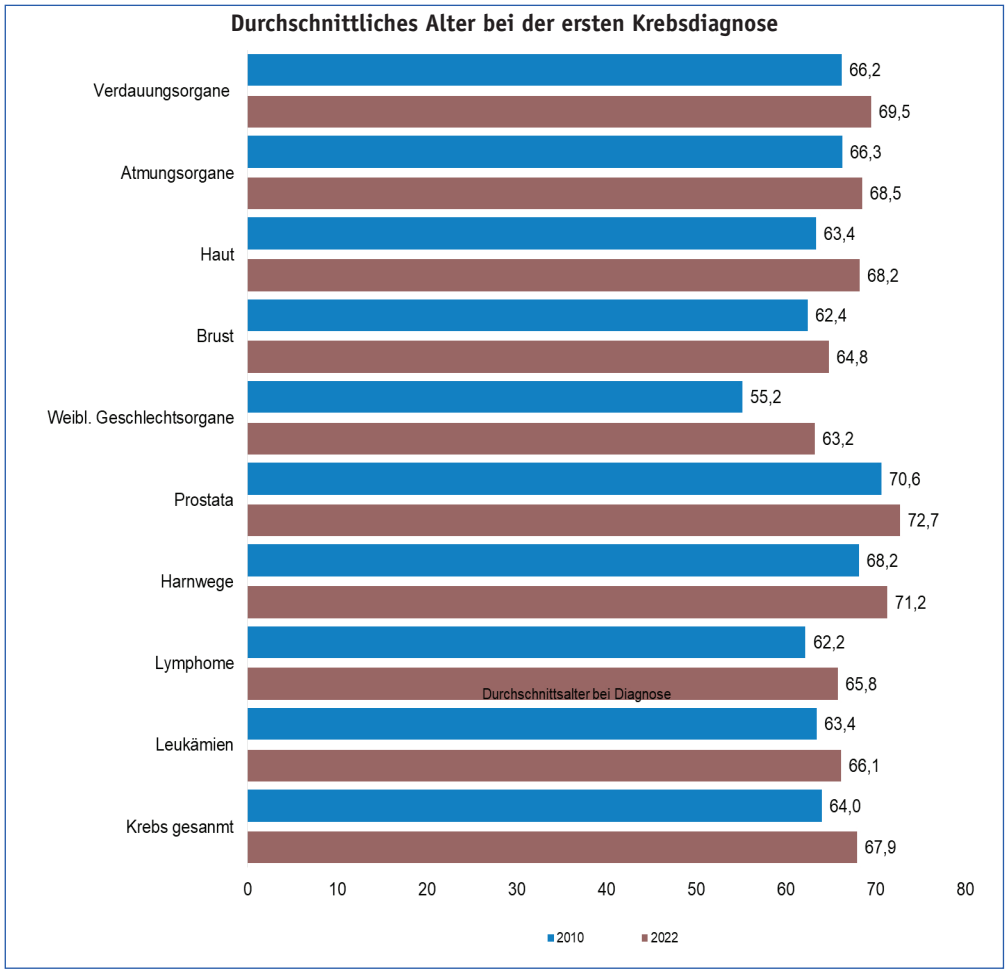


Fig.1: Average age at first cancer diagnosis, documentation 2010 and 2022

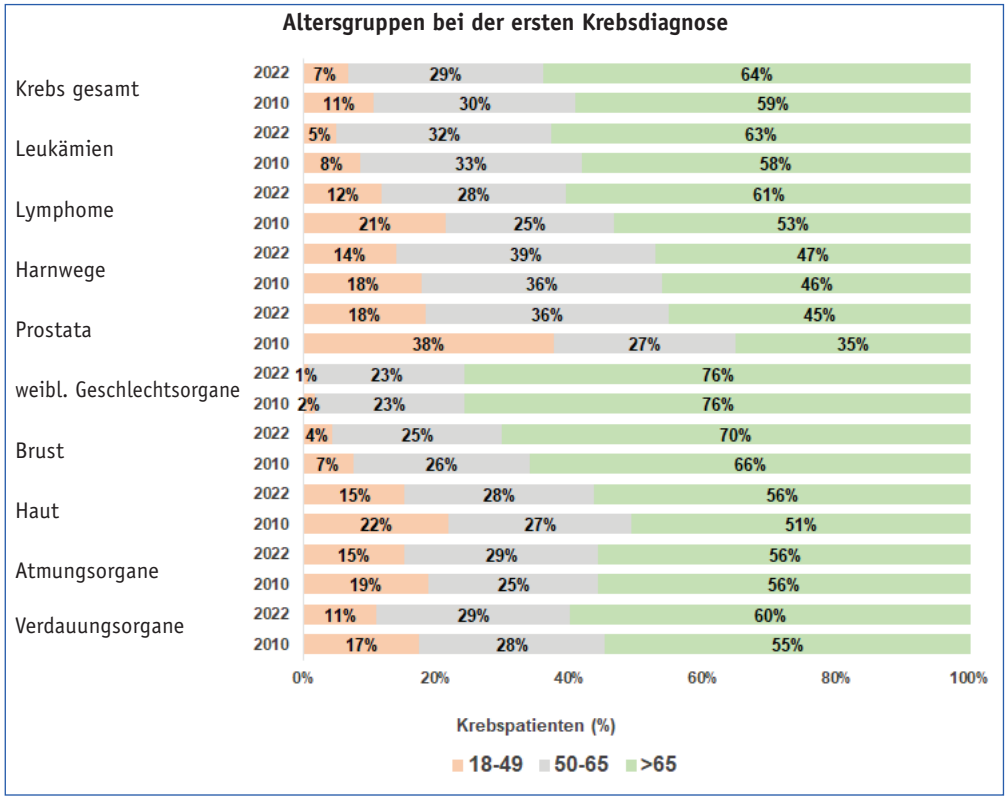


Fig .2: Age groups at first cancer diagnosis in 2010 and 2022.

published regularly [22,23]. The median age of all cancer patients:at diagnosis was 69 years for women and men in 2010 [22] and 69 years for women and 70 years for men in 2018 [23]. Even though the data from 2022 have not yet been published by the RKI, the results from 2010 and 2018 suggest that the age has not changed overall in Germany during this decade, in contrast to the results of our study. However, this may mean that the proportion of younger cancer patients in private practices is getting smaller, while that in Germany as a whole has remained constant. This raises the question of whether cancer is more likely to be overlooked in younger patients or whether oncologists in private practice and hospitals not covered by the database used play a greater role in this age group. However, it can at least be assumed that the proportion of younger cancer patients has not increased in recent years.

When considering similarities or differences in comparison to publications from abroad, the differences between the health care systems must be taken into account. Cancer screening examinations are widespread in Germany, and routine screening and early detection programmes have recently become part of health insurance benefits. Statutory health insurance covers screenings for various types of cancer, including genital, colorectal, breast, prostate and skin cancer. The aim of screening is to detect cancer at an early stage and to prevent its development prevent by detecting and treating cellular abnormalities such as dysplasias or polyps. Skin cancer screening is offered from age 35, cervical cancer screening from age 20 and breast cancer screening from age 30 [24]. The number of younger cancer patients may have decreased in recent years due to increased participation in cancer screening in Germany, which may not be the case elsewhere. While the use of available cancer screening programmes may explain the lower incidence in younger patients for some cancers, it cannot explain the lower incidence in younger patients for cancers for

which there is no effective screening, such as lymphoma or leukaemia.

In addition, cancer risk behaviour may also vary from country to country. Recently, obesity-related diseases have been shown to increase significantly, especially among young people. The epidemiological spread of obesity and its sequelae can be observed in all Western countries, but to varying degrees [25]. In Germany, 9.2% of all people with statutory health insurance were diagnosed with ob-

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esity in 2009. This proportion rose steadily to 11.2% in 2018, with a sharp increase in the frequency of obesity diagnoses during this period, especially in the older age groups from 80 years onwards [26]. Again, different structures and support services of the respective health systems may explain differences in the age of cancer diagnosis. The same also applies, for example, to certain primary prevention measures such as HPV vaccination, which is accepted differently in the respective countries [27].

In Germany, the proportion of smokers has fallen continuously over the last ten years, and those under 25 in particular smoke less than their peers did in previous decades [28]. The prevalence of smoking among adults aged 18 to 79 has declined overall in Germany over the past 20 years. This decline is mainly due to changes in the younger age groups [29]. This could lead to a decrease in the incidence of cancers of the respiratory organs, but also in the incidence of other cancer diagnoses in younger patients over time.

Furthermore, with a total of 11.1 million fitness club members, Germany has the most members in Europe, followed by the UK, France, Italy and Spain. Furthermore, Germany and France have experienced above-average membership growth rates in 2018 [30].

We have to acknowledge some limitations of our study. First, the use of ICD-10 codes to document all diagnoses could potentially lead to misclassification and undercoding of certain diagnoses. Our study focused exclusively on the association between age and cancer incidence, as we were unable to obtain information on socioeconomic status, environmental factors, lifestyle habits (such as alcohol and nicotine use) and mortality data that would have allowed for a more comprehensive analysis. Another limitation is the lack of hospital data, as some patients may only be diagnosed in hospital and no longer attend a general practice if they die within a short time of their cancer diagnosis. In addition, data on TNM status and staging were not available for the cancer diagnoses. No information was available on ethnicity and skin colour, which may be associated with skin cancer risk.

While the results of our study are consistent with previous research indicating higher cancer incidence rates in older patient:s, we cannot establish causal relationships, only draw associations. However, the strength of our study lies in the large number of patients and the use of representative data.

In summary, we present the first data from a large database in Germany that suggest that the mean age at cancer diagnosis in general practices in Germany has increased significantly and the proportion of patients with cancer at a younger age has decreased. A comparison with RKI data is necessary as soon as the RKI data for 2022 are published. <<

Authors' statement

The authors declare that there are no conflicts of interest.

Citation

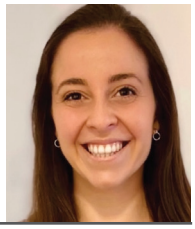
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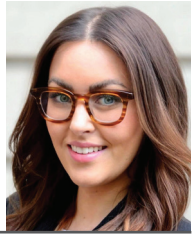
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