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INSTITUTE OF POPULATION-BASED CANCER RESEARCH

Cancer in Norway 2008

Cancer incidence, mortality,
survival and prevalence in Norway

Special issue:
The Janus Serum Bank -
From sample collection to cancer research

Cancer in Norway 2008

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General requests for cancer information, data or possible research collaborations are welcome, and should be sent to datautlevering@kreftregisteret.no

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Foreword

As with many cancer registries worldwide, the Cancer Registry of Norway publishes reports describing the patterns of cancer incidence, survival, mortality and prevalence in its catchment population. Cancer in Norway – first published in 1959 and annually since 1977 – describes the contemporary national and regional cancer profiles in terms of numbers of cases, rates and trends. It also serves to highlight some of the major breakthroughs as well as setbacks in cancer control, and by so doing, setting an agenda for future priorities. The Registry has established two areas of priority in recent editions of Cancer in Norway.

The first concerns timeliness with respect to the reporting of cancer incidence. This edition of Cancer in Norway provides statistics in tabular and graphical form on the 100+ cancer types diagnosed and registered in the population of Norway during the year 2008. A feature of the report since Cancer in Norway 2005, the cancer statistics provided are as up-to-date as possible, and we vow to continue to publish within this one-year time window, with a view to optimally serving the clinical and research communities. It should be noted that reporting is only sanctioned after a rigorous in-house evaluation of the quality of the data. That we have been to able to report such timely data is a testament to the dedication and skill of the Cancer Registry staff in ensuring the necessary high levels of completeness and accuracy of the cancer incidence data.

The second cornerstone of Cancer in Norway is the Special Issue which has become a permanent feature of the report. A primary aim is to provide a detailed report on an area of national importance, and previous topics included regional cancer incidence predictions to 2020, and a comprehensive evaluation of data quality at the Registry. An equally important objective is to ensure, where applicable, that the subject areas become a standard aspect of documentation, analysis and/or reporting at the Registry. As an example, we have created two further sections in the first part of this report, on the basis of last year's Special Issue ("Long-term cancer survival 1965-2007"). The new section on survival aims to quantify the long-term survival of cancer patients in Norway, while the trends section, in presenting concomitant trends in incidence, mortality and survival from 1964 through to 2008, provides both a historical and contemporary portrait of our successes and failures in cancer prevention and cancer control.

It is with great pleasure that we announce that the Special Issue this year is dedicated to the Janus Biobank. With its full integration with the Cancer Registry of Norway, Janus can be considered a unique paradigm for population-based epidemiological cancer research. It is hoped that this highly readable account of the history, concepts and scientific activities of Janus biobank in cancer research, will ensure further national and international scientific interest in Janus and its unique opportunities for the epidemiological study of cancer based on biological specimens.

The Cancer Registry continues to develop high levels of competence in areas along the longitudinal line of epidemiological enquiry into cancer, a "cradle to grave" approach to the study of the distribution, determinants and the possibility of cure of cancer. We continue, in close collaboration with our partners, both in Norway and abroad, to develop biological thinking through causal research, to lead in screening evaluation and screening-based research, and to establish quality surveillance systems that enable the evaluation of cancer care and management. By ensuring such activities at the Registry cover the spectrum of cancer control, the Registry remains a fundamental component in combating cancer and ameliorating the cancer burden in Norway.

Oslo, December 2009

Frøydis Langmark
Director

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Data Sources and Methods

The population of Norway

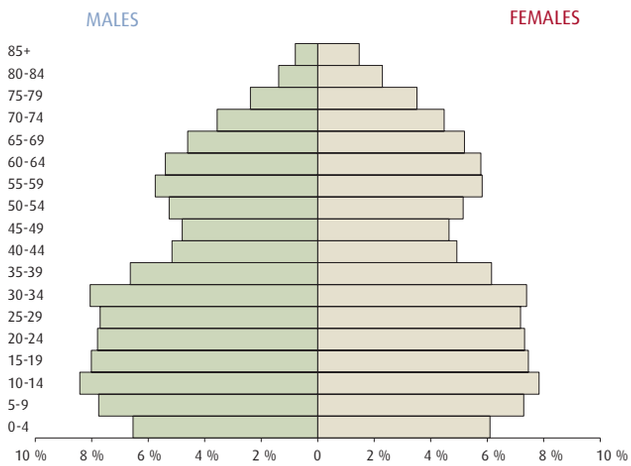
The Norwegian population is principally white Caucasian, with an immigrant population (from over 200 countries) comprising 10.6% of the total population of 4.8 million in 2008 (Table 1). Figure 1 illustrates the changing age structure of Norway, comparing population estimates in 1980 and 2008 with projections for 2030 (*Statistics Norway*, 2008/2009). The population of Norway has been increasing since records began, and this growth is expected to continue in the next few decades. The total number of inhabitants in Norway has increased by 12% during the last 25 years, largely as a result of rising life expectancy and more recently, increases in net immigration. By 2030, the size of the population is expected to increase a further 23% to about 5.8 million (*Statistics Norway*, 2008). The elderly will represent an increasingly large proportion of the population of Norway in the next quarter of a century. It is projected that by 2030 over one million inhabitants, or one-fifth of the population will be aged 65 or over.

Table 1: Number of inhabitants in Norway 31.12.2008

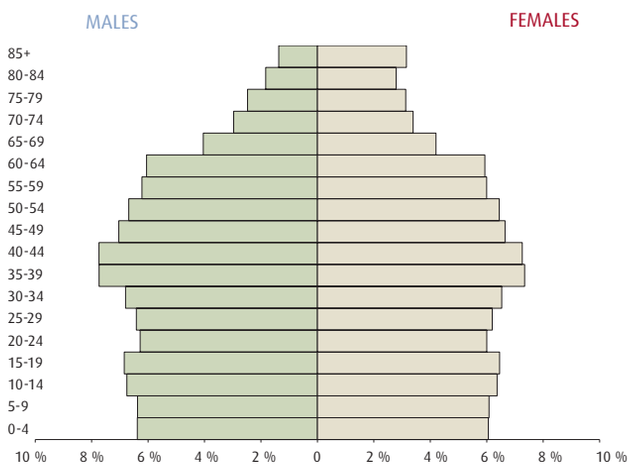
Age	Males	Females
0-4	152 844	145 616
5-9	152 680	146 257
10-14	161 690	153 129
15-19	163 961	155 253
20-24	150 394	144 342
25-29	153 607	148 977
30-34	162 783	157 058
35-39	185 253	176 590
40-44	185 346	174 486
45-49	168 529	159 900
50-54	160 046	154 913
55-59	148 909	144 216
60-64	145 011	142 650
65-69	96 896	101 073
70-74	71 075	81 531
75-79	59 325	75 281
80-84	43 921	67 053
85+	32 783	75 874
Total	2 395 053	2 404 199

Figure 1

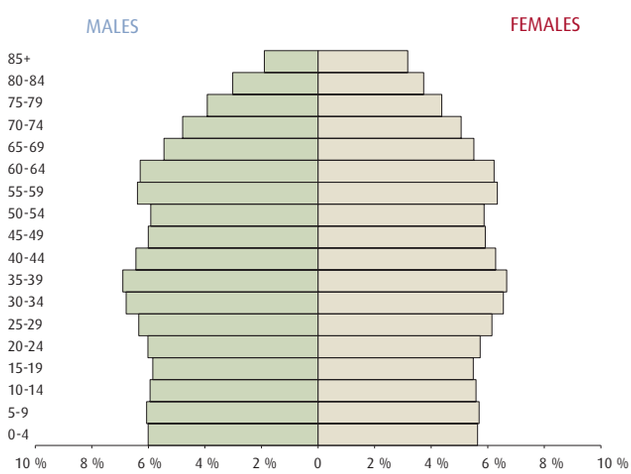
Age structure of the Norwegian population, 1980



Age structure of the Norwegian population, 2008



Age structure of the Norwegian population, 2030*



*Forecast, *Statistics Norway* 2008

Data sources and registration routines at the Cancer Registry of Norway

The Cancer Registry of Norway has, since 1952, systematically collected notifications on cancer for the Norwegian population, and the total number of registrations of cancer collected for a given year has, from the following year, 1953, been considered to be very close to complete. The reporting of neoplasms (and certain precancerous lesions) has been compulsory following a directive from the Ministry of Health and Social Affairs in 1951. A Health Registry Act came into force in 2002 that included statutory regulations for the Registry (*Regulations on the collection and processing of personal health data in the Cancer Registry of Norway*), strengthening the legal obligation to report new cases to the Registry and defining its main objectives as:

- To collect, and within the scope of the Regulations, process data relating to cancer cases and carry out studies in Norway in order to document the distribution of cancer and describe changes over time;
- To conduct, promote and provide a basis for research to develop knowledge of the causes of cancer, their diagnosis and natural course, and the effects of treatment via the follow-up of patients, with a view to improving the quality of preventive measures and medical assistance to combat cancer;
- To provide advice and information to public administrative bodies, special interest groups, and the general population, including measures that may help prevent the development of cancer.

Notifications and sources of information

The sources of information and the notification process are illustrated in Figure 2. Hospitals, laboratories, general practitioners and *Statistics Norway* provide the key information that enables the Registry to collect, code and store data on cancer patients in Norway. Information from clinical notifications, pathological notifications and death certificates are the main reporting sources, and these are processed and registered in the incidence registry. Since 1998, information from the Patient Administrative Data (PAD) system in the hospitals has proven an important additional source for identifying patients that were unregistered.

Clinical and pathological notifications

The Cancer Registry Regulations, as issued by the Ministry of Health and Social Affairs, require all hospitals, laboratories and general practitioners in Norway to report all new cases of cancer, irrespective of whether the patient is treated, admitted, or seen only as an outpatient. The Registry also receives mandatory reports from individual physicians, and from pathology and cytology laboratories. There are two generic paper-based forms for the reporting of solid or non-solid tumours, respectively. Some specific sites (colorectum, melanoma of the skin, breast, ovary, prostate, malignant lymphoma and chronic lymphatic leukaemia) are reported on separate forms with extended information on case history and treatment. Notifications of pathological information are received from hospitals and individual laboratories. These notifications may provide either histological, cytological or autopsy information. The information is identified and linked by the personal identifier number system, established in Norway in 1964.

Death certificates

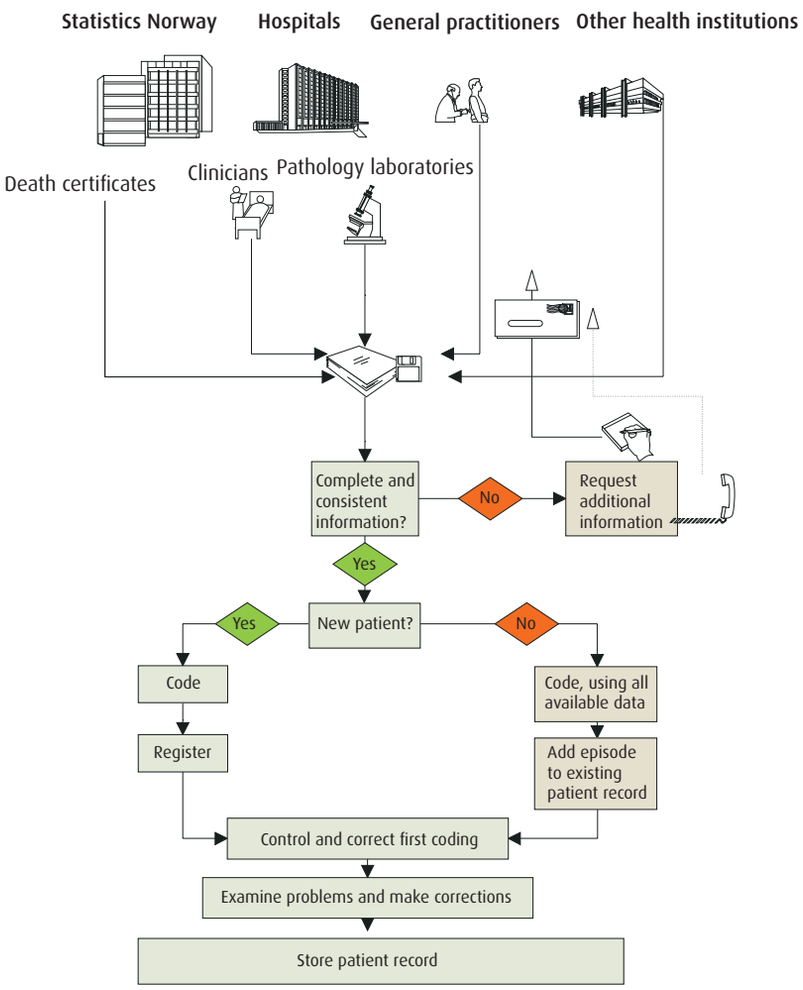
Records held in the Registry are supplemented with relevant information on vital status from the National Population Registry, and are regularly matched with the Cause of Death Register run by the National Statistics Bureau, *Statistics Norway*. The Registry receives and registers the death certificates in one or several batches in a given year. The automated procedure that matches registered patients to death certificates is an important aspect in maintaining quality control, facilitating a high level of completeness and ensuring validity of the Registry data items.

Death certificates are also a complementary source of information on new cancer cases; those inconsistently specified or unmatched to registry files are subject to further scrutiny. Cancer cases first identified from death certificates are traced back to the certifying hospital or physician. The Registry needs to ascertain from the registrar completing the certificate whether the patient had been investigated and diagnosed when alive, or whether the diagnosis was made following death. A reminder is sent to the physician or institution responsible for the treatment of the patient before death, as indicated on the death certificate. In many cases, a nursing home is the point of contact, and they refer the Registry to the treating physician or hospital where the cancer was diagnosed.

The Patient Administrative Database (PAD)

Since 2002, the Registry has received data files from the PAD system running in all Norwegian hospitals. These files contain information on all patients treated for malignant and premalignant conditions from 1998, and PAD has been a key source to the Registry in ascertaining information on unreported cases since that date.

Figure 2: Sources of information and the processes of cancer registration at the Registry



Data items registered in the Cancer Registry of Norway

There is obligatory reporting and registration at the Registry of the following:

- All definitely malignant neoplasms (e.g. carcinoma, sarcoma, malignant lymphoma, leukaemia and malignant teratoma).
- All precancerous disorders.
- All histologically benign tumours of the central nervous system and meninges.
- All histologically benign transitional cell papillomas of the urinary tract.
- All tumours of the endocrine glands within the central nervous system.

Dispatching of reminders

It is mandatory to report clinical information on new cases of cancer within two months of the diagnosis. Reminders are therefore sent to all hospitals and physicians failing to initially report new cases, or in cases where the received forms do not yield relevant information. About 40 000 reminders are sent annually, including, in some instances, repeat requests for information. There are two main sources of information used to send out reminders to the reporting institutions and physicians:

Reminders sent out on the basis of pathological information or death certificates

Pathology and cytology laboratories regularly send copies of pathology reports and autopsies to the Registry. Death certificates are received from the Deaths Registry at *Statistics Norway*. In those cases where the clinical form for the cancer case notified from these sources is missing, information on the hospital/ward/physician responsible for the diagnosis and treatment of the patient is used to send out the reminder.

Reminders sent out on the basis of PAD

The Registry augments existing sources of information with electronic patient forms received directly from each Norwegian Hospital. The PAD system database captures all C- and some D-diagnoses (D00.0- D48.9) (ICD-10) and these can be matched with the current information in the Registry database. Reminders are sent for those cases where no information about the specific diagnosis exists in the Registry.

Data quality at the Registry

Cancer in Norway 2006 included as a Special Issue an overview and comprehensive assessment of the data quality at the Cancer Registry of Norway. The report is available at www.cancerregistry.no. From this work several research articles have been published in the last year. Larsen et al (2009) have reported that the coding and classification systems, follow for the most part, international standards. Estimated overall completeness was 98.8% for the registration period 2001–2005, a lower completeness was observed for haematological malignancies and cancers of the central nervous system. Overall under-reporting for the year 2005 as a result of early publication was estimated at approximately 2.2% at the date of publication (November 2006). An accompanying two-part review provided an update of the practical aspects and techniques for addressing the data quality at a cancer registry generally, including the documentation of comparability, validity and timeliness of registry data (Bray and Parkin, 2009), as well as methods for the evaluation of registry completeness (Parkin and Bray, 2009).

Two indicators of accuracy for the period are included in Table 2, namely the percentage morphologically verified (MV%), and the percentage of death certificate only registrations (%DCO). See the above references for further details. The rules developed jointly by the International Association of Cancer Registries (IACR) and the International Agency for Research on Cancer (IARC) for the registration and reporting of multiple neoplasms (IACR, 2004) have been implemented.

Completeness and timeliness of incidence

Table 3 shows the number of cancer cases diagnosed in 2007 as enumerated on 27 November 2008, and 27 November 2009. The number of cancer cases reported and appearing in CiN 2007 were 2.4% fewer than those available for registration a year later, with the differences varying by site. The largest apparent deficits of 7-8% were for cancers of the central nervous system and corpus uteri. By comparing the shortfall in incidence at the end of 2008 (when CiN 2007 was published), with the accumulation of late registrations one year later (at the time of extracting the incidence data for this report), we can estimate the expected number of cases missing for 2007. It is observed that the net effect of the accrual of registrations 12-24 months beyond the year of diagnosis (2007) further increased the number of new registrations for that year by slightly less than 650 cases.

In the last few years, prostate cancer incidence has been increasing, but the specific number of cases is somewhat unstable, being subject to year-on-year variations in the utilisation of PSA testing in Norway. The numbers of cancer of the corpus uteri are up 10% on last year, although a clear explanation, if warranted, is not apparent at the time of going to press. More easily explained is the deficit in 2008 in the incidence of certain cancers associated with poorer prognosis that partially relies on death certificates to initiate registrations, such as pancreatic cancer. The shortfall may reflect the backlog in the processing of death certificates; the fact that the current DCO proportion for this cancer is above 5% for registrations in 2008 would tend to support this explanation.

The incidence registry

The incidence registry contains the basic data items collected from clinicians and pathologists, as well as from administrative patient discharge and mortality sources. As of December 2009, the Incidence registry contained information from 1953 on 1 427 913 cancer cases and premalignant conditions in 1 156 213

persons. A total of 3 390 433 notifications have been received since 1969. For all cases registered since 1953, 86.6% are histologically verified and 1.3% of the diagnoses are based on death certificates alone. The incidence registry is updated continuously with information on both new cases, as well as cases diagnosed in previous years.

Incidence and mortality data

The incidence data presented in the first part of this report are based on an extraction from the incidence registry on 27 November 2009. The forthcoming tables and figures commonly represent either the latest year of complete incidence (2008) or the latest five-year period (2004-8), the latter grouping used where the stratified numbers are too small to warrant presentation for a single year.

The precancerous cases included are i) atypical epithelial lesions and benign papillomas of the transitional cell-lined urinary tract, together with invasive cancers at these sites, and ii) all neoplasms of the central nervous system (benign or malignant). The precancerous conditions, cervical carcinoma in situ, ovarian borderline tumours, and basal cell carcinoma of the skin are excluded. Codes are translated from ICD-7 to ICD-10 using a combination of topography and morphology. Population data, stratified by year, sex and age, are provided by *Statistics Norway*. The main cancer forms are tabulated according to their ICD-10 three digit categories. The "all sites" figure comprises all malignant neoplasms (ICD-10 C00-96) plus several benign or precancerous conditions. The number of leukaemias reported in 2007 has increased from 515 in November 2008 to 768 one year later. This is due to the inclusion from 2009 of all malignant cases according to ICD-O-3. These are mainly polycythaemia vera (ICD-10 D45), myelodysplastic syndromes (ICD-10 D46), and other neoplasms of uncertain or unknown behaviour of lymphoid, haematopoietic and related tissue (ICD-10 D47). A commentary on the inclusion and exclusion criteria applied to several sites with respect to morphology is shown below.

Corresponding mortality data coded in ICD-10 were obtained from *Statistics Norway* and are presented in the same ICD-10 categories as incidence.

Follow-up data

To estimate long-term survival patterns and trends, registrations of cancer diagnoses 1965-2008 were matched to vital status using the information held at the Deaths Registry at *Statistics Norway*. The last follow-up date was set to 31 December 2008. A total of 23 common cancers were selected for analysis, and grouped according to their respective ICD-10 categories.

About 3.7% of the cases were excluded as they were either registered as DCO cases or cases diagnosed at autopsy, were cases for which a survival time could not be estimated (as event dates were missing), or had either erroneous event dates (survival time < 0) or zero survival time (survival time = 0). It has been shown that exclusion of patients with a prior cancer diagnosis – usually associated with an inferior prognosis – may give rise to artificially elevated estimates of survival (Brenner and Hakulinen, 2007), and hence,

ICD10-codes where specific morphologies are excluded or included

ICD10	Site	Comments
C38	Mediastinum, pleura	Excludes mesotheliomas of pleura
C44	Skin, non-melanoma	Excludes basal cell carcinoma
C56	Ovary	Excludes borderline tumors
C64	Kidney except renal pelvis	Excludes non-invasive papillary tumours
C65	Renal pelvis	Includes non-invasive papillary tumours
C66	Ureter	Includes non-invasive papillary tumours
C67	Bladder	Includes non-invasive papillary tumours
C68	Other and unspecified urinary organs	Includes non-invasive papillary tumours
C70	Meninges	Includes benign tumors (ICD-10 D42-43)
C71	Brain	Includes benign tumors (ICD-10 D42-43)
C72	Spinal cord, cranial nerves and other parts of central nervous system	Includes benign tumors (ICD-10 D42-43)
C75	Other endocrine glands and related structures	Includes benign tumors (ICD-10 D44.3-44.5)
C92	Myeloid leukaemia	Includes myelodysplastic syndrome (ICD-10 D45)
C95	Leukaemia of unspecified cell type	Includes polycytemia vera (ICD-10 D46)
C96	Other and unspecified malignant neoplasms of lymphoid, haematopoietic and related tissue	Includes other and unspecified tumors in lymphatic or hemapoetic tissue (ICD-10 D47)

patients with previous cancer diagnoses were eligible for inclusion in each site-specific analysis.

To provide an estimate of "all sites" survival (ICD-10 codes defined as above), a restriction was made to first primary tumours and thus to cancer patients. While the inclusion of multiple primaries has been recommended for comparative purposes, the corresponding reduction in the overall survival estimates have been shown to be rather negligible; the effect of their inclusion has been shown to reduce 5-year survival in Norway (for diagnoses 1995-9) by less than a percentage point (Rosso et al, 2009). Nevertheless caution in interpretation is recommended; the respective impact of PSA-testing and mammographic screening on the most frequent cancers in men and women, prostate and breast, will certainly have lead to an artificial inflation of the overall survival estimates, particularly for prostate cancer.

Statistical methods used in this report

Four measures are used in this report to describe the burden and risk of disease: incidence, mortality, survival and prevalence.

Incidence and mortality

Incidence and mortality refer to the number of new cases and deaths occurring, respectively. The latter is the product of incidence and the fatality of a given cancer, the proportion of cancer patients that die. Both measures can be expressed as the absolute number of cases (or deaths), or as the incidence (or mortality) rate, taking into account the size of the population at risk. Rates are essential in the comparisons between groups, and within groups over time. The denominator is the underlying person-time at risk in which the cases or deaths in the numerator arose. Prevalence and survival (see below) are proportions rather than rates as there is no time dimension, although the term is frequently attached to both measures. Cancer incidence and mortality in Norway are presented in this report as both numbers and rates. Several types of rates are used in this report.

Age-specific rates

There are compelling grounds for adjusting for the effects of age when comparing cancer risk in populations. Age is a very strong determinant of cancer risk. The *crude rate*, a rate based on the frequency of cancer in the entire population, is calculated ignoring possible stratifications by age. Although the measure can be useful as an indicator of the extent of burden, its utility in comparing cancer risk is severely limited where there are differing age structures across groups, or where demographic changes have impacted on the size and age structure of a population over time.

To obtain a more accurate picture of the true risk of cancer, rates are calculated for each age strata, usually grouped in five-year intervals. The age-specific rate for age class i, denoted as r_i is obtained by dividing the number of events in each age class d_i by the corresponding person-years of observation Y_i and multiplying by 100 000:

$$r_i = d_i / Y_i \times 100\,000$$

Rates are given separately for males and females, because of the often very different cancer patterns by sex. Age and sex-specific incidence and mortality rates are the foundation of epidemiological analysis of cancer frequency data.

Age-standardised rates

To facilitate comparisons however, a summary rate is required that absorbs the schedule of age-specific rates in each comparison group. The summary measure that appears in this report is the age-standardised rate (ASR), a statistic that is independent of the effects of age, thus allowing comparisons of cancer risk between different groups. The calculation of the ASR is an example of direct standardisation, whereby the observed age-specific rates are applied to a standard population. The populations in each age class of the Standard Population are known as the *weights* to be used in the standardisation process. Many possible sets of weights, w_i , can be used. The *world* standard population, a commonly-used reference, is utilised in this report (Segi, 1960; Doll et al, 1966). Although the weights of the world standard fail to resemble those of the Norwegian population in 2008 (Figure 3), this observation is of relatively little importance, since it is the ratio of ASRs, an estimate of the age-adjusted relative risk between populations or within a population over time, that is the focus of interest. This characteristic has been shown to be rather insensitive to the choice of standard (Bray et al, 2002).

For weights w_i in the ith age class of the world standard and for A age classes with $i = 1, 2,..., A$, as before, r_i is the age-specific rate in the ith age class. The ASR is calculated as:

$$ASR = \frac{\sum_i r_i w_i}{\sum_i w_i} \times 100\,000$$

Cumulative Risk

The *cumulative risk* is the probability that an individual will develop the cancer under study during a certain age span, in the absence of other competing causes of death (Day, 1982). The age span over which the risk is accumulated must be specified, and in this report, the range 0–74 years is used and provides an approximation of the risk of developing cancer. If before the age of 75 the cumulative risk is less than 10%, as is the case for most cancer forms, it is reasonably approximated by the *cumulative rate*.

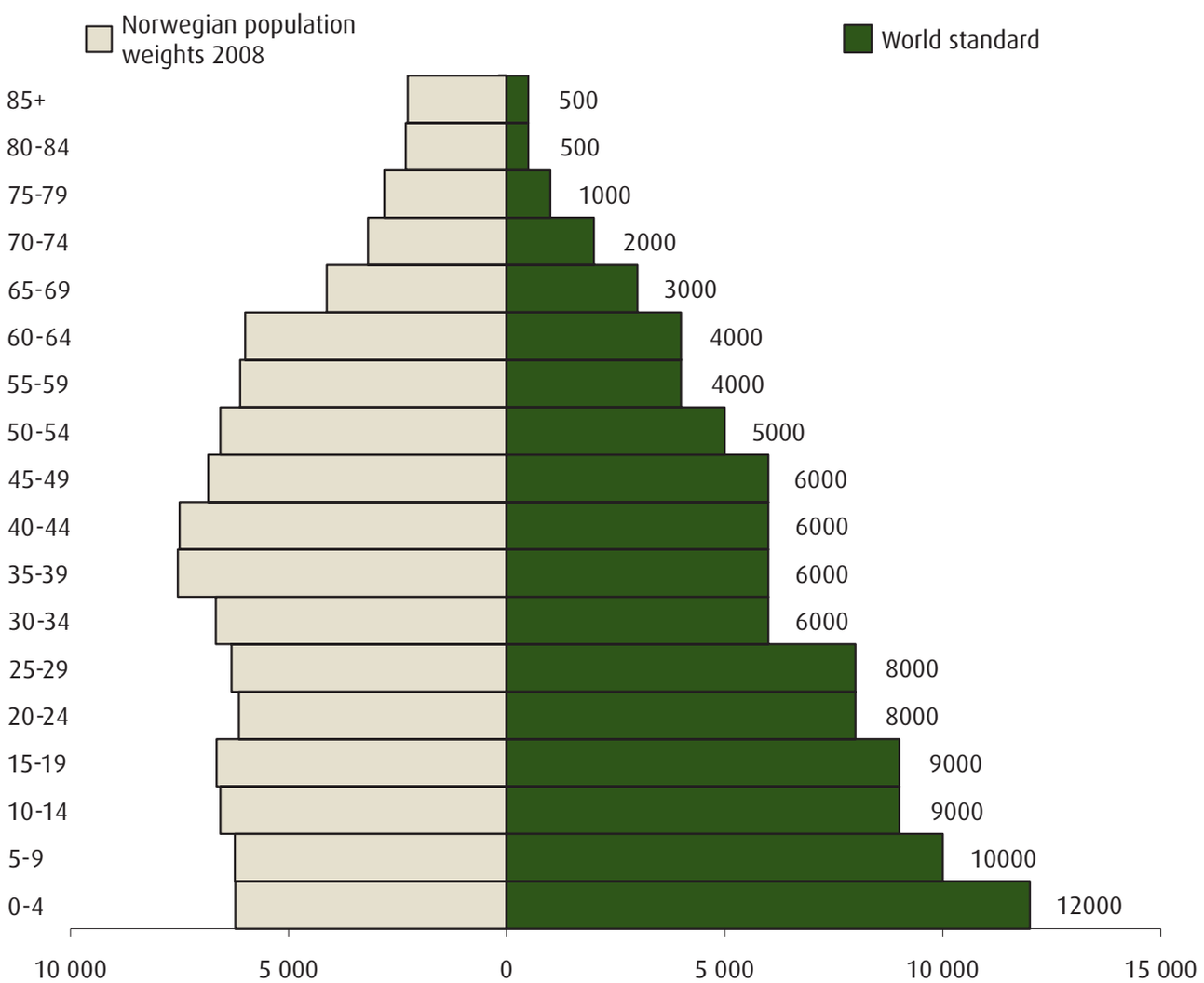
The cumulative rate is the summation of the age-specific rates over each year of age from birth to a defined upper age limit. As age-specific incidence rates are computed according to five-year age groups, the cumulative rate is five times the sum of the age-specific rates calculated over the five-year age groups, assuming the age-specific rates are the same for all ages within the five-year age stratum:

$$5\sum_{i} r_i$$

The cumulative rate has several advantages over age-standardised rates. Firstly, as a form of direct standardization, the problem of choosing an arbitrary reference population is eliminated. Secondly, as an approximation to the cumulative risk, it has a greater intuitive appeal, and is more directly interpretable as a measurement of lifetime risk, assuming no other causes of death are in operation. The precise mathematical relationship between the two is:

cumulative risk = 1 – exp (– cumulative rate)

Figure 3: Comparison of population weights



Prevalence

Prevalence is the proportion of a population that has the disease at a given point in time. It is a rather complex measure of cancer incidence, fatality, and other influences operating in affected individuals prior to death or *cure*. Although prevalence usefully describes the number of individuals requiring care for disease like hypertension and diabetes, many patients diagnosed with cancer in the past may now be considered cured, in that they no longer have an excess risk of death. Some residual disability may be present however, subsequent to a specific treatment intervention, for example.

Lifetime cancer prevalence can be defined as all persons living and ever diagnosed with cancer, and such a measure can easily be derived at the Cancer Registry of Norway given the very long-term registration of cases, and complete follow up of vital status over many years. Although such statistics are provided in this report, *partial* prevalence estimates are perhaps of more utility in quantifying resource requirements; the numbers of persons alive as of 31 December 2008, and whom were diagnosed with cancer within one year, one to four years, five to nine years, and 10 or more years, are therefore also incorporated into this report.

Survival

The survival time of a cancer patient is defined as the time that elapsed between a cancer diagnosis and subsequent death. The most basic measure of survival is observed survival, with the 5-year estimate representing the percentage of patients still alive 5 years after the date of diagnosis.

Relative Survival

Not all deaths among cancer patients are due to the primary cancer under study, and deaths resulting from other causes will lower the survival and possibly invalidate comparisons between populations. *Relative survival* is calculated to circumvent this problem by providing an estimate of *net survival*, and is defined as the observed survival proportion in a patient group divided by the expected survival of a comparable group in the general population with respect to age, sex and calendar year of investigation. At each time *t* since diagnosis, the relative survival from the cancer, $R(t)$, is defined as follows:

$$R(t) = S_o(t)/S_e(t)$$

where $S_o(t)$ is the observed survival of cancer patients while the calculation of expected survival $S_e(t)$ is based on matching the major demographic characteristics of the patients to the general population. This requires the Norwegian population life tables, available up to 2008 from *Statistics Norway* by 1-year age group, sex, and 1-year calendar period. The methods for estimating expected survival depend on the length at which an individual is considered at risk (Dickman et al, 2004). The method of Hakulinen (1982) was used whereby the survival time of the matched individual is censored at the same survival time that the cancer patient is censored.

With traditional cohort-based analyses, the most up-to-date estimates of longer-term survival would have pertained to patients diagnosed in the distant past, with corresponding profiles of prognosis. In contrast, period-based analyses consider the survival experience in recent years, and the survival that would have been observed in a hypothetical cohort of patients who experienced the same interval-specific survival as the patients who were actually at risk during a specific calendar period. Brenner and Hakulinen (2002) have concluded that period analysis should be used for routine purposes so as to advance the detection of progress in long-term cancer patient survival. Both clinicians and patients are primarily interested in up-to-date estimates of survival, and its incorporation into *Cancer in Norway* aims to reflect the most recent developments in cancer care.

For a one-year period window, information from the latest 0, 1, 2,…, n years are used in its estimation, as interval-specific survival probabilities are based on contributions from patients diagnosed 0, 1, 2,..., n years back in time. In this report, we have used a three-year period window (2006-8) to estimate relative survival up to 15 years, and the same approach to analyse trends, using a three-year moving period window from 1965 to 2008. To increase stability in the estimates, stage-specific survival is presented using a three-year period window.

A more thorough review of, and rationale for, the utilisation of these survival methods is given in last year's Special Issue on the topic (CiN 2007).

Conditional survival

The majority of cancer survivors wish to obtain information on their current prognosis, once they have survived a certain period of time after diagnosis. *Conditional survival* is a key indicator in this respect, estimating survival proportions on the pre-condition that patients have already survived a certain duration of time (Hankey and Steinhorn, 1982; Janssen-Heijnen et al, 2007). The point at which conditional 5-year relative survival reaches 100% is the point where there is no excess mortality among the cancer patients, and prog-

nosis is equivalent to that experienced in the general population. As with the 15-year relative survival analyses, a three-year period window (2006–2008) is used in this report, and we present estimates of sex-specific 5-year relative survival conditional on being alive 1 to 10 years after diagnosis. Estimates were not plotted where it was considered there were too few cancer survivors (n<20), or where the conditional survival exceeded 100%.

Definitions*

Incidence

The number of new cases (of disease) in a defined population within a specific period of time.

Incidence rate

The number of new cases that arise in a population (incidence) divided by the number of people who are at risk of getting cancer in the same period. The rate is expressed per 100 000 person-years**.

Crude rate

As above, with rates estimated for the entire population ignoring possible stratifications, such as by age group.

Age-specific rate

A rate calculated on stratifying by age, often based on a five-year interval.

Age-standardised incidence rate

Age-standardised (or age-adjusted) incidence rates are summary rates which would have been observed, given the schedule of age-specific rates, in a population with the age composition of a given standard population. The World standard population (Doll et al, 1966) is used in this report.

Prevalence

Prevalence is the proportion of a population that has the disease at a given point in time.

Relative survival

The observed survival in a patient group divided by the expected survival of a comparable group in the general population with respect to key factors affecting survival such as age, sex and calendar year of investigation. Relative survival is thus a measure of the excess mortality experienced by the patients regardless of whether the excess mortality may be directly or indirectly attributable to the disease under investigation. A key advantage is that it does not require cause of death information.

Conditional relative survival

The probability of surviving an additional number of years given that the person has already survived x years. As the duration from diagnosis lengthens, the statistic becomes more informative to survivors than the conventional relative survival estimate. A 5-year conditional relative survival that reaches close to 100% x number of years after diagnosis indicates that from thereon in, there is little or no excess mortality among the patient group.

* Last's "A Dictionary of Epidemiology 4th Ed" was consulted.
** *Person-years* is a measurement that combines persons and time (in years) as the denominator in rates.

Table 2 Percentage distribution of MV (morphologically verified) and DCO (death certificate only) by primary site 2004-2008

ICD-10	Site	Cases	MV %	DCO %
C00-96	**All sites**	**129573**	**89.1**	**1.4**
C00-14	**Mouth, pharynx**	**2206**	**97.6**	**0.1**
C00	Lip	508	99.4	0.0
C01-02	Tongue	416	98.3	0.2
C03-06	Mouth, other	446	99.1	0.0
C07-08	Salivary glands	196	87.2	0.0
C09-14	Pharynx	640	98.0	0.2
C15-26	**Digestive organs**	**26937**	**89.4**	**2.1**
C15	Oesophagus	991	95.0	1.2
C16	Stomach	2656	95.3	1.0
C17	Small intestine	526	97.1	1.0
C18	Colon	11597	95.4	1.4
C19-21	Rectum, rectosigmoid, anus	6090	97.0	0.7
C22	Liver	681	75.6	4.1
C23-24	Gallbladder, bile ducts	693	65.9	5.6
C25	Pancreas	3254	58.4	5.4
C26	Other digestive organs	449	55.2	15.1
C30-34, C38	**Respiratory organs**	**13219**	**78.5**	**1.8**
C30-31	Nose, sinuses	232	98.7	0.4
C32	Larynx, epiglottis	587	97.6	0.9
C33-34	Lung, trachea	12298	77.3	1.8
C38	Mediastinum, pleura (non-mesothelioma)	102	59.8	7.8
C40-41	**Bone**	**218**	**97.2**	**0.0**
C43	**Melanoma of the skin**	**5912**	**99.0**	**0.1**
C44	**Skin, non-melanoma**	**6926**	**98.7**	**0.1**
C45	**Mesothelioma**	**374**	**88.2**	**0.3**
C46	**Kaposi's sarcoma**	**50**	**96.0**	**2.0**
C47	**Autonomic nervous system**	**58**	**100.0**	**0.0**
C48-49	**Soft tissues**	**695**	**96.3**	**0.1**
C50	**Breast**	**13937**	**97.7**	**0.2**
C51-58	**Female genital organs**	**7773**	**95.3**	**0.8**
C53	Cervix uteri	1419	98.7	0.1
C54	Corpus uteri	3383	99.0	0.2
C55	Uterus, other	38	76.3	7.9
C56	Ovary	2257	88.7	1.6
C51-52, C57	Other female genital	660	94.1	2.7
C58	Placenta	16	50.0	0.0
C60-63	**Male genital organs**	**21606**	**96.1**	**1.1**
C61	Prostate	19991	95.8	1.2
C62	Testis	1386	99.3	0.2
C60, C63	Other male genital	229	98.3	0.4
C64-68	**Urinary organs**	**9736**	**93.5**	**1.1**
C64	Kidney excl. renal pelvis	3000	86.8	2.4
C65	Renal pelvis	358	94.7	0.6
C66-68	Bladder, ureter, urethra	6378	96.5	0.5
C69	**Eye**	**301**	**45.5**	**0.0**
C70-72, D42-43	**Central nervous system**	**4954**	**62.5**	**1.1**
C73	**Thyroid gland**	**1146**	**94.0**	**0.6**
C37, C74-75	**Other endocrine glands**	**859**	**67.8**	**1.7**
C39, C76, C80	**Other or unspecified**	**2247**	**54.3**	**9.9**
C81-96	**Lymphoid and haematopoietic tissue**	**10419**	**75.1**	**2.3**
C81	Hodgkin lymphoma	576	99.1	0.0
C82-85, C96	Non-Hodgkin lymphoma	4027	96.9	0.3
C88	Malignant immunoproliferative diseases	218	67.0	1.4
C90	Multiple myeloma	1717	53.6	3.0
C91-95	Leukaemia	3881	58.9	4.6

Table 3 Registered cancer cases in Norway 2007 as extracted from the incidence registry 27th November 2008 and 27th November 2009

		Cases diagnosed 2007 as of			
ICD10	**Site**	**27.11.2008**	**27.11.2009**	**Difference**	**%**
C00-96	**All sites**	**26196**	**26819**	**623**	**2.4**
C00-14	**Mouth, pharynx**	**444**	**446**	**2**	**0.5**
C00	Lip	119	124	5	4.2
C01-02	Tongue	82	82	0	0.0
C03-06	Mouth, other	79	77	-2	-2.5
C07-08	Salivary glands	45	41	-4	-8.9
C09-14	Pharynx	119	122	3	2.5
C15-26	**Digestive organs**	**5286**	**5485**	**199**	**3.8**
C15	Oesophagus	186	188	2	1.1
C16	Stomach	545	550	5	0.9
C17	Small intestine	107	115	8	7.5
C18	Colon	2264	2360	96	4.2
C19-21	Rectum, rectosigmoid, anus	1111	1180	69	6.2
C22	Liver	145	147	2	1.4
C23-24	Gallbladder, bile ducts	135	143	8	5.9
C25	Pancreas	678	698	20	2.9
C26	Other digestive organs	115	104	-11	-9.6
C30-34, C38	**Respiratory organs**	**2730**	**2770**	**40**	**1.5**
C30-31	Nose, sinuses	60	61	1	1.7
C32	Larynx, epiglottis	93	95	2	2.2
C33-34	Lung, trachea	2550	2585	35	1.4
C38	Mediastinum, pleura (non-mesothelioma)	27	29	2	7.4
C40-41	**Bone**	**45**	**44**	**-1**	**-2.2**
C43	**Melanoma of the skin**	**1192**	**1201**	**9**	**0.8**
C44	**Skin, non-melanoma**	**1418**	**1439**	**21**	**1.5**
C45	**Mesothelioma**	**74**	**76**	**2**	**2.7**
C46	**Kaposi's sarcoma**	**6**	**6**	**0**	**0.0**
C47	**Autonomic nervous system**	**10**	**11**	**1**	**10.0**
C48-49	**Soft tissues**	**152**	**155**	**3**	**2.0**
C50	**Breast**	**2780**	**2773**	**-7**	**-0.3**
C51-58	**Female genital organs**	**1453**	**1520**	**67**	**4.6**
C53	Cervix uteri	261	266	5	1.9
C54	Corpus uteri	604	653	49	8.1
C55	Uterus, other	10	5	-5	-50.0
C56	Ovary	449	455	6	1.3
C51-52, C57	Other female genital	128	139	11	8.6
C58	Placenta	1	2	1	100.0
C60-63	**Male genital organs**	**4724**	**4778**	**54**	**1.1**
C61	Prostate	4391	4435	44	1.0
C62	Testis	295	302	7	2.4
C60, C63	Other male genital	38	41	3	7.9
C64-68	**Urinary organs**	**1984**	**2043**	**59**	**3.0**
C64	Kidney excl. renal pelvis	622	644	22	3.5
C65	Renal pelvis	75	76	1	1.3
C66-68	Bladder, ureter, urethra	1287	1323	36	2.8
C69	**Eye**	**58**	**57**	**-1**	**-1.7**
C70-72, D42-43	**Central nervous system**	**994**	**1069**	**75**	**7.5**
C73	**Thyroid gland**	**218**	**229**	**11**	**5.0**
C37, C74-75	**Other endocrine glands**	**134**	**183**	**49**	**36.6**
C39, C76, C80	**Other or unspecified**	**455**	**442**	**-13**	**-2.9**
C81-96	**Lymphoid and haematopoietic tissue**	**2039**	**2092**	**53**	**2.6**
C81	Hodgkin lymphoma	114	112	-2	-1.8
C82-85, C96	Non-Hodgkin lymphoma	797	802	5	0.6
C88	Malignant immunoproliferative diseases	40	42	2	5.0
C90	Multiple myeloma	320	342	22	6.9
C91-95	Leukaemia	768	794	26	3.4

Table 4 Number of new cases by primary site and sex - 2008

ICD-10	Site	Males	Females	Total
C00-96	**All sites**	**14000**	**12121**	**26121**
C00-14	**Mouth, pharynx**	**262**	**189**	**451**
C00	Lip	54	50	104
C01-02	Tongue	62	32	94
C03-06	Mouth, other	43	44	87
C07-08	Salivary glands	15	23	38
C09-14	Pharynx	88	40	128
C15-26	**Digestive organs**	**2773**	**2556**	**5329**
C15	Oesophagus	159	54	213
C16	Stomach	285	198	483
C17	Small intestine	62	50	112
C18	Colon	1142	1229	2371
C19-21	Rectum, rectosigmoid, anus	639	534	1173
C22	Liver	91	57	148
C23-24	Gallbladder, bile ducts	59	68	127
C25	Pancreas	304	307	611
C26	Other digestive organs	32	59	91
C30-34, C38	**Respiratory organs**	**1567**	**1148**	**2715**
C30-31	Nose, sinuses	23	14	37
C32	Larynx, epiglottis	112	22	134
C33-34	Lung, trachea	1422	1107	2529
C38	Mediastinum, pleura (non-mesothelioma)	10	5	15
C40-41	**Bone**	**23**	**23**	**46**
C43	**Melanoma of the skin**	**669**	**616**	**1285**
C44	**Skin, non-melanoma**	**766**	**684**	**1450**
C45	**Mesothelioma**	**57**	**9**	**66**
C46	**Kaposi's sarcoma**	**5**	**2**	**7**
C47	**Autonomic nervous system**	**7**	**6**	**13**
C48-49	**Soft tissues**	**50**	**78**	**128**
C50	**Breast**	**21**	**2753**	**2774**
C51-58	**Female genital organs**		**1565**	**1565**
C53	Cervix uteri		270	270
C54	Corpus uteri		716	716
C55	Uterus, other		8	8
C56	Ovary		457	457
C51-52, C57	Other female genital		114	114
C58	Placenta			
C60-63	**Male genital organs**	**4515**		**4515**
C61	Prostate	4168		4168
C62	Testis	296		296
C60, C63	Other male genital	51		51
C64-68	**Urinary organs**	**1329**	**573**	**1902**
C64	Kidney excl. renal pelvis	367	230	597
C65	Renal pelvis	55	32	87
C66-68	Bladder, ureter, urethra	907	311	1218
C69	**Eye**	**33**	**27**	**60**
C70-72, D42-43	**Central nervous system**	**389**	**493**	**882**
C73	**Thyroid gland**	**60**	**169**	**229**
C37, C74-75	**Other endocrine glands**	**103**	**93**	**196**
C39, C76, C80	**Other or unspecified**	**177**	**199**	**376**
C81-96	**Lymphoid and haematopoietic tissue**	**1194**	**938**	**2132**
C81	Hodgkin lymphoma	76	42	118
C82-85, C96	Non-Hodgkin lymphoma	476	361	837
C88	Malignant immunoproliferative diseases	22	12	34
C90	Multiple myeloma	200	151	351
C91-95	Leukaemia	420	372	792

Incidence

In 2008, 26 121 new cases of cancer were recorded in Norway, for which 14 000 occurred among men and 12 121 among women (Table 4). Cancers of the prostate, female breast, colon and lung are the most common cancers and comprise almost half of the total cancer burden. In men, prostate cancer continues to the most frequent cancer in men (4168), followed by colorectal (1781) and lung cancer (1422). Breast cancer remains the most frequent neoplasm in women, with 2753 new cases in 2008, followed by colorectal and lung cancer, with 1763 and 1107 incident cases, respectively.

The vast majority of cancers in Norway – over 90% in men and 85% in women are diagnosed in persons aged over 50 (Figure 4). About half are diagnosed at ages 70 or greater, while 40% of all new cases occur between the ages 50 and 69, in men and women alike. A larger proportion of cancers are diagnosed in women than men at the ages of 25 to 49, while similar proportions – constituting slightly over 1% of the cancer burden – occur in children and young adults.

The relative impact of cancer at different ages varies considerably by cancer site. Figure 5 identifies the cancer forms that are the main contributors to the disease burden at different ages. Cancers of the central nervous system are most frequent in children and young female adults, while testicular cancer is by far the most common cancer diagnosed in young men. Prostate cancer is the most frequent cancer in men aged over 50, while breast cancer is the most common cancer diagnosis in women from the ages 25 through to 69.

The age-standardised rates and sex ratios for selected cancer types in 1978-1982 and 2004-2008 are compared in Table 5. Men tend to have higher rates of incidence for most cancer types in both time periods, with the exceptions of melanoma of the skin and thyroid cancer. The highest male:female (M:F) ratios are observed for several head and neck cancers, although a number of the most frequent cancer forms – including cancers of the lung, bladder, stomach and rectum - are consistently more common among men. The declines in the M:F ratios for several neoplasms over the last 25 years may largely be the result of decreasing incidence trends in men and increasing incidence trends in women for a number of cancer types. For lung cancer, the reduction of the M:F ratios over the last two to three decades points to a differential in sex-specific trends with the rapidly increasing trends in lung cancer rates among women contrasting with the recent declines in the last decade among men.

Figure 6 depicts time trends in incidence for a number of common cancers. Of note are: 1) the continuing upsurge in prostate cancer incidence since 1990, largely the result of an increasing use of the Prostate Specific Antigen (PSA) test and subsequent biopsy to detect prostate cancer in Norway; 2) the continued increase in breast cancer in women, in part related to the gradual introduction of the mammographic screening programme; 3) the contrasting lung cancer trends in

Figure 4: Percentage distribution of cancer incidence by age, 2004-2008

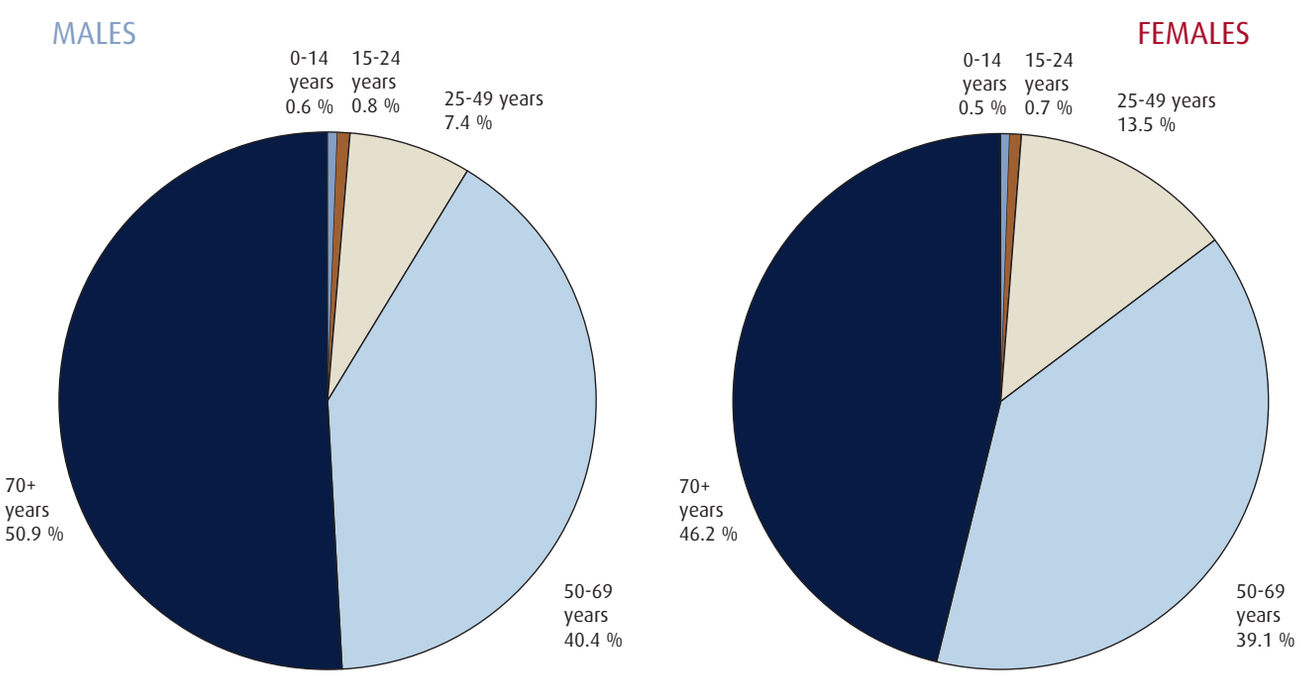


Figure 5: The most frequent incident cancers by age and sex, 2004–2008

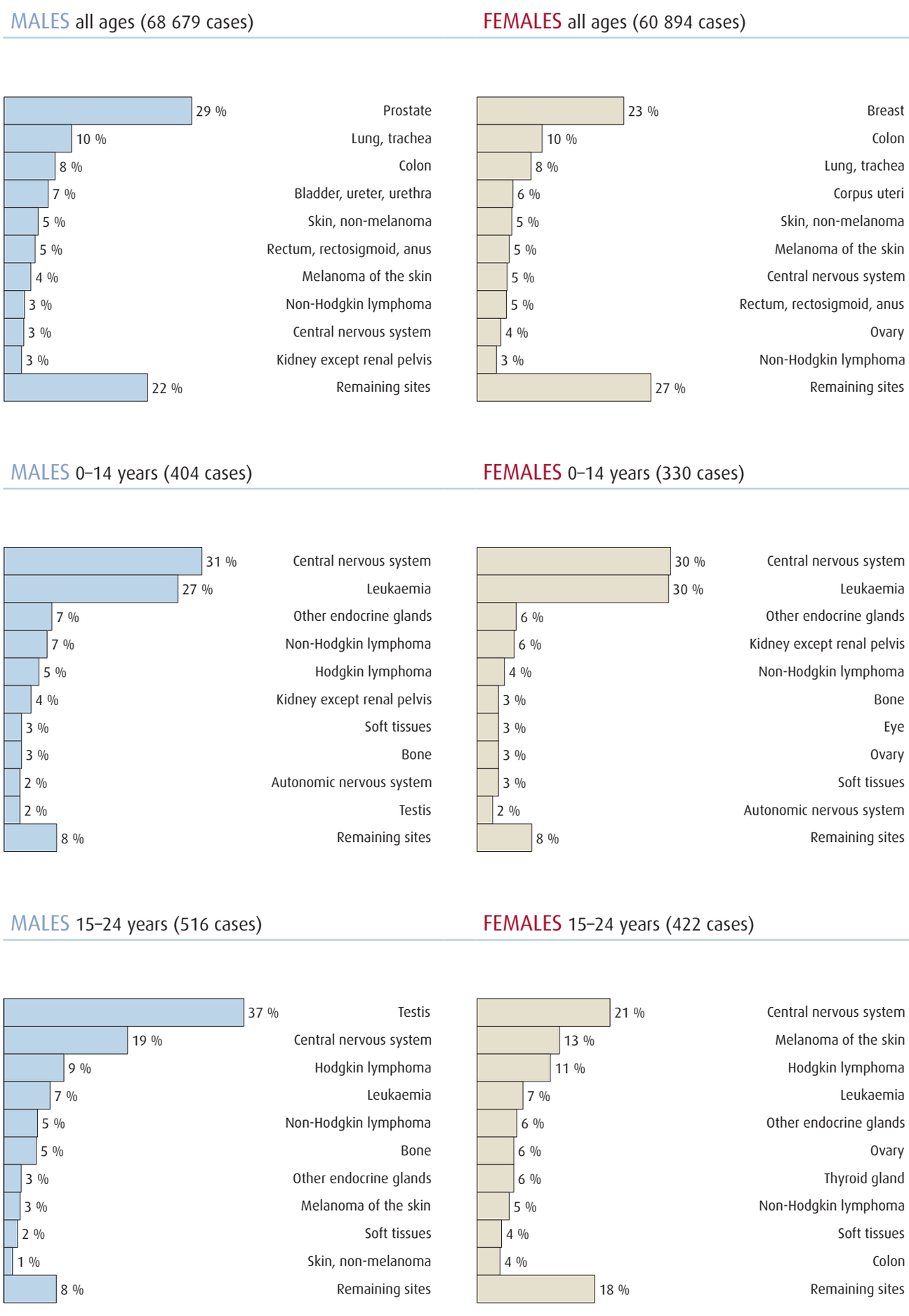
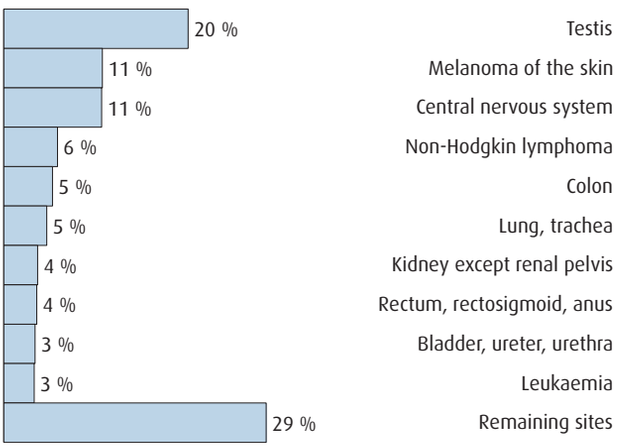
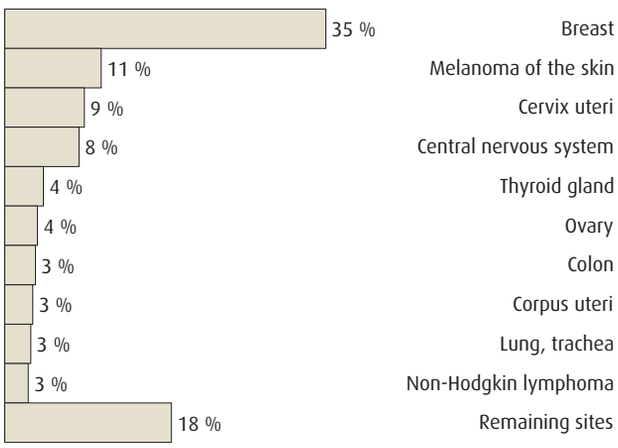


Figure 5 cont.

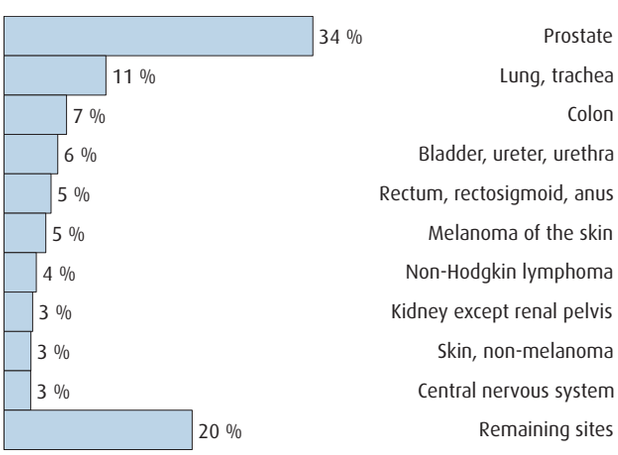
MALES 25-49 years (5051 cases)



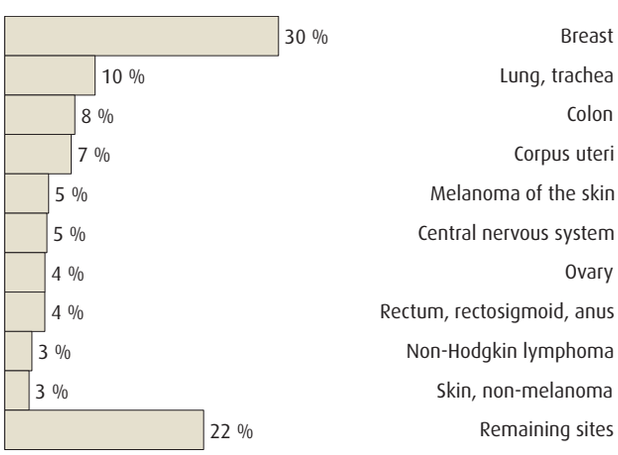
FEMALES 25-49 years (8207 cases)



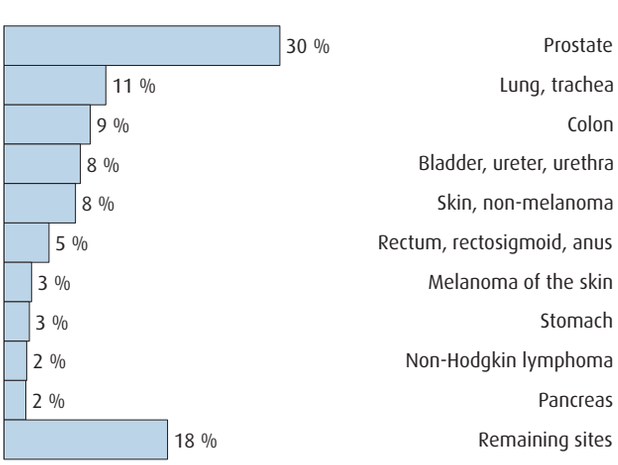
MALES 50-69 years (27 777 cases)



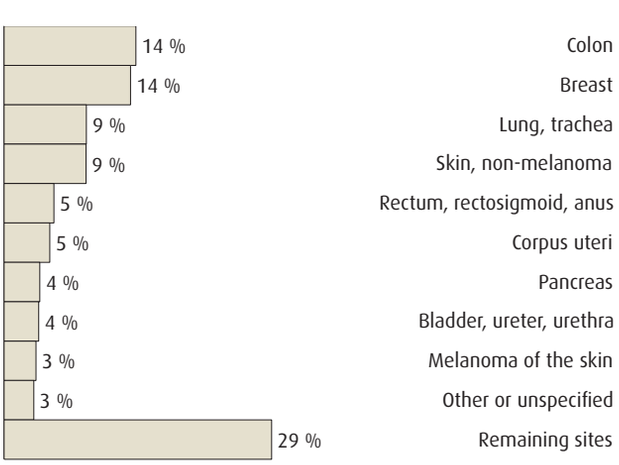
FEMALES 50-69 years (23 831 cases)



MALES 70+ years (34 931 cases)



FEMALES 70+ years (28 104 cases)



men and women, with a peak and recent decline observed in men against very rapid increases in women, observations, largely reflecting the respective phases of the smoking epidemic; 4) the continuing increases in colon cancer but stabilising rectal cancer trends in both sexes, probably reflecting changing lifestyle, particularly with respect to diet among recent generations; 5) the continuing declines in stomach cancer in both sexes, an unexpected success of primary prevention, and particularly the joint impact of refrigeration and control of *H Pylori* infection; and 6) the rapid increases in a number of cancers for which the underlying determinants remain enigmatic, amongst them testicular cancer in men and non-Hodgkin lymphoma in both sexes.

The incidence burden from cancer in Norway has been increasing in the last decade (Table 7), as it has been since the Registry began reporting in 1953. While this observation certainly reflects a genuine increase in risk of common cancers such breast cancer women, and colorectal and lung cancer in both sexes, an increasing ability to diagnose a number of cancer types with time will also have contributed.

Such trends are partially compensated by decreasing incidence trends of several common cancers including the aforementioned stomach cancer and cervical cancer in women, while melanoma of the skin can be seen to be stabilising in both sexes (Figure 6). More detailed trends of incidence, mortality and survival for 23 cancers are given in a later section of this report.

Even if rates were to remain stable over the next 15 years, incidence in terms of new cases would certainly increase as a result of the joint demographic effects of population growth and ageing (see the special issue of CiN 2005 for predictions of cancer in Norway up to 2020, by Health Region.)

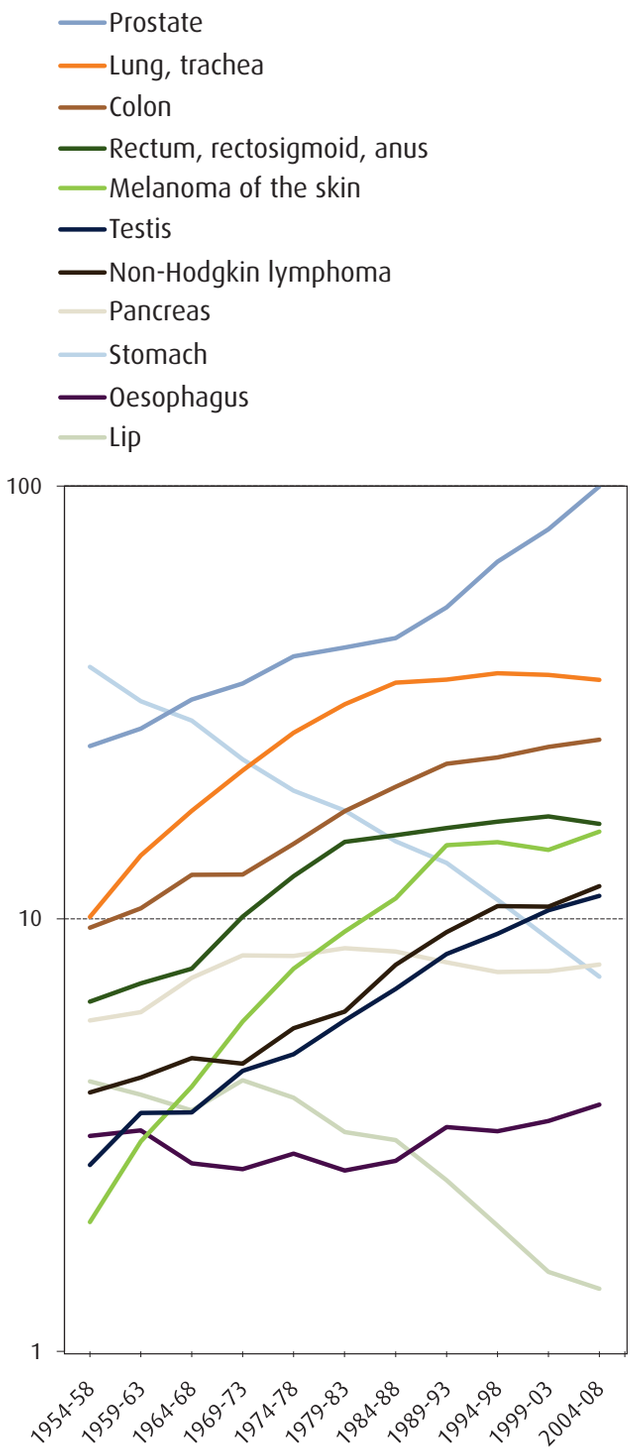
The cumulative risk is shown in Table 6 and in Figure 7, is presented in descending order of magnitude for the most common 15 cancers in men and women, respectively. The cumulative risk of 12.4 for prostate cancer ranks highest in males and indicates that, in the absence of competing causes of death, approximately one in eight men will develop this cancer before the age of 75.). The corresponding risk of developing lung cancer is considerably lower in comparison, with about one in 25 men estimated to be diagnosed with the disease before the age of 75.

Table 5: Sex ratios (male:female) of age-adjusted rates (world) in 1978-82 and 2004-2008 by primary site, sorted in descending order in last period

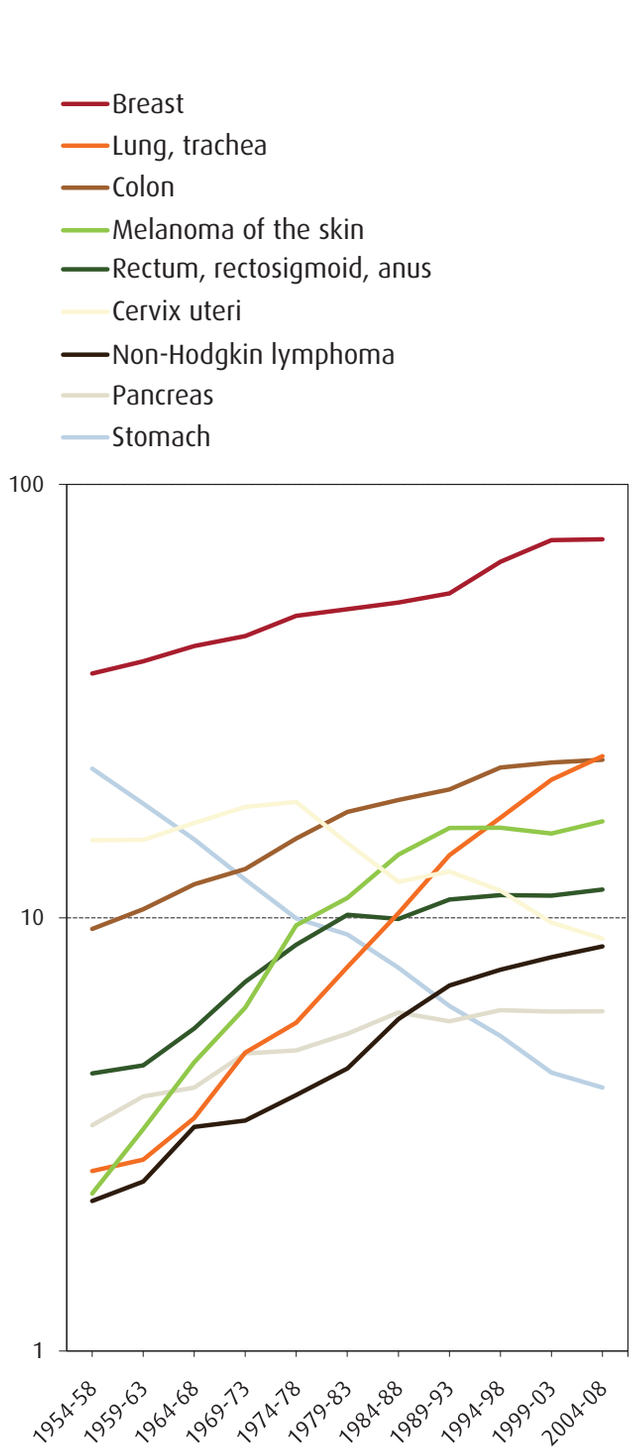
		1978-1982			2004-2008		
ICD-10	Site	M	F	M/F ratio	M	F	M/F ratio
C32	Larynx, epiglottis	3.1	0.3	10.3	2.7	0.4	6.7
C15	Oesophagus	2.7	0.7	3.8	3.7	1.0	3.6
C66-68	Bladder, ureter, urethra	18.2	5.5	3.3	22.0	6.4	3.4
C09-14	Pharynx	1.6	0.5	3.2	2.7	0.9	2.9
C65	Renal pelvis	1.0	0.4	2.2	1.2	0.5	2.5
C22	Liver	1.8	1.0	1.8	2.2	1.1	2.1
C01-02	Tongue	1.0	0.4	2.7	1.5	0.7	2.1
C64	Kidney excl. renal pelvis	7.5	4.0	1.9	10.0	5.2	1.9
C16	Stomach	18.0	9.2	2.0	7.3	4.1	1.8
C00	Lip	3.4	0.4	7.9	1.4	0.9	1.6
C90	Multiple myeloma	4.7	3.0	1.5	4.7	3.0	1.5
C33-34	Lung, trachea	30.9	7.3	4.2	35.6	23.6	1.5
C81	Hodgkin lymphoma	2.6	1.6	1.6	2.7	1.8	1.5
C19-21	Rectum, rectosigmoid, anus	14.7	10.1	1.5	16.5	11.6	1.4
C91-95	Leukaemia	8.1	5.4	1.5	8.9	6.3	1.4
C82-85, C96	Non-Hodgkin lymphoma	6.2	4.5	1.4	12.0	8.7	1.4
C25	Pancreas	8.4	5.3	1.6	7.8	6.1	1.3
C18	Colon	17.1	17.4	1.0	25.9	23.2	1.1
C23-24	Gallbladder, bile ducts	1.1	1.6	0.7	1.6	1.4	1.1
C43	**Melanoma of the skin**	**8.9**	**10.4**	**0.9**	**15.8**	**16.6**	**1.0**
C73	**Thyroid gland**	**1.6**	**5.1**	**0.3**	**1.9**	**5.1**	**0.4**

Figure 6: Time trends in age-standardised incidence rates (world) in Norway for selected cancers (semi-log scale)

MALES



FEMALES



The cumulative risk of breast cancer ranks highest in women, with the figure of 8.1 indicating that about one in 12 Norwegian women develop this disease before the age of 75, in the absence of competing causes. As with men, colorectal and lung cancers rank second and third.

Tables 7-16 provide further information on the distribution of cancer incidence in Norway. The number of incident cases and rates are tabulated according to year of diagnosis, age group, county of residence, and stage.

Further information

The descriptions in this report can be downloaded from the Cancer Registry of Norway website in various formats. The previous Special Issues on regional predictions, data quality and long-term survival in CiN 2005-7, respectively are also available online:

www.cancerregistry.no

Figure 7: Cumulative risk of developing cancer by the age of 75 for selected cancers by sex - 2004-2008

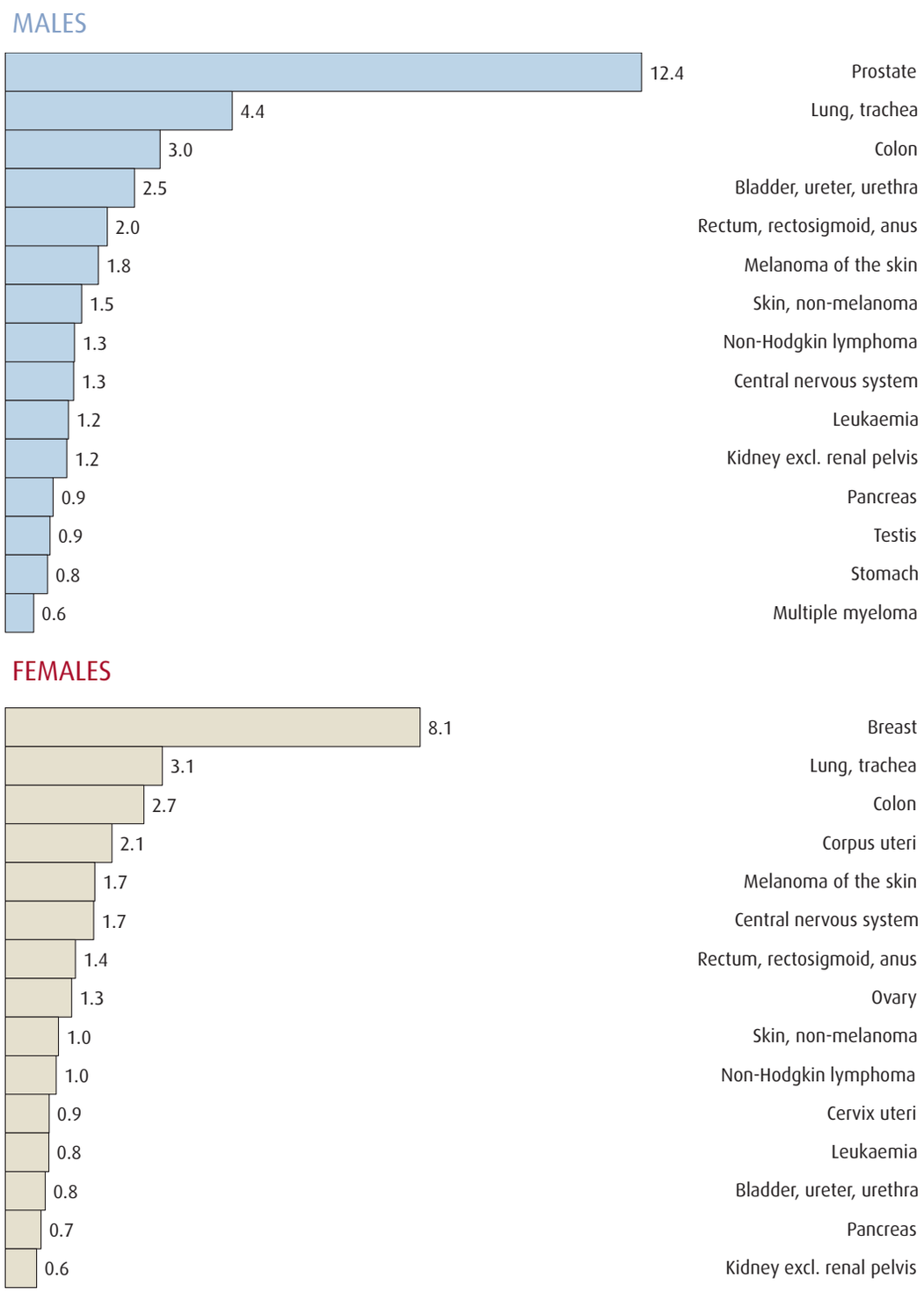


Table 6 Cumulative risk of developing cancer by the age of 75 by primary site and sex - 2004-2008

ICD-10	Site	Males	Females
C00-96	**All sites**	**34.0**	**27.8**
C00-14	**Mouth, pharynx**	**0.9**	**0.5**
C00	Lip	0.2	0.1
C01-02	Tongue	0.2	0.1
C03-06	Mouth, other	0.2	0.1
C07-08	Salivary glands	0.1	0.1
C09-14	Pharynx	0.3	0.1
C15-26	**Digestive organs**	**7.7**	**5.7**
C15	Oesophagus	0.5	0.1
C16	Stomach	0.8	0.5
C17	Small intestine	0.2	0.1
C18	Colon	3.0	2.7
C19-21	Rectum, rectosigmoid, anus	2.0	1.4
C22	Liver	0.2	0.1
C23-24	Gallbladder, bile ducts	0.2	0.2
C25	Pancreas	0.9	0.7
C26	Other digestive organs	0.1	0.1
C30-34, C38	**Respiratory organs**	**4.8**	**3.2**
C30-31	Nose, sinuses	0.1	0.1
C32	Larynx, epiglottis	0.3	0.0
C33-34	Lung, trachea	4.4	3.1
C38	Mediastinum, pleura (non-mesothelioma)	0.0	0.0
C40-41	**Bone**	**0.1**	**0.1**
C43	**Melanoma of the skin**	**1.8**	**1.7**
C44	**Skin, non-melanoma**	**1.5**	**1.0**
C45	**Mesothelioma**	**0.2**	**0.0**
C46	**Kaposi's sarcoma**	**0.0**	**0.0**
C47	**Autonomic nervous system**	**0.0**	**0.0**
C48-49	**Soft tissues**	**0.2**	**0.3**
C50	**Breast**	**0.0**	**8.1**
C51-58	**Female genital organs**		**4.5**
C53	Cervix uteri		0.9
C54	Corpus uteri		2.1
C55	Uterus, other		0.0
C56	Ovary		1.3
C51-52, C57	Other female genital		0.3
C58	Placenta		0.0
C60-63	**Male genital organs**	**13.2**	
C61	Prostate	12.4	
C62	Testis	0.9	
C60, C63	Other male genital	0.1	
C64-68	**Urinary organs**	**3.8**	**1.4**
C64	Kidney excl. renal pelvis	1.2	0.6
C65	Renal pelvis	0.1	0.1
C66-68	Bladder, ureter, urethra	2.5	0.8
C69	**Eye**	**0.1**	**0.1**
C70-72, D42-43	**Central nervous system**	**1.3**	**1.7**
C73	**Thyroid gland**	**0.2**	**0.5**
C37, C74-75	**Other endocrine glands**	**0.3**	**0.3**
C39, C76, C80	**Other or unspecified**	**0.5**	**0.4**
C81-96	**Lymphoid and haematopoietic tissue**	**3.4**	**2.4**
C81	Hodgkin lymphoma	0.2	0.1
C82-85, C96	Non-Hodgkin lymphoma	1.3	1.0
C88	Malignant immunoproliferative diseases	0.1	0.0
C90	Multiple myeloma	0.6	0.4
C91-95	Leukaemia	1.2	0.8

Table 7a Number of new cases by primary site and year - 1999-2008

MALES

ICD10	Site	Year									
		1999	00	01	02	03	04	05	06	07	2008
C00-96	**All sites**	**11418**	**11610**	**11743**	**11827**	**12718**	**13365**	**13271**	**13581**	**14462**	**14000**
C00-14	**Mouth, pharynx**	**255**	**279**	**242**	**258**	**253**	**257**	**247**	**286**	**282**	**262**
C00	Lip	60	64	52	61	42	37	48	76	70	54
C01-02	Tongue	51	43	51	50	52	53	44	46	59	62
C03-06	Mouth, other	50	56	36	47	55	52	39	53	40	43
C07-08	Salivary glands	22	28	21	23	17	17	26	15	18	15
C09-14	Pharynx	72	88	82	77	87	98	90	96	95	88
C15-26	**Digestive organs**	**2504**	**2552**	**2674**	**2635**	**2686**	**2797**	**2756**	**2717**	**2829**	**2773**
C15	Oesophagus	134	103	122	123	138	149	134	147	133	159
C16	Stomach	372	367	372	336	345	349	303	301	334	285
C17	Small intestine	40	45	67	46	58	44	51	65	64	62
C18	Colon	899	987	1000	972	991	1072	1063	1076	1098	1142
C19-21	Rectum, rectosigmoid, anus	592	618	632	684	676	693	691	656	643	639
C22	Liver	87	71	80	83	76	80	74	87	94	91
C23-24	Gallbladder, bile ducts	61	54	70	52	55	67	80	55	59	59
C25	Pancreas	275	270	292	306	310	304	323	300	359	304
C26	Other digestive organs	44	37	39	33	37	39	37	30	45	32
C30-34, C38	**Respiratory organs**	**1445**	**1454**	**1501**	**1521**	**1566**	**1549**	**1546**	**1603**	**1619**	**1567**
C30-31	Nose, sinuses	24	26	23	28	17	25	24	18	28	23
C32	Larynx, epiglottis	114	111	120	115	93	99	101	116	77	112
C33-34	Lung, trachea	1289	1303	1342	1366	1439	1414	1411	1455	1494	1422
C38	Mediastinum, pleura (non-mesothelioma)	18	14	16	12	17	11	10	14	20	10
C40-41	**Bone**	**21**	**20**	**22**	**28**	**21**	**28**	**25**	**25**	**22**	**23**
C43	**Melanoma of the skin**	**468**	**466**	**485**	**475**	**479**	**488**	**585**	**560**	**572**	**669**
C44	**Skin, non-melanoma**	**543**	**590**	**598**	**667**	**657**	**694**	**669**	**766**	**753**	**766**
C45	**Mesothelioma**	**55**	**51**	**61**	**51**	**66**	**72**	**72**	**49**	**63**	**57**
C46	**Kaposi's sarcoma**	**3**	**3**	**6**	**6**	**5**	**9**	**9**	**9**	**3**	**5**
C47	**Autonomic nervous system**	**7**	**7**	**4**	**5**	**7**	**3**	**6**	**6**	**6**	**7**
C48-49	**Soft tissues**	**46**	**51**	**50**	**56**	**48**	**51**	**47**	**60**	**65**	**50**
C50	**Breast**	**14**	**17**	**13**	**14**	**20**	**14**	**18**	**14**	**19**	**21**
C60-63	**Male genital organs**	**3324**	**3358**	**3210**	**3052**	**3725**	**4148**	**4001**	**4164**	**4778**	**4515**
C61	Prostate	3048	3080	2908	2772	3415	3836	3691	3861	4435	4168
C62	Testis	249	250	271	239	257	267	260	261	302	296
C60, C63	Other male genital	27	28	31	41	53	45	50	42	41	51
C64-68	**Urinary organs**	**1124**	**1127**	**1184**	**1245**	**1254**	**1414**	**1291**	**1334**	**1449**	**1329**
C64	Kidney excl. renal pelvis	284	272	322	329	334	393	353	358	397	367
C65	Renal pelvis	34	38	36	37	32	51	28	47	54	55
C66-68	Bladder, ureter, urethra	806	817	826	879	888	970	910	929	998	907
C69	**Eye**	**27**	**35**	**23**	**31**	**41**	**31**	**27**	**37**	**28**	**33**
C70-72, D42-43	**Central nervous system**	**350**	**347**	**377**	**377**	**422**	**392**	**454**	**410**	**479**	**389**
C73	**Thyroid gland**	**46**	**53**	**53**	**54**	**54**	**50**	**68**	**81**	**66**	**60**
C37, C74-75	**Other endocrine glands**	**64**	**68**	**60**	**81**	**85**	**66**	**81**	**79**	**99**	**103**
C39, C76, C80	**Other or unspecified**	**275**	**262**	**237**	**234**	**247**	**206**	**218**	**204**	**190**	**177**
C81-96	**Lymphoid and haematopoietic tissue**	**847**	**870**	**943**	**1037**	**1082**	**1096**	**1151**	**1177**	**1140**	**1194**
C81	Hodgkin lymphoma	59	64	53	52	84	73	65	66	64	76
C82-85, C96	Non-Hodgkin lymphoma	330	386	354	341	379	409	423	467	421	476
C88	Malignant immunoproliferative diseases	20	15	28	29	34	26	27	26	28	22
C90	Multiple myeloma	155	151	182	164	166	179	217	181	183	200
C91-95	Leukaemia	283	254	326	451	419	409	419	437	444	420

Table 7b Number of new cases by primary site and year - 1999-2008

FEMALES

		Year									
ICD10	**Site**	**1999**	**00**	**01**	**02**	**03**	**04**	**05**	**06**	**07**	**2008**
C00-96	**All sites**	**10357**	**10881**	**11003**	**11510**	**11576**	**11976**	**12109**	**12331**	**12357**	**12121**
C00-14	**Mouth, pharynx**	**133**	**127**	**141**	**133**	**129**	**132**	**183**	**204**	**164**	**189**
C00	Lip	19	23	32	25	24	25	41	53	54	50
C01-02	Tongue	34	29	27	27	25	26	33	38	23	32
C03-06	Mouth, other	25	29	35	35	28	40	43	55	37	44
C07-08	Salivary glands	22	23	24	18	20	11	26	22	23	23
C09-14	Pharynx	33	23	23	28	32	30	40	36	27	40
C15-26	**Digestive organs**	**2412**	**2563**	**2471**	**2548**	**2548**	**2566**	**2621**	**2666**	**2656**	**2556**
C15	Oesophagus	46	56	52	48	56	54	61	45	55	54
C16	Stomach	234	240	210	258	223	217	237	216	216	198
C17	Small intestine	40	47	47	62	46	50	43	46	51	50
C18	Colon	1080	1155	1138	1136	1234	1185	1199	1271	1262	1229
C19-21	Rectum, rectosigmoid, anus	506	534	514	520	504	574	566	557	537	534
C22	Liver	62	52	48	46	41	41	60	44	53	57
C23-24	Gallbladder, bile ducts	84	89	62	80	83	64	80	77	84	68
C25	Pancreas	294	334	345	351	319	333	315	370	339	307
C26	Other digestive organs	66	56	55	47	42	48	60	40	59	59
C30-34, C38	**Respiratory organs**	**794**	**827**	**844**	**861**	**937**	**978**	**989**	**1069**	**1151**	**1148**
C30-31	Nose, sinuses	17	13	15	15	12	28	17	22	33	14
C32	Larynx, epiglottis	19	20	22	18	18	13	17	12	18	22
C33-34	Lung, trachea	747	786	799	824	905	925	949	1030	1091	1107
C38	Mediastinum, pleura (non-mesothelioma)	11	8	8	4	2	12	6	5	9	5
C40-41	**Bone**	**28**	**22**	**21**	**21**	**19**	**15**	**17**	**18**	**22**	**23**
C43	**Melanoma of the skin**	**483**	**534**	**530**	**555**	**549**	**558**	**574**	**661**	**629**	**616**
C44	**Skin, non-melanoma**	**457**	**511**	**485**	**522**	**570**	**579**	**675**	**654**	**686**	**684**
C45	**Mesothelioma**	**9**	**10**	**5**	**8**	**11**	**10**	**9**	**20**	**13**	**9**
C46	**Kaposi's sarcoma**	**3**	**8**	**0**	**3**	**2**	**3**	**2**	**5**	**3**	**2**
C47	**Autonomic nervous system**	**2**	**3**	**5**	**4**	**3**	**7**	**4**	**8**	**5**	**6**
C48-49	**Soft tissues**	**65**	**75**	**68**	**64**	**69**	**88**	**84**	**82**	**90**	**78**
C50	**Breast**	**2422**	**2535**	**2637**	**2715**	**2741**	**2806**	**2815**	**2723**	**2754**	**2753**
C51-58	**Female genital organs**	**1377**	**1428**	**1498**	**1540**	**1492**	**1572**	**1565**	**1551**	**1520**	**1565**
C53	Cervix uteri	287	286	302	312	296	269	305	309	266	270
C54	Corpus uteri	492	564	595	589	627	686	677	651	653	716
C55	Uterus, other	7	15	6	11	13	8	6	11	5	8
C56	Ovary	460	456	449	522	426	466	425	454	455	457
C51-52, C57	Other female genital	125	105	143	103	126	139	146	122	139	114
C58	Placenta	6	2	3	3	4	4	6	4	2	0
C64-68	**Urinary organs**	**502**	**518**	**518**	**584**	**565**	**575**	**591**	**586**	**594**	**573**
C64	Kidney excl. renal pelvis	184	181	188	213	202	210	237	208	247	230
C65	Renal pelvis	27	18	26	30	37	27	18	24	22	32
C66-68	Bladder, ureter, urethra	291	319	304	341	326	338	336	354	325	311
C69	**Eye**	**31**	**20**	**28**	**34**	**34**	**37**	**24**	**28**	**29**	**27**
C70-72, D42-43	**Central nervous system**	**420**	**419**	**478**	**520**	**525**	**586**	**573**	**588**	**590**	**493**
C73	**Thyroid gland**	**121**	**147**	**130**	**144**	**133**	**171**	**164**	**154**	**163**	**169**
C37, C74-75	**Other endocrine glands**	**58**	**44**	**56**	**74**	**82**	**81**	**81**	**92**	**84**	**93**
C39, C76, C80	**Other or unspecified**	**296**	**325**	**287**	**308**	**304**	**283**	**270**	**248**	**252**	**199**
C81-96	**Lymphoid and haematopoietic tissue**	**744**	**765**	**801**	**872**	**863**	**929**	**868**	**974**	**952**	**938**
C81	Hodgkin lymphoma	39	64	33	43	53	46	49	47	48	42
C82-85, C96	Non-Hodgkin lymphoma	332	323	333	342	335	369	335	385	381	361
C88	Malignant immunoproliferative diseases	9	11	16	20	15	21	19	23	14	12
C90	Multiple myeloma	157	123	174	162	151	152	151	144	159	151
C91-95	Leukaemia	207	244	245	305	309	341	314	375	350	372

Table 8a Age-adjusted (world) incidence rates per 100 000 person-years by primary site and year - 1999-2008

MALES

		Year									
ICD10	Site	1999	00	01	02	03	04	05	06	07	2008
C00-96	**All sites**	**321.3**	**323.8**	**322.9**	**322.0**	**341.8**	**352.4**	**344.6**	**348.0**	**365.5**	**348.9**
C00-14	**Mouth, pharynx**	**7.9**	**8.5**	**7.2**	**7.8**	**7.7**	**7.6**	**7.0**	**7.7**	**7.7**	**7.0**
C00	Lip	1.6	1.8	1.4	1.7	1.1	1.0	1.2	1.8	1.7	1.2
C01-02	Tongue	1.6	1.3	1.6	1.6	1.7	1.6	1.3	1.2	1.6	1.7
C03-06	Mouth, other	1.6	1.7	1.1	1.4	1.6	1.5	1.1	1.5	1.1	1.2
C07-08	Salivary glands	0.7	0.8	0.6	0.7	0.5	0.5	0.7	0.4	0.5	0.4
C09-14	Pharynx	2.4	2.9	2.5	2.4	2.7	2.9	2.6	2.8	2.7	2.5
C15-26	**Digestive organs**	**67.4**	**67.0**	**69.7**	**68.5**	**68.7**	**70.2**	**68.1**	**65.9**	**67.8**	**65.7**
C15	Oesophagus	3.7	2.8	3.2	3.5	3.8	4.0	3.5	3.9	3.3	3.9
C16	Stomach	9.5	9.3	9.1	8.6	8.5	8.2	7.1	7.0	7.8	6.6
C17	Small intestine	1.2	1.3	2.0	1.3	1.7	1.2	1.3	1.8	1.6	1.5
C18	Colon	24.1	25.8	25.5	24.8	24.7	26.5	26.1	25.2	25.6	26.3
C19-21	Rectum, rectosigmoid, anus	16.5	16.5	17.3	18.0	17.8	17.8	17.3	16.1	16.1	15.4
C22	Liver	2.4	1.9	2.0	2.3	2.1	1.8	2.1	2.3	2.4	2.5
C23-24	Gallbladder, bile ducts	1.5	1.4	1.9	1.3	1.4	1.7	2.0	1.3	1.4	1.4
C25	Pancreas	7.3	7.0	7.7	7.9	7.9	8.0	7.9	7.6	8.4	7.3
C26	Other digestive organs	1.2	1.0	0.9	0.8	0.8	1.1	0.8	0.7	1.0	0.7
C30-34, C38	**Respiratory organs**	**41.1**	**39.8**	**40.6**	**41.2**	**41.7**	**39.8**	**38.8**	**40.5**	**39.4**	**37.9**
C30-31	Nose, sinuses	0.8	0.8	0.6	0.9	0.5	0.7	0.7	0.4	0.8	0.6
C32	Larynx, epiglottis	3.3	3.3	3.1	3.3	2.8	2.7	2.7	3.2	2.0	2.8
C33-34	Lung, trachea	36.4	35.4	36.4	36.8	38.0	36.1	35.2	36.7	36.2	34.2
C38	Mediastinum, pleura (non-mesothelioma)	0.5	0.4	0.5	0.3	0.4	0.3	0.3	0.3	0.5	0.3
C40-41	**Bone**	**0.8**	**0.9**	**0.9**	**1.2**	**0.8**	**1.1**	**0.9**	**1.1**	**0.7**	**1.0**
C43	**Melanoma of the skin**	**14.6**	**14.1**	**14.8**	**14.3**	**14.4**	**14.5**	**16.5**	**15.3**	**15.6**	**17.6**
C44	**Skin, non-melanoma**	**13.3**	**14.5**	**14.3**	**15.6**	**14.8**	**15.0**	**14.4**	**16.3**	**15.4**	**15.3**
C45	**Mesothelioma**	**1.7**	**1.3**	**1.6**	**1.4**	**1.7**	**1.8**	**1.8**	**1.2**	**1.5**	**1.4**
C46	**Kaposi's sarcoma**	**0.1**	**0.1**	**0.2**	**0.1**	**0.1**	**0.3**	**0.2**	**0.2**	**0.1**	**0.1**
C47	**Autonomic nervous system**	**0.4**	**0.3**	**0.2**	**0.3**	**0.4**	**0.1**	**0.4**	**0.2**	**0.3**	**0.3**
C48-49	**Soft tissues**	**1.6**	**1.7**	**1.6**	**1.8**	**1.4**	**1.6**	**1.4**	**1.9**	**1.9**	**1.6**
C50	**Breast**	**0.3**	**0.5**	**0.4**	**0.3**	**0.5**	**0.3**	**0.5**	**0.3**	**0.5**	**0.5**
C60-63	**Male genital organs**	**91.2**	**94.0**	**88.4**	**82.4**	**99.1**	**110.4**	**105.4**	**107.9**	**123.6**	**114.3**
C61	Prostate	80.1	82.6	76.5	71.2	87.1	98.5	93.1	96.2	110.2	101.4
C62	Testis	10.3	10.5	11.1	10.0	10.4	11.0	10.9	10.7	12.3	11.6
C60, C63	Other male genital	0.7	0.8	0.9	1.2	1.5	1.0	1.4	1.0	1.1	1.3
C64-68	**Urinary organs**	**30.1**	**29.8**	**31.1**	**32.5**	**32.4**	**35.2**	**31.9**	**32.3**	**34.8**	**32.0**
C64	Kidney excl. renal pelvis	8.2	8.0	9.4	9.6	9.4	10.9	9.5	9.7	10.3	9.9
C65	Renal pelvis	0.9	0.9	0.9	0.9	0.7	1.3	0.8	1.1	1.3	1.4
C66-68	Bladder, ureter, urethra	21.0	20.9	20.8	22.0	22.2	23.0	21.6	21.4	23.2	20.8
C69	**Eye**	**1.1**	**1.0**	**0.7**	**1.0**	**1.2**	**1.1**	**0.8**	**1.1**	**0.8**	**0.9**
C70-72, D42-43	**Central nervous system**	**12.6**	**12.0**	**12.9**	**13.4**	**15.0**	**12.9**	**15.0**	**13.2**	**15.6**	**12.2**
C73	**Thyroid gland**	**1.5**	**1.8**	**1.8**	**1.7**	**1.7**	**1.5**	**2.1**	**2.4**	**1.8**	**1.7**
C37, C74-75	**Other endocrine glands**	**2.3**	**2.6**	**2.2**	**2.6**	**3.0**	**2.3**	**2.4**	**2.7**	**3.1**	**3.4**
C39, C76, C80	**Other or unspecified**	**6.7**	**6.6**	**5.5**	**5.7**	**5.6**	**4.6**	**4.9**	**4.7**	**4.2**	**3.9**
C81-96	**Lymphoid and haematopoietic tissue**	**26.8**	**27.3**	**28.8**	**30.1**	**31.7**	**32.0**	**32.1**	**33.1**	**30.7**	**32.0**
C81	Hodgkin lymphoma	2.5	2.7	2.1	2.2	3.4	3.0	2.7	2.5	2.3	2.8
C82-85, C96	Non-Hodgkin lymphoma	10.3	12.0	10.6	9.8	11.1	11.9	11.5	12.7	11.4	12.6
C88	Malignant immunoproliferative diseases	0.5	0.5	0.8	0.8	0.8	0.6	0.7	0.6	0.7	0.4
C90	Multiple myeloma	4.0	3.9	5.1	4.3	4.3	4.5	5.3	4.6	4.4	4.7
C91-95	Leukaemia	9.3	8.3	10.2	13.0	12.1	12.0	11.8	12.6	12.0	11.5

Table 8b Age-adjusted (world) incidence rates per 100 000 person-years by primary site and year - 1999-2008

FEMALES

		Year									
ICD10	**Site**	**1999**	**00**	**01**	**02**	**03**	**04**	**05**	**06**	**07**	**2008**
C00-96	**All sites**	**263.9**	**271.8**	**276.3**	**285.7**	**282.8**	**290.6**	**289.0**	**293.3**	**287.9**	**281.1**
C00-14	**Mouth, pharynx**	**3.6**	**3.1**	**3.2**	**3.3**	**3.2**	**3.1**	**4.1**	**4.9**	**3.6**	**4.1**
C00	Lip	0.5	0.5	0.7	0.6	0.5	0.5	0.7	1.2	1.0	0.9
C01-02	Tongue	0.9	0.7	0.5	0.7	0.6	0.7	0.7	0.9	0.5	0.8
C03-06	Mouth, other	0.6	0.7	0.6	0.9	0.7	0.9	0.9	1.2	0.7	0.8
C07-08	Salivary glands	0.7	0.6	0.7	0.5	0.6	0.2	0.7	0.5	0.6	0.6
C09-14	Pharynx	1.0	0.6	0.6	0.8	0.9	0.8	1.1	1.1	0.7	1.1
C15-26	**Digestive organs**	**49.4**	**50.7**	**50.0**	**50.7**	**49.8**	**51.5**	**50.6**	**51.8**	**50.3**	**48.0**
C15	Oesophagus	0.9	1.0	1.1	0.9	1.1	1.1	1.2	0.9	0.9	1.1
C16	Stomach	4.6	4.7	3.9	4.8	4.0	4.5	4.4	4.0	4.0	3.3
C17	Small intestine	1.1	1.3	1.1	1.5	1.0	1.2	1.0	1.1	1.1	1.2
C18	Colon	22.3	22.8	22.8	22.5	23.8	23.3	22.6	23.9	23.6	22.5
C19-21	Rectum, rectosigmoid, anus	11.0	11.6	11.3	11.5	10.9	12.0	11.8	12.0	11.4	10.8
C22	Liver	1.3	1.1	1.1	1.0	0.9	1.0	1.4	0.8	1.0	1.1
C23-24	Gallbladder, bile ducts	1.7	1.7	1.4	1.4	1.4	1.2	1.5	1.5	1.6	1.3
C25	Pancreas	5.5	5.9	6.4	6.4	6.3	6.3	5.6	6.9	5.8	5.8
C26	Other digestive organs	1.0	0.7	0.8	0.7	0.6	0.9	1.0	0.6	0.9	0.9
C30-34, C38	**Respiratory organs**	**21.1**	**21.7**	**21.6**	**21.5**	**23.1**	**23.4**	**23.3**	**24.7**	**25.9**	**25.7**
C30-31	Nose, sinuses	0.4	0.3	0.4	0.5	0.3	0.5	0.4	0.5	0.7	0.3
C32	Larynx, epiglottis	0.5	0.5	0.6	0.5	0.5	0.3	0.5	0.3	0.5	0.5
C33-34	Lung, trachea	19.9	20.8	20.5	20.6	22.4	22.5	22.3	23.9	24.6	24.8
C38	Mediastinum, pleura (non-mesothelioma)	0.2	0.2	0.2	0.0	0.0	0.2	0.1	0.1	0.1	0.1
C40-41	**Bone**	**1.1**	**0.9**	**0.9**	**1.0**	**0.8**	**0.6**	**0.6**	**0.6**	**0.8**	**0.7**
C43	**Melanoma of the skin**	**14.9**	**15.6**	**15.6**	**16.3**	**15.8**	**15.8**	**16.0**	**18.7**	**16.6**	**16.4**
C44	**Skin, non-melanoma**	**7.8**	**8.4**	**8.6**	**8.5**	**9.2**	**9.6**	**10.2**	**10.3**	**10.4**	**10.7**
C45	**Mesothelioma**	**0.1**	**0.2**	**0.1**	**0.2**	**0.2**	**0.1**	**0.2**	**0.4**	**0.2**	**0.2**
C46	**Kaposi's sarcoma**	**0.0**	**0.2**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.1**	**0.0**	**0.0**
C47	**Autonomic nervous system**	**0.1**	**0.2**	**0.2**	**0.3**	**0.1**	**0.3**	**0.2**	**0.3**	**0.3**	**0.3**
C48-49	**Soft tissues**	**1.7**	**2.0**	**2.1**	**1.6**	**1.9**	**2.5**	**2.6**	**2.2**	**2.4**	**2.1**
C50	**Breast**	**68.9**	**73.1**	**75.7**	**77.3**	**77.1**	**77.4**	**76.6**	**73.7**	**73.2**	**72.8**
C51-58	**Female genital organs**	**39.2**	**39.1**	**40.8**	**41.7**	**39.8**	**41.1**	**40.7**	**39.3**	**38.7**	**39.2**
C53	Cervix uteri	9.7	9.3	9.8	10.3	9.5	8.7	9.8	9.6	8.4	8.2
C54	Corpus uteri	13.4	14.8	15.0	15.1	16.1	17.0	16.5	15.5	15.9	17.4
C55	Uterus, other	0.1	0.3	0.1	0.2	0.2	0.2	0.1	0.2	0.1	0.1
C56	Ovary	13.0	12.3	12.5	13.8	11.1	12.3	10.8	11.2	11.3	11.2
C51-52, C57	Other female genital	2.8	2.3	3.1	2.2	2.8	2.7	3.2	2.7	2.8	2.2
C58	Placenta	0.3	0.1	0.1	0.1	0.1	0.2	0.3	0.2	0.1	0.0
C64-68	**Urinary organs**	**11.5**	**11.0**	**11.2**	**12.2**	**11.7**	**11.3**	**12.5**	**12.3**	**12.4**	**12.1**
C64	Kidney excl. renal pelvis	4.7	4.2	4.2	4.7	4.8	4.8	5.5	5.0	5.7	5.2
C65	Renal pelvis	0.6	0.4	0.6	0.6	0.8	0.4	0.3	0.5	0.4	0.6
C66-68	Bladder, ureter, urethra	6.2	6.3	6.4	6.9	6.0	6.0	6.6	6.8	6.3	6.2
C69	**Eye**	**0.9**	**0.4**	**0.7**	**1.0**	**0.8**	**1.0**	**0.8**	**0.8**	**0.8**	**0.7**
C70-72, D42-43	**Central nervous system**	**13.3**	**13.1**	**14.6**	**16.9**	**16.0**	**17.3**	**17.7**	**16.7**	**17.3**	**14.7**
C73	**Thyroid gland**	**3.8**	**5.1**	**4.3**	**4.6**	**4.3**	**5.4**	**5.1**	**4.9**	**5.1**	**5.1**
C37, C74-75	**Other endocrine glands**	**1.9**	**1.7**	**2.2**	**2.5**	**3.0**	**2.6**	**3.1**	**3.2**	**2.9**	**3.1**
C39, C76, C80	**Other or unspecified**	**5.3**	**5.6**	**4.5**	**5.1**	**4.6**	**4.8**	**4.4**	**4.1**	**4.0**	**3.3**
C81-96	**Lymphoid and haematopoietic tissue**	**19.2**	**19.7**	**20.0**	**21.0**	**21.3**	**22.7**	**20.3**	**24.1**	**23.2**	**21.8**
C81	Hodgkin lymphoma	1.6	2.7	1.4	1.6	2.1	1.7	2.0	2.1	1.9	1.4
C82-85, C96	Non-Hodgkin lymphoma	8.4	8.0	8.3	8.1	7.9	9.0	7.8	9.1	9.2	8.3
C88	Malignant immunoproliferative diseases	0.2	0.2	0.3	0.4	0.3	0.4	0.3	0.5	0.3	0.2
C90	Multiple myeloma	3.2	2.5	3.5	3.3	2.8	3.1	3.2	2.7	3.2	3.0
C91-95	Leukaemia	5.9	6.4	6.5	7.5	8.3	8.4	7.0	9.7	8.7	8.8

Table 9a Average annual number of new cases by primary site and five-year age group - 2004-2008

ICD10	Site	0-4	5-9	10-14	15-19	20-24	25-29
C00-96	**All sites**	**35**	**19**	**27**	**42**	**62**	**98**
C00-14	**Mouth, pharynx**	**0**	**0**	**0**	**0**	**1**	**1**
C00	Lip	0	0	0	0	0	0
C01-02	Tongue	0	0	0	0	0	0
C03-06	Mouth, other	0	0	0	0	0	0
C07-08	Salivary glands	0	0	0	0	0	0
C09-14	Pharynx	0	0	0	0	0	0
C15-26	**Digestive organs**	**1**	**1**	**0**	**1**	**2**	**3**
C15	Oesophagus	0	0	0	0	0	0
C16	Stomach	0	0	0	0	0	0
C17	Small intestine	0	0	0	0	0	0
C18	Colon	0	0	0	0	1	2
C19-21	Rectum, rectosigmoid, anus	0	0	0	0	0	1
C22	Liver	1	1	0	0	0	0
C23-24	Gallbladder, bile ducts	0	0	0	0	0	0
C25	Pancreas	0	0	0	0	0	0
C26	Other digestive organs	0	0	0	0	0	0
C30-34, C38	**Respiratory organs**	**0**	**0**	**0**	**1**	**0**	**1**
C30-31	Nose, sinuses	0	0	0	0	0	0
C32	Larynx, epiglottis	0	0	0	0	0	0
C33-34	Lung, trachea	0	0	0	0	0	1
C38	Mediastinum, pleura (non-mesothelioma)	0	0	0	0	0	0
C40-41	**Bone**	**0**	**1**	**1**	**3**	**2**	**1**
C43	**Melanoma of the skin**	**0**	**0**	**0**	**1**	**2**	**8**
C44	**Skin, non-melanoma**	**0**	**0**	**0**	**1**	**1**	**1**
C45	**Mesothelioma**	**0**	**0**	**0**	**0**	**0**	**0**
C46	**Kaposi's sarcoma**	**0**	**0**	**0**	**0**	**0**	**0**
C47	**Autonomic nervous system**	**2**	**0**	**0**	**0**	**0**	**0**
C48-49	**Soft tissues**	**1**	**0**	**1**	**1**	**1**	**1**
C50	**Breast**	**0**	**0**	**0**	**0**	**0**	**0**
C60-63	**Male genital organs**	**1**	**0**	**1**	**7**	**31**	**52**
C61	Prostate	0	0	0	0	0	0
C62	Testis	1	0	1	7	31	51
C60, C63	Other male genital	0	0	0	0	0	1
C64-68	**Urinary organs**	**2**	**1**	**0**	**0**	**2**	**2**
C64	Kidney excl. renal pelvis	2	1	0	0	1	1
C65	Renal pelvis	0	0	0	0	0	0
C66-68	Bladder, ureter, urethra	0	0	0	0	1	1
C69	**Eye**	**2**	**0**	**0**	**0**	**0**	**1**
C70-72, D42-43	**Central nervous system**	**9**	**7**	**9**	**11**	**9**	**11**
C73	**Thyroid gland**	**0**	**0**	**0**	**0**	**0**	**1**
C37, C74-75	**Other endocrine glands**	**2**	**1**	**2**	**2**	**1**	**1**
C39, C76, C80	**Other or unspecified**	**0**	**0**	**0**	**0**	**0**	**0**
C81-96	**Lymphoid and haematopoietic tissue**	**15**	**7**	**10**	**13**	**10**	**14**
C81	Hodgkin lymphoma	0	1	3	5	5	7
C82-85, C96	Non-Hodgkin lymphoma	2	1	2	3	2	3
C88	Malignant immunoproliferative diseases	0	0	0	0	0	0
C90	Multiple myeloma	0	0	0	0	0	0
C91-95	Leukaemia	12	5	5	5	3	4

Age											
30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85+
140	170	237	365	650	1222	1794	1889	1997	2092	1730	1167
1	**3**	**7**	**15**	**27**	**40**	**45**	**38**	**31**	**26**	**19**	**13**
0	0	1	2	4	5	6	8	8	9	7	7
0	1	1	5	4	8	9	9	6	4	4	2
0	1	1	1	4	9	9	7	6	4	3	0
1	1	1	1	2	2	2	2	2	2	1	2
0	1	3	7	13	18	19	12	8	7	4	2
12	**19**	**42**	**76**	**138**	**234**	**332**	**360**	**415**	**459**	**393**	**285**
0	0	2	6	9	16	21	23	21	21	15	11
1	2	7	7	14	22	35	33	47	56	48	43
1	2	1	3	3	6	9	7	8	9	6	2
6	6	15	26	47	77	118	137	175	195	170	117
3	5	10	17	37	68	91	89	97	101	86	59
1	1	3	5	7	8	9	8	11	11	12	8
0	0	1	2	4	6	8	7	10	9	9	7
1	2	3	10	15	30	40	50	42	52	43	30
0	0	1	1	2	2	2	5	6	5	6	7
2	**6**	**12**	**33**	**72**	**154**	**233**	**232**	**258**	**278**	**203**	**92**
0	0	1	1	1	3	4	4	3	2	2	2
0	0	1	2	8	16	17	17	13	13	11	3
1	5	10	30	63	134	210	209	241	261	188	86
0	0	0	0	0	1	2	2	1	2	2	1
1	**2**	**2**	**2**	**1**	**2**	**1**	**1**	**1**	**2**	**1**	**0**
12	**20**	**31**	**36**	**53**	**65**	**74**	**61**	**67**	**61**	**48**	**34**
4	**3**	**5**	**9**	**15**	**35**	**45**	**69**	**98**	**134**	**158**	**154**
0	**0**	**0**	**1**	**2**	**4**	**8**	**9**	**13**	**10**	**9**	**6**
0	**0**	**0**	**0**	**1**	**0**	**0**	**2**	**1**	**1**	**1**	**1**
0	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**
1	**2**	**3**	**5**	**5**	**6**	**5**	**4**	**6**	**6**	**5**	**2**
0	**0**	**0**	**1**	**1**	**2**	**3**	**2**	**2**	**2**	**2**	**2**
54	**45**	**40**	**51**	**134**	**369**	**658**	**751**	**687**	**636**	**491**	**313**
0	0	4	29	119	357	649	742	679	628	483	308
53	44	35	20	13	7	4	4	3	1	1	1
1	1	1	2	2	5	5	5	6	6	7	4
5	**10**	**20**	**38**	**68**	**122**	**164**	**163**	**206**	**243**	**196**	**122**
2	6	11	18	33	44	52	45	51	48	40	18
0	0	0	2	2	3	6	6	9	9	5	3
2	4	9	19	33	75	105	112	146	185	150	100
0	**1**	**0**	**2**	**3**	**3**	**5**	**3**	**4**	**2**	**3**	**2**
19	**22**	**28**	**28**	**34**	**46**	**45**	**36**	**33**	**33**	**28**	**18**
3	**4**	**5**	**6**	**7**	**9**	**8**	**3**	**5**	**6**	**4**	**2**
3	**5**	**6**	**8**	**7**	**9**	**11**	**6**	**8**	**7**	**5**	**2**
0	**0**	**1**	**5**	**10**	**12**	**17**	**21**	**28**	**31**	**38**	**35**
22	**27**	**36**	**48**	**72**	**109**	**138**	**128**	**135**	**155**	**129**	**84**
9	6	6	3	5	4	4	4	3	2	1	1
6	13	15	22	32	54	58	51	49	56	41	28
0	0	0	1	2	1	4	3	3	5	5	2
0	2	4	5	13	17	23	26	26	33	28	15
6	6	10	17	21	33	49	44	55	60	53	37

Table 9b Average annual number of new cases by primary site and five-year age group - 2004-2008

ICD10	Site	0-4	5-9	10-14	15-19	20-24	25-29
C00-96	**All sites**	**30**	**19**	**17**	**34**	**51**	**92**
C00-14	**Mouth, pharynx**	**0**	**0**	**0**	**0**	**1**	**1**
C00	Lip	0	0	0	0	0	0
C01-02	Tongue	0	0	0	0	0	0
C03-06	Mouth, other	0	0	0	0	0	1
C07-08	Salivary glands	0	0	0	0	0	0
C09-14	Pharynx	0	0	0	0	0	0
C15-26	**Digestive organs**	**1**	**0**	**1**	**2**	**3**	**4**
C15	Oesophagus	0	0	0	0	0	0
C16	Stomach	0	0	0	0	0	1
C17	Small intestine	0	0	0	0	0	0
C18	Colon	0	0	0	1	2	2
C19-21	Rectum, rectosigmoid, anus	0	0	0	0	1	1
C22	Liver	1	0	0	1	0	0
C23-24	Gallbladder, bile ducts	0	0	0	0	0	0
C25	Pancreas	0	0	0	0	0	0
C26	Other digestive organs	0	0	0	0	0	0
C30-34, C38	**Respiratory organs**	**0**	**0**	**0**	**0**	**0**	**1**
C30-31	Nose, sinuses	0	0	0	0	0	0
C32	Larynx, epiglottis	0	0	0	0	0	0
C33-34	Lung, trachea	0	0	0	0	0	1
C38	Mediastinum, pleura (non-mesothelioma)	0	0	0	0	0	0
C40-41	**Bone**	**0**	**1**	**1**	**1**	**1**	**1**
C43	**Melanoma of the skin**	**0**	**0**	**0**	**2**	**8**	**14**
C44	**Skin, non-melanoma**	**0**	**0**	**0**	**1**	**1**	**1**
C45	**Mesothelioma**	**0**	**0**	**0**	**0**	**0**	**0**
C46	**Kaposi's sarcoma**	**0**	**0**	**0**	**0**	**0**	**0**
C47	**Autonomic nervous system**	**1**	**0**	**0**	**0**	**0**	**0**
C48-49	**Soft tissues**	**0**	**1**	**1**	**2**	**1**	**2**
C50	**Breast**	**0**	**0**	**0**	**0**	**2**	**9**
C51-58	**Female genital organs**	**1**	**1**	**1**	**2**	**7**	**19**
C53	Cervix uteri	0	0	0	0	3	14
C54	Corpus uteri	0	0	0	0	0	1
C55	Uterus, other	0	0	0	0	0	0
C56	Ovary	1	1	1	2	3	3
C51-52, C57	Other female genital	0	0	0	0	0	1
C58	Placenta	0	0	0	0	1	1
C64-68	**Urinary organs**	**3**	**1**	**0**	**0**	**1**	**2**
C64	Kidney excl. renal pelvis	3	1	0	0	0	1
C65	Renal pelvis	0	0	0	0	0	0
C66-68	Bladder, ureter, urethra	0	0	0	0	0	0
C69	**Eye**	**2**	**0**	**0**	**0**	**0**	**0**
C70-72, D42-43	**Central nervous system**	**7**	**7**	**6**	**9**	**9**	**12**
C73	**Thyroid gland**	**0**	**0**	**0**	**2**	**3**	**8**
C37, C74-75	**Other endocrine glands**	**2**	**1**	**1**	**2**	**4**	**5**
C39, C76, C80	**Other or unspecified**	**0**	**0**	**0**	**0**	**0**	**0**
C81-96	**Lymphoid and haematopoietic tissue**	**13**	**6**	**5**	**11**	**10**	**13**
C81	Hodgkin lymphoma	0	0	1	5	5	6
C82-85, C96	Non-Hodgkin lymphoma	0	1	2	2	2	4
C88	Malignant immunoproliferative diseases	0	0	0	0	0	0
C90	Multiple myeloma	0	0	0	0	0	0
C91-95	Leukaemia	12	5	3	4	3	2

Age											
30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85+
169	**284**	**423**	**673**	**931**	**1191**	**1390**	**1254**	**1256**	**1442**	**1448**	**1475**
2	**2**	**3**	**7**	**14**	**18**	**21**	**18**	**20**	**22**	**20**	**24**
0	0	0	1	3	3	4	4	6	8	6	9
0	0	1	2	2	4	5	3	3	3	3	4
0	0	1	1	2	4	5	5	6	5	7	8
0	1	1	1	1	1	3	2	2	3	2	2
0	0	0	2	5	6	5	5	3	3	2	2
10	**21**	**37**	**63**	**110**	**176**	**249**	**285**	**323**	**406**	**465**	**458**
0	0	1	1	3	5	6	5	6	9	7	11
2	2	2	7	10	12	18	20	27	31	41	44
1	1	1	1	3	6	6	7	7	7	5	4
4	8	16	24	44	74	106	139	161	199	233	213
2	6	10	19	33	46	67	63	63	77	86	79
0	0	1	1	2	2	6	4	8	9	8	8
0	1	1	3	3	6	6	8	8	13	15	10
0	2	3	7	12	22	31	35	38	52	59	70
0	0	1	1	1	3	3	4	5	7	10	17
1	**6**	**11**	**31**	**66**	**116**	**154**	**152**	**168**	**176**	**115**	**69**
0	0	0	1	2	3	2	2	2	3	3	4
0	1	0	0	2	2	2	1	2	2	1	1
1	5	11	29	62	111	149	148	163	169	109	63
0	0	0	0	0	1	1	0	1	2	2	1
1	**1**	**0**	**1**	**1**	**2**	**2**	**1**	**1**	**1**	**1**	**1**
24	**38**	**46**	**50**	**53**	**61**	**66**	**48**	**48**	**53**	**45**	**50**
2	**3**	**8**	**9**	**18**	**30**	**35**	**45**	**68**	**90**	**126**	**218**
0	**0**	**1**	**0**	**0**	**1**	**0**	**2**	**2**	**2**	**4**	**1**
0	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**
0	**0**	**1**	**1**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**
1	**3**	**2**	**5**	**7**	**9**	**10**	**10**	**9**	**9**	**6**	**7**
32	**83**	**166**	**283**	**360**	**381**	**383**	**297**	**174**	**191**	**209**	**201**
40	**54**	**65**	**90**	**148**	**181**	**199**	**162**	**157**	**162**	**146**	**123**
34	37	31	27	29	23	23	12	13	17	13	9
2	7	14	27	65	90	101	90	89	77	62	53
0	0	0	0	0	0	2	0	1	1	2	2
3	7	17	30	43	56	64	47	43	51	47	36
1	2	3	6	10	11	10	13	12	16	22	24
1	0	0	0	0	0	0	0	0	0	0	0
2	**5**	**9**	**14**	**24**	**43**	**69**	**64**	**80**	**96**	**89**	**82**
1	3	5	8	11	19	30	24	30	38	28	22
0	0	0	0	0	2	3	3	3	5	5	2
1	2	4	6	12	22	36	37	46	53	57	57
0	**1**	**1**	**2**	**1**	**4**	**3**	**2**	**3**	**2**	**3**	**3**
20	**26**	**30**	**46**	**50**	**58**	**61**	**50**	**53**	**49**	**41**	**34**
14	**16**	**13**	**18**	**12**	**18**	**14**	**10**	**9**	**11**	**8**	**8**
6	**6**	**6**	**9**	**6**	**8**	**10**	**5**	**5**	**4**	**5**	**2**
1	**1**	**2**	**5**	**9**	**14**	**18**	**17**	**25**	**40**	**46**	**72**
13	**18**	**22**	**39**	**52**	**72**	**95**	**85**	**111**	**129**	**119**	**122**
4	4	3	2	2	3	1	1	3	3	1	1
4	7	9	19	28	33	42	39	43	51	43	38
0	0	0	0	1	2	2	2	2	5	2	2
0	1	3	5	7	12	19	12	22	27	24	20
4	7	7	13	15	22	30	31	40	43	49	60

Table 10a Age-specific incidence rates per 100 000 person-years by primary site and five-year age group - 2004-2008

ICD10	Site	0-4	5-9	10-14	15-19	20-24	25-29
C00-96	**All sites**	**23.2**	**12.3**	**16.9**	**26.5**	**43.0**	**66.3**
C00-14	**Mouth, pharynx**	**0.0**	**0.0**	**0.2**	**0.0**	**0.6**	**0.5**
C00	Lip	0.0	0.0	0.0	0.0	0.0	0.0
C01-02	Tongue	0.0	0.0	0.0	0.0	0.0	0.1
C03-06	Mouth, other	0.0	0.0	0.1	0.0	0.0	0.1
C07-08	Salivary glands	0.0	0.0	0.1	0.0	0.3	0.3
C09-14	Pharynx	0.0	0.0	0.0	0.0	0.3	0.0
C15-26	**Digestive organs**	**0.7**	**0.5**	**0.2**	**0.6**	**1.1**	**2.3**
C15	Oesophagus	0.0	0.0	0.0	0.0	0.0	0.0
C16	Stomach	0.0	0.0	0.0	0.0	0.1	0.0
C17	Small intestine	0.0	0.0	0.0	0.0	0.0	0.1
C18	Colon	0.0	0.0	0.1	0.1	0.8	1.2
C19-21	Rectum, rectosigmoid, anus	0.0	0.0	0.0	0.0	0.1	0.8
C22	Liver	0.7	0.5	0.0	0.3	0.0	0.1
C23-24	Gallbladder, bile ducts	0.0	0.0	0.0	0.0	0.0	0.0
C25	Pancreas	0.0	0.0	0.0	0.1	0.0	0.0
C26	Other digestive organs	0.0	0.0	0.1	0.1	0.0	0.0
C30-34, C38	**Respiratory organs**	**0.0**	**0.1**	**0.2**	**0.5**	**0.1**	**0.4**
C30-31	Nose, sinuses	0.0	0.1	0.1	0.2	0.0	0.0
C32	Larynx, epiglottis	0.0	0.0	0.0	0.0	0.0	0.0
C33-34	Lung, trachea	0.0	0.0	0.0	0.3	0.1	0.4
C38	Mediastinum, pleura (non-mesothelioma)	0.0	0.0	0.1	0.0	0.0	0.0
C40-41	**Bone**	**0.0**	**0.5**	**0.9**	**1.8**	**1.7**	**0.8**
C43	**Melanoma of the skin**	**0.0**	**0.0**	**0.2**	**0.7**	**1.1**	**5.4**
C44	**Skin, non-melanoma**	**0.0**	**0.0**	**0.1**	**0.5**	**0.4**	**0.7**
C45	**Mesothelioma**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
C46	**Kaposi's sarcoma**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
C47	**Autonomic nervous system**	**1.2**	**0.0**	**0.1**	**0.0**	**0.1**	**0.1**
C48-49	**Soft tissues**	**0.8**	**0.1**	**0.5**	**0.8**	**0.7**	**0.8**
C50	**Breast**	**0.0**	**0.0**	**0.1**	**0.0**	**0.0**	**0.0**
C60-63	**Male genital organs**	**0.4**	**0.0**	**0.9**	**4.7**	**21.9**	**34.9**
C61	Prostate	0.0	0.0	0.0	0.1	0.0	0.0
C62	Testis	0.4	0.0	0.9	4.4	21.9	34.5
C60, C63	Other male genital	0.0	0.0	0.0	0.1	0.0	0.4
C64-68	**Urinary organs**	**1.6**	**0.9**	**0.0**	**0.3**	**1.1**	**1.5**
C64	Kidney excl. renal pelvis	1.3	0.9	0.0	0.1	0.7	0.8
C65	Renal pelvis	0.0	0.0	0.0	0.0	0.0	0.0
C66-68	Bladder, ureter, urethra	0.3	0.0	0.0	0.1	0.4	0.7
C69	**Eye**	**1.1**	**0.1**	**0.0**	**0.0**	**0.1**	**0.4**
C70-72, D42-43	**Central nervous system**	**5.9**	**4.5**	**5.6**	**6.7**	**6.4**	**7.5**
C73	**Thyroid gland**	**0.0**	**0.0**	**0.0**	**0.3**	**0.3**	**0.9**
C37, C74-75	**Other endocrine glands**	**1.6**	**0.8**	**1.5**	**1.3**	**0.5**	**0.7**
C39, C76, C80	**Other or unspecified**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
C81-96	**Lymphoid and haematopoietic tissue**	**9.9**	**4.6**	**6.2**	**8.4**	**6.7**	**9.4**
C81	Hodgkin lymphoma	0.0	0.8	2.0	3.0	3.5	4.6
C82-85, C96	Non-Hodgkin lymphoma	1.6	0.6	1.2	2.2	1.4	1.9
C88	Malignant immunoproliferative diseases	0.0	0.0	0.0	0.0	0.0	0.0
C90	Multiple myeloma	0.0	0.0	0.0	0.0	0.0	0.3
C91-95	Leukaemia	8.3	3.2	3.0	3.3	1.8	2.6

Age											
30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85+
84.0	**92.8**	**134.5**	**222.7**	**417.1**	**811.3**	**1380.4**	**2127.4**	**2865.3**	**3483.5**	**3896.4**	**3841.4**
0.6	**1.8**	**3.9**	**9.4**	**17.4**	**26.8**	**34.6**	**42.8**	**43.9**	**42.6**	**42.8**	**42.7**
0.0	0.0	0.6	1.2	2.7	3.1	4.6	8.7	12.1	15.7	15.3	22.5
0.0	0.5	0.8	2.8	2.8	5.0	7.3	10.2	8.0	6.3	9.0	5.9
0.0	0.3	0.5	0.6	2.7	6.0	6.7	8.1	8.9	6.7	6.3	1.3
0.5	0.3	0.6	0.4	1.0	1.1	1.6	2.1	2.9	2.7	3.2	7.2
0.1	0.5	1.5	4.4	8.2	11.7	14.5	13.6	12.0	11.3	9.0	5.8
7.3	**10.4**	**23.8**	**46.4**	**88.5**	**155.5**	**257.1**	**405.4**	**596.2**	**764.4**	**884.9**	**939.8**
0.0	0.1	1.0	3.9	5.6	10.6	16.1	25.7	30.1	34.3	32.9	37.7
0.5	1.1	3.7	4.1	9.2	14.7	26.9	37.3	67.0	93.6	107.1	142.8
0.6	0.9	0.8	1.7	2.2	3.9	6.5	8.3	10.9	15.3	13.1	7.8
3.4	3.3	8.3	15.7	29.9	51.1	90.9	155.0	251.2	324.2	382.0	384.9
1.8	2.8	5.6	10.5	24.0	44.9	70.4	100.7	138.6	168.5	194.0	194.8
0.4	0.7	1.8	2.9	4.4	5.0	6.9	8.5	15.8	18.3	26.6	27.2
0.2	0.2	0.8	1.1	2.3	3.8	6.4	7.9	14.6	14.7	20.7	22.8
0.5	1.3	1.4	6.0	9.8	19.9	31.3	56.5	60.0	87.2	96.0	97.6
0.0	0.0	0.3	0.5	1.0	1.6	1.8	5.6	8.0	8.3	12.6	24.3
1.0	**3.3**	**6.8**	**20.4**	**46.5**	**102.1**	**179.9**	**261.8**	**369.6**	**463.2**	**456.2**	**303.2**
0.0	0.2	0.6	0.6	0.9	1.7	3.0	4.0	3.7	3.7	5.0	6.6
0.0	0.2	0.6	1.2	5.0	10.4	13.1	19.8	18.9	21.7	23.9	10.4
0.8	2.8	5.6	18.6	40.3	89.1	162.1	236.3	345.3	433.9	423.3	281.8
0.1	0.0	0.1	0.0	0.3	0.9	1.7	1.8	1.7	4.0	4.0	4.4
0.7	**1.1**	**0.9**	**1.1**	**0.9**	**1.4**	**1.1**	**0.9**	**1.4**	**2.7**	**1.4**	**1.4**
7.4	**11.1**	**17.8**	**22.2**	**33.7**	**43.1**	**57.2**	**68.7**	**95.8**	**102.0**	**109.0**	**110.3**
2.2	**1.5**	**2.6**	**5.4**	**9.4**	**23.2**	**34.7**	**77.5**	**140.3**	**223.1**	**355.9**	**504.2**
0.0	**0.0**	**0.0**	**0.6**	**1.4**	**2.8**	**6.4**	**10.3**	**18.9**	**17.0**	**19.4**	**19.1**
0.2	**0.1**	**0.2**	**0.0**	**0.4**	**0.3**	**0.0**	**1.9**	**0.9**	**1.3**	**1.8**	**3.9**
0.1	**0.0**	**0.1**	**0.4**	**0.3**	**0.1**	**0.4**	**0.0**	**0.0**	**0.7**	**0.5**	**1.3**
0.7	**1.3**	**1.7**	**2.8**	**3.0**	**3.7**	**3.8**	**4.3**	**9.2**	**9.3**	**11.3**	**5.9**
0.0	**0.1**	**0.1**	**0.7**	**0.4**	**1.1**	**2.3**	**2.5**	**2.6**	**4.0**	**4.9**	**5.2**
32.3	**24.8**	**22.5**	**31.1**	**85.8**	**245.3**	**504.2**	**844.7**	**986.2**	**1058.9**	**1104.5**	**1031.8**
0.0	0.1	2.0	17.7	76.3	237.4	497.1	833.9	974.4	1045.9	1087.0	1017.7
31.9	24.1	19.7	12.0	8.5	4.5	3.3	4.7	3.7	2.3	1.8	2.0
0.4	0.5	0.8	1.5	1.0	3.3	3.7	6.1	8.0	10.7	15.7	12.2
2.7	**5.3**	**11.1**	**23.3**	**43.8**	**81.1**	**126.8**	**182.9**	**295.8**	**403.9**	**440.3**	**401.7**
1.3	3.1	6.0	10.9	20.9	29.1	40.8	50.5	73.8	79.9	90.5	61.0
0.0	0.2	0.2	1.0	1.5	2.1	5.0	6.9	12.6	15.3	11.7	10.3
1.4	2.1	4.9	11.5	21.4	49.9	81.0	125.5	209.5	308.7	338.2	330.4
0.1	**0.5**	**0.2**	**1.3**	**1.7**	**2.0**	**3.8**	**3.7**	**5.2**	**4.0**	**5.8**	**6.7**
11.5	**12.1**	**15.7**	**16.9**	**22.1**	**30.7**	**34.4**	**40.6**	**46.8**	**54.6**	**63.1**	**58.4**
1.9	**2.0**	**2.7**	**3.4**	**4.8**	**6.1**	**6.4**	**3.9**	**7.2**	**9.7**	**9.5**	**7.0**
1.8	**2.6**	**3.2**	**4.9**	**4.7**	**5.7**	**8.3**	**7.1**	**10.9**	**11.3**	**10.8**	**7.2**
0.1	**0.1**	**0.8**	**3.2**	**6.3**	**8.1**	**13.1**	**24.2**	**39.9**	**51.9**	**84.6**	**115.9**
13.2	**14.6**	**20.2**	**29.1**	**46.2**	**72.2**	**105.9**	**144.5**	**194.4**	**258.8**	**289.8**	**275.5**
5.4	3.3	3.4	1.9	2.9	2.4	3.2	4.8	3.7	4.0	2.3	3.9
3.8	7.0	8.4	13.7	20.5	35.9	44.5	57.3	70.6	92.6	92.4	91.8
0.0	0.0	0.1	0.4	1.0	0.9	2.9	3.1	4.6	7.6	11.7	8.1
0.2	0.9	2.4	2.9	8.1	11.0	17.9	29.7	37.0	54.3	64.0	49.3
3.7	3.5	6.0	10.3	13.6	22.0	37.3	49.6	78.5	100.2	119.4	122.4

Table 10b Age-specific incidence rates per 100 000 person-years by primary site and five-year age group - 2004-2008

ICD10	Site	0-4	5-9	10-14	15-19	20-24	25-29
C00-96	**All sites**	**21.1**	**12.9**	**11.1**	**22.6**	**36.7**	**63.4**
C00-14	**Mouth, pharynx**	**0.0**	**0.1**	**0.3**	**0.1**	**0.6**	**1.0**
C00	Lip	0.0	0.0	0.0	0.0	0.0	0.1
C01-02	Tongue	0.0	0.0	0.0	0.0	0.1	0.1
C03-06	Mouth, other	0.0	0.0	0.0	0.0	0.0	0.4
C07-08	Salivary glands	0.0	0.0	0.3	0.1	0.3	0.3
C09-14	Pharynx	0.0	0.1	0.0	0.0	0.1	0.0
C15-26	**Digestive organs**	**0.4**	**0.3**	**0.4**	**1.2**	**2.2**	**3.0**
C15	Oesophagus	0.0	0.0	0.0	0.0	0.0	0.0
C16	Stomach	0.0	0.0	0.0	0.0	0.1	0.8
C17	Small intestine	0.0	0.0	0.0	0.1	0.0	0.1
C18	Colon	0.0	0.1	0.1	0.7	1.4	1.4
C19-21	Rectum, rectosigmoid, anus	0.0	0.0	0.0	0.0	0.4	0.5
C22	Liver	0.4	0.1	0.1	0.4	0.1	0.0
C23-24	Gallbladder, bile ducts	0.0	0.0	0.0	0.0	0.0	0.1
C25	Pancreas	0.0	0.0	0.0	0.0	0.0	0.0
C26	Other digestive organs	0.0	0.0	0.1	0.0	0.0	0.0
C30-34, C38	**Respiratory organs**	**0.0**	**0.1**	**0.1**	**0.0**	**0.1**	**1.0**
C30-31	Nose, sinuses	0.0	0.1	0.0	0.0	0.0	0.1
C32	Larynx, epiglottis	0.0	0.0	0.0	0.0	0.0	0.0
C33-34	Lung, trachea	0.0	0.0	0.1	0.0	0.1	0.8
C38	Mediastinum, pleura (non-mesothelioma)	0.0	0.0	0.0	0.0	0.0	0.0
C40-41	**Bone**	**0.1**	**0.4**	**0.9**	**0.8**	**0.4**	**0.4**
C43	**Melanoma of the skin**	**0.0**	**0.0**	**0.1**	**1.6**	**6.1**	**9.6**
C44	**Skin, non-melanoma**	**0.1**	**0.1**	**0.1**	**0.7**	**1.0**	**0.8**
C45	**Mesothelioma**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
C46	**Kaposi's sarcoma**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.1**
C47	**Autonomic nervous system**	**0.8**	**0.3**	**0.0**	**0.3**	**0.0**	**0.3**
C48-49	**Soft tissues**	**0.3**	**0.8**	**0.4**	**1.2**	**1.0**	**1.1**
C50	**Breast**	**0.0**	**0.0**	**0.0**	**0.0**	**1.3**	**5.9**
C51-58	**Female genital organs**	**0.7**	**0.4**	**0.4**	**1.5**	**4.8**	**13.0**
C53	Cervix uteri	0.0	0.0	0.0	0.1	1.9	9.5
C54	Corpus uteri	0.0	0.0	0.0	0.0	0.0	0.7
C55	Uterus, other	0.0	0.0	0.0	0.0	0.0	0.0
C56	Ovary	0.7	0.4	0.4	1.2	2.2	1.8
C51-52, C57	Other female genital	0.0	0.0	0.0	0.0	0.1	0.4
C58	Placenta	0.0	0.0	0.0	0.1	0.6	0.6
C64-68	**Urinary organs**	**2.0**	**0.5**	**0.1**	**0.0**	**0.6**	**1.1**
C64	Kidney excl. renal pelvis	2.0	0.5	0.1	0.0	0.3	1.0
C65	Renal pelvis	0.0	0.0	0.0	0.0	0.0	0.0
C66-68	Bladder, ureter, urethra	0.0	0.0	0.0	0.0	0.3	0.1
C69	**Eye**	**1.5**	**0.0**	**0.0**	**0.1**	**0.0**	**0.1**
C70-72, D42-43	**Central nervous system**	**5.0**	**4.5**	**3.9**	**5.8**	**6.4**	**8.0**
C73	**Thyroid gland**	**0.0**	**0.3**	**0.3**	**1.1**	**2.3**	**5.8**
C37, C74-75	**Other endocrine glands**	**1.1**	**0.9**	**0.7**	**1.1**	**2.6**	**3.2**
C39, C76, C80	**Other or unspecified**	**0.0**	**0.0**	**0.0**	**0.0**	**0.1**	**0.3**
C81-96	**Lymphoid and haematopoietic tissue**	**8.8**	**4.1**	**3.4**	**7.2**	**7.1**	**8.7**
C81	Hodgkin lymphoma	0.0	0.3	0.4	3.3	3.3	4.4
C82-85, C96	Non-Hodgkin lymphoma	0.1	0.7	1.0	1.3	1.6	2.6
C88	Malignant immunoproliferative diseases	0.0	0.0	0.0	0.0	0.0	0.0
C90	Multiple myeloma	0.0	0.0	0.0	0.0	0.0	0.0
C91-95	Leukaemia	8.7	3.1	2.0	2.5	2.1	1.7

Age											
30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85+
104.1	**161.5**	**252.6**	**427.2**	**615.6**	**817.7**	**1081.5**	**1330.0**	**1552.8**	**1850.7**	**2052.7**	**2059.6**
1.1	**1.3**	**1.7**	**4.4**	**9.2**	**12.6**	**16.7**	**19.0**	**25.0**	**28.0**	**28.1**	**34.1**
0.2	0.2	0.1	0.4	2.1	2.1	3.2	4.6	6.9	10.5	8.0	11.8
0.3	0.2	0.6	1.1	1.2	2.6	3.6	2.8	4.0	4.4	4.9	5.0
0.1	0.2	0.4	0.5	1.6	2.9	3.7	4.9	7.4	5.9	10.0	11.0
0.2	0.3	0.4	0.9	0.8	0.7	2.5	1.9	2.7	3.9	2.6	3.4
0.3	0.2	0.2	1.5	3.6	4.4	3.7	4.8	3.9	3.3	2.6	2.8
6.4	**11.7**	**22.0**	**40.3**	**72.6**	**120.7**	**194.6**	**302.4**	**398.8**	**520.6**	**659.4**	**639.0**
0.0	0.1	0.4	0.8	1.7	3.7	4.6	4.9	7.4	12.1	9.6	15.7
1.0	1.0	1.3	4.2	6.5	8.1	14.4	21.0	33.4	40.3	58.2	61.7
0.6	0.5	0.7	0.8	1.7	3.9	4.5	7.1	8.1	8.5	7.4	6.2
2.7	4.6	9.8	15.4	29.0	51.1	82.9	147.7	199.2	255.0	331.2	296.8
1.5	3.6	6.0	11.9	21.6	31.6	52.2	67.0	78.1	99.5	121.2	111.4
0.1	0.1	0.5	0.8	1.1	1.2	4.6	4.5	9.9	11.6	11.7	11.4
0.1	0.5	0.5	1.7	2.1	3.9	4.6	8.6	9.9	17.2	21.8	14.3
0.2	1.1	1.9	4.4	7.9	15.4	24.1	37.7	46.5	67.2	84.0	97.9
0.1	0.2	0.8	0.4	0.9	1.9	2.6	3.9	6.2	9.3	14.3	23.8
0.9	**3.2**	**6.7**	**19.4**	**43.7**	**79.8**	**119.4**	**160.4**	**208.0**	**225.8**	**163.9**	**96.7**
0.2	0.0	0.1	0.4	1.2	1.8	1.7	2.5	2.5	3.9	4.3	6.0
0.1	0.3	0.2	0.3	1.4	1.2	1.9	1.5	2.5	3.1	1.7	2.0
0.5	2.8	6.3	18.5	40.8	76.3	115.1	156.4	202.1	216.8	155.7	87.4
0.0	0.0	0.0	0.3	0.3	0.6	0.6	0.0	1.0	2.0	2.2	1.4
0.6	**0.6**	**0.1**	**0.9**	**0.7**	**1.5**	**1.8**	**1.2**	**1.7**	**1.3**	**1.4**	**0.8**
15.0	**21.8**	**27.5**	**31.5**	**35.3**	**41.9**	**51.1**	**50.4**	**59.4**	**68.5**	**63.5**	**69.7**
1.2	**1.8**	**4.8**	**6.0**	**11.6**	**20.3**	**27.4**	**47.7**	**84.1**	**115.3**	**178.4**	**303.3**
0.0	**0.0**	**0.4**	**0.1**	**0.1**	**0.6**	**0.1**	**2.1**	**2.0**	**2.0**	**5.7**	**1.4**
0.0	**0.0**	**0.0**	**0.0**	**0.1**	**0.0**	**0.0**	**0.0**	**0.0**	**0.5**	**1.2**	**2.0**
0.0	**0.1**	**0.4**	**0.6**	**0.4**	**0.5**	**0.1**	**0.0**	**0.0**	**0.0**	**0.3**	**0.0**
0.7	**1.6**	**1.3**	**3.2**	**4.7**	**5.9**	**7.4**	**10.6**	**11.4**	**11.3**	**9.1**	**9.2**
19.8	**47.4**	**99.4**	**179.5**	**237.9**	**261.1**	**298.6**	**316.1**	**214.5**	**244.5**	**296.1**	**281.2**
24.4	**30.5**	**38.6**	**57.2**	**97.5**	**124.0**	**155.1**	**171.2**	**194.5**	**207.9**	**205.9**	**171.1**
20.9	20.8	18.4	17.3	18.9	15.8	18.0	13.1	16.1	21.8	18.7	11.9
1.0	4.2	8.2	16.9	43.1	61.7	78.1	95.2	109.6	98.6	88.2	73.7
0.0	0.0	0.0	0.1	0.3	0.3	1.2	0.0	0.7	1.3	2.3	2.5
1.6	4.0	10.0	18.8	28.4	38.5	49.5	49.3	52.7	66.1	65.9	49.6
0.6	1.2	1.9	4.1	6.7	7.7	8.3	13.5	15.3	20.2	30.8	33.4
0.4	0.2	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.0	**3.0**	**5.5**	**8.9**	**15.7**	**29.7**	**53.3**	**68.2**	**98.7**	**123.3**	**126.7**	**114.7**
0.5	1.7	3.2	5.2	7.4	13.2	23.5	25.7	37.6	49.3	39.3	31.2
0.1	0.2	0.0	0.1	0.3	1.6	1.9	3.0	3.7	6.5	7.3	3.4
0.4	1.0	2.3	3.6	8.0	14.9	27.9	39.6	57.4	67.6	80.1	80.1
0.2	**0.6**	**0.6**	**1.4**	**0.5**	**2.8**	**2.6**	**2.5**	**4.2**	**2.8**	**3.9**	**4.0**
12.2	**14.7**	**17.8**	**29.1**	**33.3**	**39.7**	**47.9**	**53.3**	**65.3**	**63.3**	**57.7**	**47.4**
8.4	**8.9**	**8.0**	**11.6**	**7.9**	**12.1**	**10.8**	**10.6**	**11.4**	**14.4**	**10.7**	**11.2**
3.7	**3.6**	**3.7**	**5.6**	**3.8**	**5.6**	**7.6**	**5.4**	**6.7**	**5.2**	**6.7**	**2.8**
0.6	**0.5**	**1.2**	**3.0**	**6.1**	**9.6**	**14.0**	**18.6**	**30.6**	**50.7**	**64.8**	**101.1**
7.9	**10.3**	**13.1**	**24.5**	**34.5**	**49.2**	**73.2**	**90.1**	**136.7**	**165.2**	**168.9**	**169.9**
2.6	2.0	1.8	1.3	1.3	2.1	1.1	1.5	3.9	3.6	2.0	2.0
2.5	3.9	5.3	11.9	18.3	22.7	32.6	40.9	53.3	65.8	61.1	52.7
0.0	0.0	0.1	0.3	0.5	1.1	1.6	1.9	2.5	6.4	2.2	3.4
0.1	0.3	1.5	2.9	4.7	8.0	15.2	12.7	27.7	34.5	34.1	28.4
2.7	4.1	4.4	8.1	9.7	15.4	22.7	33.2	49.2	55.0	69.5	83.4

Table 11a Average annual number of new cases by primary site and 5-year period 1954-2008

ICD10	Site	1954-58	1959-63	1964-68
C00-96	**All sites**	**3735**	**4303**	**5097**
C00-14	**Mouth, pharynx**	**181**	**190**	**191**
C00	Lip	96	97	97
C01-02	Tongue	16	21	21
C03-06	Mouth, other	21	25	27
C07-08	Salivary glands	11	12	12
C09-14	Pharynx	36	36	35
C15-26	**Digestive organs**	**1612**	**1676**	**1820**
C15	Oesophagus	72	82	76
C16	Stomach	872	806	794
C17	Small intestine	14	9	15
C18	Colon	216	266	348
C19-21	Rectum, rectosigmoid, anus	147	179	211
C22	Liver	16	22	32
C23-24	Gallbladder, bile ducts	14	20	25
C25	Pancreas	130	152	202
C26	Other digestive organs	131	138	118
C30-34, C38	**Respiratory organs**	**276**	**404**	**554**
C30-31	Nose, sinuses	20	19	21
C32	Larynx, epiglottis	26	40	59
C33-34	Lung, trachea	220	334	463
C38	Mediastinum, pleura (non-mesothelioma)	11	11	12
C40-41	**Bone**	**17**	**13**	**19**
C43	**Melanoma of the skin**	**42**	**67**	**91**
C44	**Skin, non-melanoma**	**91**	**72**	**76**
C45	**Mesothelioma**	**0**	**1**	**1**
C46	**Kaposi's sarcoma**	**1**	**3**	**4**
C47	**Autonomic nervous system**	**17**	**16**	**17**
C48-49	**Soft tissues**	**20**	**23**	**29**
C50	**Breast**	**7**	**7**	**9**
C60-63	**Male genital organs**	**673**	**831**	**1042**
C61	Prostate	606	746	953
C62	Testis	50	65	65
C60, C63	Other male genital	17	21	23
C64-68	**Urinary organs**	**278**	**352**	**479**
C64	Kidney excl. renal pelvis	83	114	145
C65	Renal pelvis	6	11	15
C66-68	Bladder, ureter, urethra	189	228	319
C69	**Eye**	**17**	**18**	**20**
C70-72, D42-43	**Central nervous system**	**113**	**127**	**145**
C73	**Thyroid gland**	**17**	**24**	**29**
C37, C74-75	**Other endocrine glands**	**6**	**8**	**11**
C39, C76, C80	**Other or unspecified**	**47**	**72**	**109**
C81-96	**Lymphoid and haematopoietic tissue**	**320**	**398**	**450**
C81	Hodgkin lymphoma	38	51	60
C82-85, C96	Non-Hodgkin lymphoma	85	103	132
C88	Malignant immunoproliferative diseases	0	0	1
C90	Multiple myeloma	58	77	86
C91-95	Leukaemia	139	167	172

Period							
1969-73	1974-78	1979-83	1984-88	1989-93	1994-98	1999-2003	2004-08
5904	**7062**	**8048**	**8894**	**9918**	**10897**	**11863**	**13736**
234	**238**	**244**	**258**	**259**	**258**	**257**	**267**
121	115	102	102	85	67	56	57
23	27	33	38	38	45	49	53
30	30	45	45	53	53	49	45
15	17	13	14	22	18	22	18
46	50	51	59	61	75	81	93
1906	**2079**	**2285**	**2350**	**2449**	**2498**	**2610**	**2774**
80	89	88	90	106	112	124	144
695	628	599	542	497	424	358	314
17	19	24	27	29	39	51	57
372	472	591	700	817	882	970	1090
298	390	495	527	567	594	640	664
45	53	57	67	62	56	79	85
27	37	37	51	50	56	58	64
244	258	284	297	284	280	291	318
130	132	109	49	36	55	38	37
721	**928**	**1120**	**1277**	**1332**	**1415**	**1497**	**1577**
23	25	22	22	23	21	24	24
70	81	98	110	103	104	111	101
613	804	980	1137	1193	1272	1348	1439
16	19	20	8	13	19	15	13
17	**25**	**22**	**22**	**20**	**21**	**22**	**25**
133	**186**	**235**	**297**	**412**	**453**	**475**	**575**
143	**200**	**249**	**320**	**419**	**534**	**611**	**730**
6	**14**	**21**	**34**	**37**	**43**	**57**	**63**
4	**8**	**4**	**11**	**16**	**10**	**5**	**7**
13	**10**	**9**	**7**	**8**	**6**	**6**	**6**
40	**47**	**50**	**41**	**44**	**50**	**50**	**55**
9	**10**	**12**	**12**	**13**	**14**	**16**	**17**
1242	**1534**	**1742**	**1959**	**2363**	**2894**	**3334**	**4321**
1132	1410	1592	1774	2143	2637	3045	3998
86	98	123	156	194	217	253	277
24	26	27	29	27	40	36	46
565	**756**	**895**	**1005**	**1123**	**1145**	**1187**	**1363**
159	196	225	251	274	277	308	374
23	30	33	32	35	40	35	47
383	529	636	723	814	829	843	943
22	**20**	**27**	**23**	**27**	**28**	**31**	**31**
155	**179**	**204**	**240**	**257**	**292**	**375**	**425**
37	**39**	**49**	**44**	**47**	**46**	**52**	**65**
25	**27**	**39**	**42**	**42**	**57**	**72**	**86**
135	**169**	**204**	**258**	**287**	**294**	**251**	**199**
498	**592**	**638**	**696**	**764**	**838**	**956**	**1152**
63	65	59	48	54	52	62	69
126	163	186	250	297	338	358	439
3	8	8	9	13	19	25	26
107	138	153	156	159	169	164	192
200	219	232	233	241	259	347	426

Table 11b Average annual number of new cases by primary site and 5-year period 1954-2008

ICD10	Site	1954-58	1959-63	1964-68
C00-96	**All sites**	**3968**	**4386**	**5015**
C00-14	**Mouth, pharynx**	**64**	**60**	**74**
C00	Lip	7	8	11
C01-02	Tongue	13	12	15
C03-06	Mouth, other	12	12	16
C07-08	Salivary glands	8	9	16
C09-14	Pharynx	24	20	16
C15-26	**Digestive organs**	**1356**	**1418**	**1505**
C15	Oesophagus	24	25	30
C16	Stomach	607	563	515
C17	Small intestine	10	9	12
C18	Colon	254	308	395
C19-21	Rectum, rectosigmoid, anus	115	132	175
C22	Liver	11	14	15
C23-24	Gallbladder, bile ducts	43	51	54
C25	Pancreas	89	112	136
C26	Other digestive organs	203	205	173
C30-34, C38	**Respiratory organs**	**86**	**98**	**130**
C30-31	Nose, sinuses	14	12	14
C32	Larynx, epiglottis	2	3	6
C33-34	Lung, trachea	65	77	104
C38	Mediastinum, pleura (non-mesothelioma)	5	6	7
C40-41	**Bone**	**12**	**10**	**12**
C43	**Melanoma of the skin**	**51**	**74**	**108**
C44	**Skin, non-melanoma**	**60**	**45**	**43**
C45	**Mesothelioma**	**0**	**0**	**1**
C46	**Kaposi's sarcoma**	**1**	**0**	**2**
C47	**Autonomic nervous system**	**17**	**14**	**11**
C48-49	**Soft tissues**	**17**	**23**	**25**
C50	**Breast**	**868**	**999**	**1150**
C51-58	**Female genital organs**	**813**	**914**	**1038**
C53	Cervix uteri	332	343	381
C54	Corpus uteri	159	199	239
C55	Uterus, other	22	22	15
C56	Ovary	236	276	335
C51-52, C57	Other female genital	62	70	64
C58	Placenta	2	2	4
C64-68	**Urinary organs**	**180**	**205**	**240**
C64	Kidney excl. renal pelvis	69	87	96
C65	Renal pelvis	6	5	8
C66-68	Bladder, ureter, urethra	105	113	136
C69	**Eye**	**14**	**17**	**18**
C70-72, D42-43	**Central nervous system**	**100**	**115**	**128**
C73	**Thyroid gland**	**51**	**56**	**71**
C37, C74-75	**Other endocrine glands**	**8**	**5**	**9**
C39, C76, C80	**Other or unspecified**	**41**	**61**	**83**
C81-96	**Lymphoid and haematopoietic tissue**	**231**	**272**	**366**
C81	Hodgkin lymphoma	28	33	46
C82-85, C96	Non-Hodgkin lymphoma	55	69	107
C88	Malignant immunoproliferative diseases	0	0	0
C90	Multiple myeloma	37	44	77
C91-95	Leukaemia	110	126	135

Period							
1969-73	1974-78	1979-83	1984-88	1989-93	1994-98	1999-2003	2004-08
5683	**6687**	**7485**	**8178**	**9054**	**10022**	**11065**	**12179**
77	**81**	**95**	**113**	**111**	**133**	**133**	**174**
9	13	18	23	30	29	25	45
18	17	18	27	21	23	28	30
17	16	24	30	29	38	30	44
14	11	15	12	15	19	21	21
19	23	20	21	16	23	28	35
1647	**1863**	**2100**	**2189**	**2259**	**2432**	**2508**	**2613**
29	34	31	36	38	46	52	54
455	412	410	366	320	283	233	217
17	19	25	28	32	33	48	48
454	593	730	837	923	1073	1149	1229
249	319	406	423	479	501	516	554
27	29	37	45	48	37	50	51
56	59	77	83	73	76	80	75
178	201	241	291	290	317	329	333
180	197	142	81	57	66	53	53
182	**220**	**291**	**398**	**538**	**674**	**853**	**1067**
14	13	12	16	15	16	14	23
7	8	12	11	14	21	19	16
156	191	262	367	503	630	812	1020
6	7	5	4	6	7	7	7
13	**13**	**14**	**15**	**15**	**16**	**22**	**19**
145	**237**	**298**	**387**	**472**	**500**	**530**	**608**
81	**135**	**172**	**243**	**341**	**442**	**509**	**656**
2	**3**	**1**	**7**	**7**	**8**	**9**	**12**
4	**3**	**3**	**7**	**6**	**4**	**3**	**3**
15	**6**	**6**	**7**	**9**	**9**	**3**	**6**
31	**41**	**45**	**44**	**46**	**48**	**68**	**84**
1278	**1505**	**1635**	**1798**	**1938**	**2279**	**2610**	**2770**
1180	**1285**	**1295**	**1274**	**1380**	**1416**	**1467**	**1555**
420	443	380	331	363	336	297	284
294	349	382	387	443	476	573	677
13	6	8	5	7	9	10	8
345	356	395	448	454	467	463	451
104	130	126	101	107	126	120	132
4	2	4	3	7	3	4	3
295	**349**	**407**	**437**	**476**	**511**	**537**	**584**
116	128	147	167	185	196	194	226
12	20	17	18	21	25	28	25
167	202	243	253	270	290	316	333
17	**21**	**22**	**21**	**28**	**30**	**29**	**29**
123	**172**	**206**	**237**	**280**	**344**	**472**	**566**
97	**119**	**145**	**137**	**140**	**121**	**135**	**164**
12	**22**	**43**	**38**	**43**	**50**	**63**	**86**
98	**144**	**189**	**245**	**316**	**307**	**304**	**250**
386	**469**	**518**	**582**	**648**	**698**	**809**	**932**
42	43	40	34	34	36	46	46
108	132	169	223	270	290	333	366
2	3	5	6	11	11	14	18
89	118	126	137	140	140	153	151
145	173	178	180	193	221	262	350

Table 12a Age-adjusted (world) incidence rates per 100 000 person-years by primary site and five-year period 1954-2008

ICD10	Site	1954-58	1959-63	1964-68
C00-96	**All sites**	**167.5**	**175.7**	**191.4**
C00-14	**Mouth, pharynx**	**8.0**	**7.8**	**7.2**
C00	Lip	4.2	3.9	3.6
C01-02	Tongue	0.7	0.8	0.8
C03-06	Mouth, other	0.9	1.0	1.0
C07-08	Salivary glands	0.5	0.5	0.5
C09-14	Pharynx	1.7	1.5	1.3
C15-26	**Digestive organs**	**70.9**	**66.4**	**65.9**
C15	Oesophagus	3.1	3.2	2.7
C16	Stomach	38.2	31.8	28.7
C17	Small intestine	0.6	0.4	0.6
C18	Colon	9.5	10.6	12.6
C19-21	Rectum, rectosigmoid, anus	6.4	7.1	7.7
C22	Liver	0.8	1.0	1.2
C23-24	Gallbladder, bile ducts	0.6	0.8	0.9
C25	Pancreas	5.8	6.1	7.3
C26	Other digestive organs	5.7	5.4	4.2
C30-34, C38	**Respiratory organs**	**12.7**	**16.9**	**21.3**
C30-31	Nose, sinuses	0.9	0.8	0.8
C32	Larynx, epiglottis	1.2	1.7	2.3
C33-34	Lung, trachea	10.1	14.0	17.8
C38	Mediastinum, pleura (non-mesothelioma)	0.5	0.5	0.5
C40-41	**Bone**	**1.0**	**0.7**	**0.9**
C43	**Melanoma of the skin**	**2.0**	**3.1**	**4.1**
C44	**Skin, non-melanoma**	**3.9**	**2.8**	**2.6**
C45	**Mesothelioma**	**0.0**	**0.1**	**0.1**
C46	**Kaposi's sarcoma**	**0.1**	**0.1**	**0.1**
C47	**Autonomic nervous system**	**0.8**	**0.8**	**0.8**
C48-49	**Soft tissues**	**1.0**	**1.0**	**1.2**
C50	**Breast**	**0.3**	**0.3**	**0.3**
C60-63	**Male genital organs**	**28.5**	**31.9**	**36.5**
C61	Prostate	25.1	27.5	32.1
C62	Testis	2.7	3.6	3.6
C60, C63	Other male genital	0.7	0.8	0.9
C64-68	**Urinary organs**	**12.5**	**14.4**	**17.9**
C64	Kidney excl. renal pelvis	3.9	4.8	5.6
C65	Renal pelvis	0.3	0.4	0.6
C66-68	Bladder, ureter, urethra	8.4	9.1	11.7
C69	**Eye**	**0.9**	**0.8**	**0.9**
C70-72, D42-43	**Central nervous system**	**5.9**	**6.2**	**6.9**
C73	**Thyroid gland**	**0.8**	**1.0**	**1.2**
C37, C74-75	**Other endocrine glands**	**0.3**	**0.4**	**0.5**
C39, C76, C80	**Other or unspecified**	**2.1**	**3.0**	**4.1**
C81-96	**Lymphoid and haematopoietic tissue**	**15.8**	**18.0**	**18.8**
C81	Hodgkin lymphoma	2.0	2.5	2.8
C82-85, C96	Non-Hodgkin lymphoma	4.1	4.6	5.4
C88	Malignant immunoproliferative diseases	0.0	0.0	0.0
C90	Multiple myeloma	2.6	3.1	3.1
C91-95	Leukaemia	7.0	7.7	7.4

Period							
1969-73	1974-78	1979-83	1984-88	1989-93	1994-98	1999-2003	2004-08
207.7	**232.4**	**251.9**	**266.8**	**288.0**	**309.5**	**326.4**	**351.9**
8.2	**8.1**	**8.0**	**8.5**	**8.4**	**8.2**	**7.8**	**7.4**
4.2	3.9	3.2	3.1	2.5	2.0	1.5	1.4
0.8	1.0	1.1	1.3	1.3	1.4	1.6	1.5
1.0	1.0	1.5	1.5	1.7	1.7	1.5	1.3
0.6	0.6	0.4	0.5	0.7	0.6	0.7	0.5
1.6	1.7	1.7	2.1	2.2	2.5	2.6	2.7
64.5	**65.9**	**68.4**	**67.7**	**68.7**	**67.8**	**68.3**	**67.5**
2.6	2.9	2.6	2.8	3.3	3.2	3.4	3.7
23.4	19.8	17.8	15.1	13.5	11.1	9.0	7.3
0.6	0.6	0.8	0.9	0.9	1.1	1.5	1.5
12.7	14.9	17.7	20.2	22.8	23.6	25.0	25.9
10.1	12.5	15.1	15.6	16.2	16.8	17.2	16.6
1.6	1.8	1.8	2.1	1.9	1.6	2.2	2.2
0.9	1.1	1.1	1.4	1.4	1.5	1.5	1.6
8.2	8.2	8.5	8.4	7.9	7.5	7.6	7.8
4.4	4.0	3.1	1.3	0.9	1.4	0.9	0.9
26.0	**31.2**	**36.0**	**39.7**	**40.0**	**41.4**	**40.9**	**39.3**
0.8	0.8	0.7	0.7	0.7	0.6	0.7	0.7
2.5	2.8	3.3	3.6	3.2	3.3	3.2	2.7
22.0	26.9	31.3	35.1	35.7	36.9	36.6	35.7
0.6	0.7	0.7	0.3	0.4	0.6	0.4	0.3
0.8	**1.1**	**1.0**	**1.0**	**0.9**	**1.0**	**0.9**	**1.0**
5.8	**7.7**	**9.3**	**11.2**	**14.8**	**15.0**	**14.4**	**15.9**
4.7	**6.0**	**7.1**	**8.6**	**10.8**	**13.3**	**14.5**	**15.3**
0.2	**0.5**	**0.7**	**1.1**	**1.1**	**1.2**	**1.5**	**1.5**
0.1	**0.2**	**0.1**	**0.3**	**0.5**	**0.3**	**0.1**	**0.2**
0.6	**0.5**	**0.5**	**0.4**	**0.4**	**0.3**	**0.3**	**0.3**
1.6	**1.8**	**1.9**	**1.5**	**1.6**	**1.7**	**1.6**	**1.7**
0.3	**0.3**	**0.4**	**0.4**	**0.4**	**0.4**	**0.4**	**0.4**
40.3	**46.1**	**49.0**	**52.4**	**61.5**	**77.3**	**91.0**	**112.3**
35.0	40.4	42.4	44.6	52.4	66.9	79.5	99.9
4.4	4.9	5.8	6.9	8.3	9.2	10.5	11.3
0.8	0.9	0.8	0.9	0.8	1.1	1.0	1.2
19.8	**24.9**	**28.0**	**29.7**	**32.1**	**31.8**	**31.2**	**33.2**
5.9	6.9	7.6	8.1	8.3	8.3	8.9	10.0
0.8	1.0	1.0	1.0	1.0	1.2	0.9	1.2
13.1	17.0	19.3	20.7	22.7	22.3	21.4	22.0
1.0	**0.8**	**1.1**	**0.9**	**1.0**	**1.0**	**1.0**	**1.0**
7.0	**7.8**	**8.5**	**9.6**	**9.9**	**10.7**	**13.2**	**13.8**
1.5	**1.5**	**1.7**	**1.5**	**1.7**	**1.6**	**1.7**	**1.9**
1.2	**1.2**	**1.8**	**1.8**	**1.7**	**2.2**	**2.6**	**2.8**
4.7	**5.5**	**6.2**	**7.4**	**7.8**	**7.7**	**6.0**	**4.5**
19.4	**21.1**	**22.2**	**23.2**	**24.9**	**26.6**	**28.9**	**32.0**
2.8	2.7	2.4	1.9	2.2	2.3	2.6	2.7
4.9	5.7	6.4	8.4	9.7	10.8	10.8	12.0
0.1	0.2	0.3	0.2	0.4	0.5	0.7	0.6
3.6	4.4	4.6	4.6	4.5	4.5	4.3	4.7
8.0	8.0	8.4	8.1	8.0	8.5	10.6	12.0

Table 12b Age-adjusted (world) incidence rates per 100 000 person-years by primary site and five-year period 1954-2008

ICD10	Site	1954-58	1959-63	1964-68
C00-96	**All sites**	**162.1**	**165.9**	**176.2**
C00-14	**Mouth, pharynx**	**2.5**	**2.2**	**2.3**
C00	Lip	0.3	0.3	0.3
C01-02	Tongue	0.5	0.4	0.4
C03-06	Mouth, other	0.5	0.4	0.5
C07-08	Salivary glands	0.3	0.3	0.5
C09-14	Pharynx	0.9	0.7	0.5
C15-26	**Digestive organs**	**49.7**	**47.1**	**45.1**
C15	Oesophagus	0.9	0.8	0.9
C16	Stomach	22.1	18.4	15.2
C17	Small intestine	0.4	0.3	0.4
C18	Colon	9.4	10.5	11.9
C19-21	Rectum, rectosigmoid, anus	4.4	4.6	5.6
C22	Liver	0.4	0.6	0.5
C23-24	Gallbladder, bile ducts	1.6	1.7	1.6
C25	Pancreas	3.3	3.9	4.1
C26	Other digestive organs	7.2	6.5	5.0
C30-34, C38	**Respiratory organs**	**3.4**	**3.5**	**4.3**
C30-31	Nose, sinuses	0.6	0.4	0.4
C32	Larynx, epiglottis	0.1	0.1	0.2
C33-34	Lung, trachea	2.6	2.8	3.4
C38	Mediastinum, pleura (non-mesothelioma)	0.2	0.2	0.2
C40-41	**Bone**	**0.7**	**0.6**	**0.6**
C43	**Melanoma of the skin**	**2.3**	**3.3**	**4.6**
C44	**Skin, non-melanoma**	**2.2**	**1.5**	**1.3**
C45	**Mesothelioma**	**0.0**	**0.0**	**0.0**
C46	**Kaposi's sarcoma**	**0.0**	**0.0**	**0.1**
C47	**Autonomic nervous system**	**0.8**	**0.6**	**0.5**
C48-49	**Soft tissues**	**0.7**	**1.0**	**1.0**
C50	**Breast**	**36.6**	**39.0**	**42.4**
C51-58	**Female genital organs**	**35.6**	**37.7**	**40.5**
C53	Cervix uteri	15.1	15.1	16.5
C54	Corpus uteri	6.8	7.8	8.7
C55	Uterus, other	0.8	0.8	0.4
C56	Ovary	10.3	11.2	12.5
C51-52, C57	Other female genital	2.4	2.5	2.0
C58	Placenta	0.1	0.1	0.3
C64-68	**Urinary organs**	**7.2**	**7.2**	**7.7**
C64	Kidney excl. renal pelvis	2.9	3.2	3.3
C65	Renal pelvis	0.3	0.2	0.3
C66-68	Bladder, ureter, urethra	4.0	3.8	4.1
C69	**Eye**	**0.6**	**0.7**	**0.7**
C70-72, D42-43	**Central nervous system**	**4.9**	**5.3**	**5.6**
C73	**Thyroid gland**	**2.1**	**2.3**	**2.8**
C37, C74-75	**Other endocrine glands**	**0.4**	**0.2**	**0.4**
C39, C76, C80	**Other or unspecified**	**1.7**	**2.2**	**2.7**
C81-96	**Lymphoid and haematopoietic tissue**	**10.6**	**11.3**	**13.4**
C81	Hodgkin lymphoma	1.4	1.6	2.0
C82-85, C96	Non-Hodgkin lymphoma	2.4	2.7	3.8
C88	Malignant immunoproliferative diseases	0.0	0.0	0.0
C90	Multiple myeloma	1.5	1.5	2.4
C91-95	Leukaemia	5.3	5.5	5.2

Period							
1969-73	1974-78	1979-83	1984-88	1989-93	1994-98	1999-2003	2004-08
187.9	**208.2**	**218.6**	**224.9**	**241.5**	**260.1**	**276.1**	**288.4**
2.3	**2.2**	**2.6**	**2.9**	**2.9**	**3.4**	**3.3**	**4.0**
0.3	0.3	0.5	0.5	0.7	0.6	0.5	0.9
0.5	0.4	0.5	0.7	0.6	0.6	0.7	0.7
0.5	0.4	0.6	0.7	0.7	1.0	0.7	0.9
0.5	0.3	0.5	0.4	0.5	0.5	0.6	0.5
0.6	0.6	0.6	0.6	0.5	0.7	0.8	0.9
45.4	**46.8**	**49.0**	**47.8**	**48.0**	**50.0**	**50.1**	**50.4**
0.7	0.8	0.7	0.8	0.8	0.9	1.0	1.0
12.2	10.0	9.2	7.7	6.3	5.3	4.4	4.1
0.5	0.6	0.7	0.7	0.8	0.8	1.2	1.1
13.0	15.2	17.6	18.7	19.8	22.2	22.8	23.2
7.1	8.7	10.2	9.9	11.0	11.3	11.3	11.6
0.8	0.8	1.0	1.0	1.1	0.8	1.1	1.1
1.5	1.4	1.7	1.6	1.5	1.5	1.5	1.4
4.9	4.9	5.4	6.0	5.8	6.1	6.1	6.1
4.6	4.5	2.8	1.3	0.9	1.0	0.7	0.9
5.7	**6.6**	**8.5**	**11.1**	**14.9**	**18.2**	**21.8**	**24.6**
0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.5
0.2	0.2	0.3	0.3	0.4	0.6	0.5	0.4
4.9	5.7	7.7	10.3	14.0	17.0	20.8	23.6
0.2	0.2	0.1	0.1	0.2	0.2	0.1	0.1
0.6	**0.5**	**0.6**	**0.6**	**0.6**	**0.7**	**0.9**	**0.7**
6.2	**9.6**	**11.1**	**14.0**	**16.1**	**16.1**	**15.6**	**16.7**
2.1	**3.3**	**3.7**	**4.8**	**6.4**	**7.9**	**8.5**	**10.2**
0.1	**0.1**	**0.0**	**0.2**	**0.2**	**0.2**	**0.2**	**0.2**
0.1	**0.1**	**0.1**	**0.2**	**0.1**	**0.1**	**0.0**	**0.0**
0.7	**0.3**	**0.3**	**0.3**	**0.4**	**0.4**	**0.2**	**0.3**
1.2	**1.4**	**1.5**	**1.4**	**1.5**	**1.4**	**1.9**	**2.4**
44.7	**49.8**	**51.5**	**53.4**	**56.0**	**66.3**	**74.4**	**74.7**
44.3	**46.5**	**44.2**	**40.5**	**42.8**	**41.4**	**40.1**	**39.8**
18.0	18.5	14.9	12.1	12.8	11.5	9.7	8.9
10.1	11.5	12.5	11.9	13.3	13.4	14.9	16.5
0.3	0.1	0.2	0.1	0.1	0.2	0.2	0.1
12.7	12.7	13.3	13.9	13.8	13.4	12.5	11.4
2.9	3.5	3.2	2.4	2.5	2.8	2.6	2.7
0.2	0.1	0.2	0.1	0.3	0.1	0.1	0.2
8.4	**9.5**	**10.1**	**10.2**	**10.9**	**11.1**	**11.5**	**12.1**
3.6	3.9	4.1	4.3	4.6	4.7	4.5	5.2
0.3	0.5	0.4	0.4	0.4	0.5	0.6	0.5
4.5	5.1	5.7	5.6	5.9	5.9	6.4	6.4
0.7	**0.7**	**0.8**	**0.8**	**0.9**	**1.0**	**0.8**	**0.8**
5.3	**7.0**	**8.0**	**8.8**	**9.7**	**11.4**	**14.8**	**16.7**
3.8	**4.7**	**5.2**	**5.0**	**4.9**	**4.0**	**4.4**	**5.1**
0.6	**0.9**	**1.9**	**1.7**	**1.7**	**1.9**	**2.2**	**3.0**
2.8	**3.7**	**4.4**	**5.1**	**6.3**	**6.0**	**5.0**	**4.1**
13.0	**14.5**	**15.0**	**16.1**	**17.2**	**18.6**	**20.2**	**22.4**
1.7	1.7	1.6	1.3	1.4	1.5	1.9	1.8
3.6	4.0	4.8	6.2	7.2	7.6	8.1	8.7
0.1	0.1	0.1	0.1	0.3	0.2	0.3	0.4
2.4	3.1	3.0	3.0	2.9	2.8	3.1	3.0
5.1	5.6	5.5	5.4	5.4	6.4	6.9	8.5

Table 13a Average annual number of new cases by primary site and county - 2004-2008

ICD10	Site	Norway	Østfold	Akershus	Oslo	Hedmark	Oppland	Buskerud
C00-96	**All sites**	**13736**	**817**	**1317**	**1296**	**645**	**601**	**780**
C00-14	**Mouth, pharynx**	**267**	**19**	**26**	**29**	**13**	**9**	**13**
C00	Lip	57	4	5	4	4	2	2
C01-02	Tongue	53	3	6	6	3	2	2
C03-06	Mouth, other	45	4	4	4	2	2	3
C07-08	Salivary glands	18	2	2	1	1	1	0
C09-14	Pharynx	93	6	9	14	3	3	6
C15-26	**Digestive organs**	**2774**	**169**	**267**	**251**	**127**	**124**	**144**
C15	Oesophagus	144	8	15	15	6	7	9
C16	Stomach	314	17	23	30	12	14	16
C17	Small intestine	57	3	5	5	3	2	3
C18	Colon	1090	67	106	91	52	50	58
C19-21	Rectum, rectosigmoid, anus	664	46	65	55	31	27	36
C22	Liver	85	5	9	13	4	3	4
C23-24	Gallbladder, bile ducts	64	3	7	6	3	4	2
C25	Pancreas	318	17	33	34	16	15	14
C26	Other digestive organs	37	2	5	3	2	2	2
C30-34, C38	**Respiratory organs**	**1577**	**97**	**144**	**138**	**76**	**62**	**84**
C30-31	Nose, sinuses	24	1	2	2	1	1	1
C32	Larynx, epiglottis	101	6	9	9	5	4	5
C33-34	Lung, trachea	1439	89	131	126	69	56	77
C38	Mediastinum, pleura (non-mesothelioma)	13	0	2	1	0	0	1
C40-41	**Bone**	**25**	**1**	**2**	**2**	**1**	**1**	**2**
C43	**Melanoma of the skin**	**575**	**35**	**68**	**59**	**26**	**25**	**40**
C44	**Skin, non-melanoma**	**730**	**49**	**65**	**67**	**34**	**24**	**62**
C45	**Mesothelioma**	**63**	**3**	**7**	**5**	**2**	**2**	**5**
C46	**Kaposi's sarcoma**	**7**	**0**	**0**	**2**	**0**	**0**	**0**
C47	**Autonomic nervous system**	**6**	**0**	**0**	**0**	**0**	**0**	**0**
C48-49	**Soft tissues**	**55**	**2**	**6**	**6**	**4**	**2**	**2**
C50	**Breast**	**17**	**1**	**2**	**2**	**0**	**0**	**1**
C60-63	**Male genital organs**	**4321**	**238**	**385**	**397**	**202**	**217**	**246**
C61	Prostate	3998	218	353	357	192	202	232
C62	Testis	277	16	27	35	8	13	12
C60, C63	Other male genital	46	4	4	5	2	2	2
C64-68	**Urinary organs**	**1363**	**91**	**133**	**124**	**67**	**55**	**69**
C64	Kidney excl. renal pelvis	374	27	43	36	19	16	21
C65	Renal pelvis	47	3	4	4	3	2	2
C66-68	Bladder, ureter, urethra	943	61	86	84	45	37	46
C69	**Eye**	**31**	**3**	**4**	**4**	**1**	**1**	**1**
C70-72, D42-43	**Central nervous system**	**425**	**23**	**41**	**46**	**17**	**15**	**22**
C73	**Thyroid gland**	**65**	**3**	**7**	**9**	**4**	**3**	**5**
C37, C74-75	**Other endocrine glands**	**86**	**5**	**9**	**6**	**5**	**3**	**3**
C39, C76, C80	**Other or unspecified**	**199**	**14**	**20**	**24**	**9**	**7**	**11**
C81-96	**Lymphoid and haematopoietic tissue**	**1152**	**64**	**130**	**126**	**56**	**50**	**69**
C81	Hodgkin lymphoma	69	5	6	10	3	3	4
C82-85, C96	Non-Hodgkin lymphoma	439	21	50	51	24	21	19
C88	Malignant immunoproliferative diseases	26	2	4	2	1	1	1
C90	Multiple myeloma	192	9	22	19	10	8	12
C91-95	Leukaemia	426	28	49	45	17	16	32

Vestfold	Telemark	Aust-Agder	Vest-Agder	Rogaland	Hordaland	Sogn og Fjordane	Møre og Romsdal	Sør-Trøn-delag	Nord-Trøn-delag	Nordland	Troms	Finnmark
746	**556**	**356**	**494**	**1125**	**1278**	**375**	**815**	**762**	**398**	**770**	**426**	**177**
14	**11**	**7**	**10**	**22**	**21**	**7**	**13**	**15**	**7**	**18**	**9**	**3**
3	2	2	3	8	4	2	2	4	1	4	1	1
3	2	3	1	3	5	1	2	2	1	5	2	1
2	1	0	2	4	4	2	3	2	2	3	1	1
2	2	0	1	2	1	1	1	1	0	1	0	0
4	4	2	2	6	7	2	5	6	3	6	4	1
145	**106**	**58**	**92**	**219**	**294**	**73**	**171**	**165**	**77**	**161**	**93**	**39**
7	7	3	6	11	13	4	8	7	3	8	5	3
16	11	3	7	24	33	10	24	20	10	20	14	10
2	2	1	1	5	6	1	4	7	2	4	1	1
61	40	22	39	90	114	28	65	59	34	69	33	12
33	24	16	21	52	79	20	39	39	15	36	21	10
3	2	3	4	6	7	2	4	6	2	4	4	1
4	3	2	3	5	7	2	2	5	2	3	2	1
18	14	7	9	23	33	6	22	19	8	16	11	3
1	2	2	1	3	2	1	4	2	1	1	1	0
86	**61**	**46**	**68**	**115**	**150**	**41**	**95**	**91**	**43**	**89**	**61**	**30**
1	1	0	1	2	3	0	1	2	0	2	1	1
5	5	4	5	7	8	1	6	5	2	6	5	1
79	56	41	61	104	138	39	87	84	40	80	55	28
1	1	0	0	1	1	0	1	1	0	1	1	0
2	**2**	**0**	**1**	**2**	**2**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
36	**23**	**14**	**21**	**59**	**51**	**10**	**25**	**37**	**16**	**13**	**13**	**3**
46	**39**	**25**	**42**	**69**	**64**	**15**	**28**	**35**	**18**	**28**	**14**	**5**
7	**3**	**1**	**2**	**5**	**8**	**1**	**2**	**4**	**0**	**2**	**1**	**1**
0	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
0	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**0**
3	**2**	**1**	**2**	**5**	**5**	**1**	**3**	**2**	**2**	**3**	**2**	**1**
1	**0**	**0**	**1**	**1**	**1**	**0**	**1**	**2**	**1**	**1**	**0**	**0**
224	**176**	**119**	**155**	**375**	**379**	**141**	**277**	**217**	**130**	**264**	**128**	**52**
209	166	113	143	344	344	136	259	198	119	248	117	46
12	8	6	10	27	30	4	16	16	9	14	9	5
3	2	1	2	4	5	0	2	2	1	2	1	1
78	**54**	**31**	**37**	**109**	**128**	**35**	**84**	**79**	**40**	**90**	**44**	**18**
19	14	6	10	31	32	9	23	21	11	23	9	6
5	1	2	1	3	4	1	3	3	1	3	2	0
54	39	24	25	75	91	25	58	55	28	65	33	12
2	**1**	**1**	**1**	**2**	**3**	**2**	**1**	**1**	**0**	**2**	**0**	**1**
20	**17**	**13**	**13**	**35**	**40**	**11**	**26**	**32**	**13**	**20**	**17**	**5**
2	**3**	**1**	**3**	**3**	**5**	**3**	**5**	**4**	**2**	**3**	**1**	**1**
5	**3**	**2**	**4**	**8**	**7**	**4**	**8**	**6**	**3**	**4**	**1**	**2**
10	**10**	**5**	**4**	**13**	**19**	**6**	**9**	**9**	**7**	**13**	**5**	**3**
65	**48**	**29**	**39**	**83**	**96**	**25**	**65**	**61**	**39**	**56**	**36**	**13**
3	2	2	2	6	7	1	3	5	2	3	2	1
26	17	12	16	32	32	11	25	20	14	24	16	6
1	1	0	1	2	2	1	1	1	2	1	1	0
9	10	6	5	13	17	5	10	11	7	8	6	3
25	18	10	15	30	38	7	25	24	13	20	12	3

Table 13b Average annual number of new cases by primary site and county - 2004-2008

ICD10	Site	Norway	Østfold	Akershus	Oslo	Hedmark	Oppland	Buskerud
C00-96	**All sites**	**12179**	**745**	**1237**	**1385**	**563**	**513**	**710**
C00-14	**Mouth, pharynx**	**174**	**11**	**15**	**23**	**9**	**7**	**10**
C00	Lip	45	3	5	3	2	1	2
C01-02	Tongue	30	1	3	5	2	1	2
C03-06	Mouth, other	44	3	3	6	4	2	3
C07-08	Salivary glands	21	1	2	2	1	1	2
C09-14	Pharynx	35	2	2	7	1	2	2
C15-26	**Digestive organs**	**2613**	**167**	**244**	**270**	**118**	**110**	**144**
C15	Oesophagus	54	2	7	8	3	3	3
C16	Stomach	217	10	15	21	9	8	14
C17	Small intestine	48	4	6	5	2	1	3
C18	Colon	1229	80	111	124	55	50	70
C19-21	Rectum, rectosigmoid, anus	554	38	57	57	25	26	29
C22	Liver	51	2	6	5	4	2	2
C23-24	Gallbladder, bile ducts	75	4	5	7	5	6	4
C25	Pancreas	333	23	30	39	13	13	17
C26	Other digestive organs	53	3	6	5	2	2	2
C30-34, C38	**Respiratory organs**	**1067**	**63**	**111**	**132**	**50**	**40**	**59**
C30-31	Nose, sinuses	23	1	2	4	1	1	1
C32	Larynx, epiglottis	16	1	1	3	1	1	1
C33-34	Lung, trachea	1020	61	107	123	48	38	57
C38	Mediastinum, pleura (non-mesothelioma)	7	0	1	2	0	0	0
C40-41	**Bone**	**19**	**1**	**1**	**3**	**0**	**1**	**2**
C43	**Melanoma of the skin**	**608**	**43**	**64**	**67**	**24**	**23**	**41**
C44	**Skin, non-melanoma**	**656**	**49**	**52**	**63**	**28**	**19**	**60**
C45	**Mesothelioma**	**12**	**1**	**2**	**2**	**0**	**1**	**1**
C46	**Kaposi's sarcoma**	**3**	**0**	**0**	**0**	**0**	**0**	**0**
C47	**Autonomic nervous system**	**6**	**1**	**1**	**0**	**0**	**0**	**0**
C48-49	**Soft tissues**	**84**	**4**	**8**	**9**	**3**	**3**	**4**
C50	**Breast**	**2770**	**160**	**309**	**344**	**127**	**113**	**158**
C51-58	**Female genital organs**	**1555**	**87**	**161**	**175**	**82**	**90**	**87**
C53	Cervix uteri	284	15	33	36	12	12	16
C54	Corpus uteri	677	35	73	76	39	42	34
C55	Uterus, other	8	1	1	1	1	0	0
C56	Ovary	451	29	45	50	23	28	28
C51-52, C57	Other female genital	132	7	10	12	7	7	8
C58	Placenta	3	0	0	0	0	0	0
C64-68	**Urinary organs**	**584**	**40**	**56**	**65**	**26**	**21**	**32**
C64	Kidney excl. renal pelvis	226	17	20	24	10	8	12
C65	Renal pelvis	25	2	3	3	1	1	2
C66-68	Bladder, ureter, urethra	333	21	33	39	15	12	18
C69	**Eye**	**29**	**2**	**3**	**4**	**1**	**1**	**2**
C70-72, D42-43	**Central nervous system**	**566**	**31**	**56**	**59**	**24**	**24**	**31**
C73	**Thyroid gland**	**164**	**5**	**20**	**18**	**11**	**4**	**9**
C37, C74-75	**Other endocrine glands**	**86**	**6**	**9**	**10**	**3**	**3**	**4**
C39, C76, C80	**Other or unspecified**	**250**	**17**	**23**	**32**	**14**	**11**	**15**
C81-96	**Lymphoid and haematopoietic tissue**	**932**	**56**	**103**	**110**	**43**	**42**	**52**
C81	Hodgkin lymphoma	46	1	5	6	3	1	3
C82-85, C96	Non-Hodgkin lymphoma	366	19	38	46	17	17	19
C88	Malignant immunoproliferative diseases	18	2	3	2	1	1	1
C90	Multiple myeloma	151	9	16	18	7	6	8
C91-95	Leukaemia	350	25	42	38	15	17	22

FEMALES

Vestfold	Telemark	Aust-Agder	Vest-Agder	Rogaland	Hordaland	Sogn og Fjordane	Møre og Romsdal	Sør-Trøn-delag	Nord-Trøn-delag	Nordland	Troms	Finnmark
666	**486**	**289**	**443**	**936**	**1117**	**263**	**651**	**707**	**338**	**632**	**343**	**154**
10	**7**	**4**	**8**	**12**	**13**	**4**	**9**	**10**	**3**	**10**	**7**	**2**
2	1	2	4	7	4	2	2	2	0	1	1	0
2	2	1	0	1	2	1	2	2	0	2	1	1
3	1	1	1	1	3	1	2	3	1	4	2	0
2	1	0	0	1	1	1	2	1	1	1	1	0
1	1	1	2	2	3	0	2	2	1	2	2	0
139	**92**	**61**	**79**	**200**	**273**	**70**	**164**	**157**	**71**	**140**	**82**	**32**
3	2	1	2	4	4	1	1	3	1	2	2	1
11	9	4	5	17	25	8	14	15	6	12	10	5
2	2	1	2	2	3	1	4	5	1	4	1	0
64	45	26	38	92	139	32	82	69	38	66	38	11
32	16	14	14	46	59	17	29	33	13	29	13	6
2	2	1	2	4	4	1	3	3	0	4	2	1
2	4	3	3	5	6	2	5	5	3	2	2	2
20	12	9	10	25	31	8	22	20	9	16	10	6
4	2	2	2	5	3	1	4	3	1	4	2	0
57	**42**	**29**	**48**	**71**	**82**	**18**	**52**	**62**	**29**	**65**	**34**	**20**
1	1	0	1	1	2	0	1	1	0	2	1	1
1	0	0	1	1	1	0	0	1	0	1	1	0
55	41	29	46	69	78	18	50	60	28	63	32	18
0	0	0	0	0	1	0	0	0	0	0	0	0
2	**0**	**1**	**1**	**1**	**3**	**0**	**1**	**1**	**1**	**0**	**0**	**0**
39	**26**	**15**	**22**	**64**	**59**	**9**	**29**	**36**	**16**	**15**	**10**	**4**
33	**42**	**24**	**40**	**68**	**56**	**13**	**21**	**35**	**19**	**20**	**9**	**3**
1	**1**	**1**	**0**	**1**	**1**	**0**	**1**	**1**	**1**	**0**	**0**	**0**
0	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**0**
0	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**0**	**0**	**1**	**0**	**0**
5	**3**	**2**	**3**	**6**	**4**	**3**	**4**	**7**	**5**	**6**	**4**	**2**
164	**105**	**53**	**95**	**215**	**242**	**60**	**151**	**152**	**74**	**136**	**78**	**33**
76	**66**	**35**	**55**	**122**	**139**	**32**	**70**	**86**	**39**	**84**	**45**	**22**
11	11	6	8	23	27	5	11	14	8	20	11	4
32	30	14	27	53	62	15	29	38	17	34	17	10
0	0	0	0	1	1	0	0	1	0	0	1	0
24	19	12	16	33	40	7	22	24	10	23	12	7
8	6	4	4	12	9	4	8	10	4	7	4	1
0	0	0	0	1	0	0	0	0	0	0	1	0
29	**22**	**17**	**23**	**39**	**46**	**11**	**33**	**40**	**16**	**41**	**20**	**8**
10	9	4	10	15	17	5	12	16	9	17	8	4
2	1	1	1	1	1	1	1	2	1	1	1	0
18	12	11	13	23	27	5	19	22	7	23	11	4
1	**1**	**1**	**1**	**3**	**2**	**1**	**2**	**2**	**1**	**1**	**0**	**0**
33	**22**	**12**	**20**	**36**	**56**	**13**	**32**	**40**	**21**	**32**	**16**	**8**
7	**8**	**1**	**5**	**8**	**18**	**3**	**11**	**10**	**4**	**12**	**6**	**2**
7	**2**	**2**	**2**	**4**	**7**	**1**	**7**	**7**	**3**	**6**	**1**	**1**
12	**11**	**5**	**8**	**17**	**24**	**7**	**9**	**13**	**8**	**16**	**8**	**3**
51	**36**	**25**	**33**	**67**	**90**	**17**	**53**	**49**	**27**	**44**	**22**	**12**
2	1	1	2	4	5	1	2	3	1	3	1	1
20	14	11	13	31	34	5	21	19	10	20	7	7
0	0	0	0	1	2	0	2	1	1	1	0	0
9	7	4	5	10	14	4	11	5	4	7	6	1
20	14	8	12	22	35	7	17	21	11	14	8	2

Table 14a Age-adjusted (world) incidence rates per 100 000 person-years by county and primary site - 2004-2008

ICD10	Site	Norway	Østfold	Akershus	Oslo	Hedmark	Oppland	Buskerud
C00-96	**All sites**	**351.9**	**349.3**	**332.1**	**344.4**	**343.4**	**336.7**	**356.3**
C00-14	**Mouth, pharynx**	**7.4**	**8.4**	**6.9**	**8.3**	**8.2**	**6.1**	**6.6**
C00	Lip	1.4	1.7	1.3	0.9	2.0	0.9	1.2
C01-02	Tongue	1.5	1.3	1.6	1.9	1.7	1.4	0.8
C03-06	Mouth, other	1.3	1.9	1.0	1.1	1.4	1.0	1.2
C07-08	Salivary glands	0.5	0.7	0.6	0.3	0.8	0.5	0.1
C09-14	Pharynx	2.7	2.7	2.5	4.1	2.3	2.2	3.2
C15-26	**Digestive organs**	**67.5**	**69.5**	**64.0**	**63.8**	**63.7**	**65.8**	**62.6**
C15	Oesophagus	3.7	3.3	3.7	3.9	2.7	3.7	4.4
C16	Stomach	7.3	6.8	5.4	7.3	5.5	6.6	7.1
C17	Small intestine	1.5	1.5	1.2	1.3	1.7	1.2	1.1
C18	Colon	25.9	27.2	25.1	22.7	24.1	26.1	25.0
C19-21	Rectum, rectosigmoid, anus	16.6	18.8	15.9	14.1	15.9	15.4	15.5
C22	Liver	2.2	2.3	2.2	3.5	2.4	1.3	1.9
C23-24	Gallbladder, bile ducts	1.6	1.1	1.7	1.5	1.9	2.1	0.7
C25	Pancreas	7.8	7.5	7.8	8.8	8.8	8.3	6.1
C26	Other digestive organs	0.9	1.0	1.0	0.7	0.6	1.2	0.8
C30-34, C38	**Respiratory organs**	**39.3**	**40.3**	**34.3**	**35.8**	**39.1**	**31.9**	**37.5**
C30-31	Nose, sinuses	0.7	0.6	0.6	0.6	0.6	0.6	0.5
C32	Larynx, epiglottis	2.7	2.7	2.2	2.6	2.9	2.4	2.1
C33-34	Lung, trachea	35.7	36.9	31.1	32.4	35.6	28.7	34.6
C38	Mediastinum, pleura (non-mesothelioma)	0.3	0.1	0.4	0.2	0.0	0.2	0.2
C40-41	**Bone**	**1.0**	**0.4**	**0.8**	**0.9**	**1.2**	**0.6**	**1.2**
C43	**Melanoma of the skin**	**15.9**	**17.1**	**17.7**	**15.5**	**15.9**	**15.9**	**19.7**
C44	**Skin, non-melanoma**	**15.3**	**17.6**	**13.8**	**14.1**	**13.9**	**10.1**	**23.4**
C45	**Mesothelioma**	**1.5**	**1.0**	**1.8**	**1.1**	**1.3**	**1.0**	**2.3**
C46	**Kaposi's sarcoma**	**0.2**	**0.1**	**0.1**	**0.6**	**0.1**	**0.1**	**0.1**
C47	**Autonomic nervous system**	**0.3**	**0.4**	**0.2**	**0.1**	**0.0**	**0.2**	**0.1**
C48-49	**Soft tissues**	**1.7**	**1.8**	**1.8**	**1.6**	**2.4**	**1.2**	**1.4**
C50	**Breast**	**0.4**	**0.6**	**0.6**	**0.6**	**0.1**	**0.1**	**0.3**
C60-63	**Male genital organs**	**112.3**	**99.1**	**100.8**	**108.9**	**105.3**	**122.6**	**115.1**
C61	Prostate	99.9	85.8	89.1	97.5	94.9	107.3	104.2
C62	Testis	11.3	11.8	10.6	10.0	8.9	14.4	9.9
C60, C63	Other male genital	1.2	1.5	1.1	1.4	1.4	1.0	0.9
C64-68	**Urinary organs**	**33.2**	**38.0**	**31.8**	**32.2**	**33.2**	**28.4**	**29.6**
C64	Kidney excl. renal pelvis	10.0	12.2	11.1	9.8	11.4	9.1	9.7
C65	Renal pelvis	1.2	1.5	1.1	1.0	1.2	1.0	1.0
C66-68	Bladder, ureter, urethra	22.0	24.3	19.6	21.4	20.6	18.3	18.8
C69	**Eye**	**1.0**	**1.5**	**0.9**	**1.1**	**0.6**	**1.1**	**0.6**
C70-72, D42-43	**Central nervous system**	**13.8**	**12.5**	**12.8**	**14.3**	**11.7**	**10.8**	**12.5**
C73	**Thyroid gland**	**1.9**	**1.2**	**1.8**	**2.3**	**3.0**	**2.0**	**2.6**
C37, C74-75	**Other endocrine glands**	**2.8**	**2.6**	**2.6**	**1.9**	**4.9**	**2.5**	**2.0**
C39, C76, C80	**Other or unspecified**	**4.5**	**5.7**	**4.7**	**5.8**	**4.2**	**3.5**	**4.7**
C81-96	**Lymphoid and haematopoietic tissue**	**32.0**	**31.6**	**34.7**	**35.6**	**34.4**	**32.6**	**34.1**
C81	Hodgkin lymphoma	2.7	3.0	2.2	3.1	3.7	3.6	3.3
C82-85, C96	Non-Hodgkin lymphoma	12.0	9.9	12.9	14.1	14.0	12.8	9.3
C88	Malignant immunoproliferative diseases	0.6	0.7	0.7	0.6	0.6	0.8	0.7
C90	Multiple myeloma	4.7	3.9	5.4	5.0	5.7	4.1	4.9
C91-95	Leukaemia	12.0	14.0	13.4	12.8	10.5	11.4	15.8

Vestfold	Telemark	Aust-Agder	Vest-Agder	Rogaland	Hordaland	Sogn og Fjordane	Møre og Romsdal	Sør-Trøn-delag	Nord-Trøn-delag	Nordland	Troms	Finnmark
381.7	**354.3**	**399.2**	**381.0**	**378.4**	**342.8**	**385.2**	**366.3**	**338.7**	**330.5**	**358.8**	**334.7**	**295.9**
7.8	**8.0**	**8.1**	**7.4**	**7.4**	**6.4**	**8.4**	**6.8**	**7.0**	**5.8**	**9.2**	**7.4**	**5.2**
1.6	1.2	2.4	2.3	2.2	1.1	1.8	0.8	1.6	0.6	1.7	0.5	1.3
1.6	1.2	3.2	1.2	0.9	1.5	1.7	1.2	1.0	1.2	2.3	2.1	1.5
1.3	1.0	0.6	1.5	1.5	1.2	2.3	1.5	0.9	1.3	1.2	1.1	1.0
0.9	1.2	0.0	0.5	0.6	0.3	0.5	0.7	0.7	0.3	0.4	0.5	0.0
2.5	3.4	1.9	1.9	2.1	2.3	2.0	2.6	2.8	2.5	3.5	3.2	1.4
69.8	**64.2**	**61.2**	**66.6**	**70.6**	**75.3**	**72.5**	**70.6**	**68.0**	**59.5**	**71.4**	**70.4**	**64.9**
3.5	5.1	3.5	4.4	3.7	3.8	3.9	3.5	3.0	2.2	4.0	4.1	4.9
7.2	7.0	3.2	5.0	7.5	8.0	9.2	9.6	8.1	7.4	8.3	10.4	15.9
1.1	1.3	0.9	1.2	1.6	1.6	0.7	1.9	3.1	1.9	1.8	1.2	0.9
29.5	23.5	21.6	27.4	28.8	28.4	27.0	26.2	23.8	26.8	29.6	23.9	19.6
15.6	14.0	17.0	15.2	17.4	20.9	20.7	16.5	17.3	12.0	16.3	16.8	16.3
1.2	1.5	3.3	4.1	1.9	2.3	2.2	1.4	2.6	1.5	1.9	2.8	1.1
2.2	1.9	1.9	2.4	1.5	1.7	1.7	0.6	2.1	1.1	1.1	1.6	0.9
9.0	8.9	7.9	6.4	7.4	8.2	5.9	8.9	7.4	5.9	7.7	9.1	4.6
0.5	1.0	2.0	0.5	0.9	0.5	1.1	2.0	0.6	0.7	0.6	0.5	0.7
43.4	**39.4**	**50.4**	**53.3**	**38.3**	**40.3**	**41.0**	**41.9**	**37.9**	**33.7**	**39.4**	**46.2**	**47.3**
0.6	0.5	0.3	0.8	0.8	0.9	0.6	0.6	0.7	0.1	0.9	0.7	1.3
2.8	3.3	4.6	4.6	2.6	2.3	1.4	3.1	2.0	2.2	2.8	3.8	1.9
39.5	35.3	45.3	47.7	34.6	36.9	38.8	37.9	34.9	31.2	35.1	41.0	43.4
0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.3	0.2	0.6	0.6	0.7
1.6	**1.6**	**0.6**	**1.0**	**1.1**	**1.0**	**1.2**	**1.1**	**0.8**	**0.5**	**0.9**	**0.8**	**2.1**
20.2	**16.5**	**16.7**	**17.1**	**21.1**	**14.7**	**10.6**	**12.7**	**18.1**	**14.5**	**7.3**	**11.2**	**6.8**
20.3	**19.7**	**23.5**	**26.0**	**20.2**	**14.2**	**11.9**	**9.1**	**12.7**	**11.4**	**10.5**	**9.5**	**6.9**
3.6	**1.6**	**1.3**	**1.3**	**1.7**	**2.2**	**1.1**	**0.9**	**1.6**	**0.4**	**0.9**	**1.2**	**0.9**
0.2	**0.2**	**0.5**	**0.0**	**0.0**	**0.3**	**0.1**	**0.0**	**0.2**	**0.0**	**0.2**	**0.1**	**0.0**
0.0	**0.0**	**0.0**	**0.0**	**0.1**	**0.7**	**1.0**	**0.1**	**0.8**	**0.0**	**0.1**	**0.3**	**1.1**
1.5	**1.8**	**2.0**	**2.1**	**2.1**	**1.4**	**1.4**	**1.3**	**1.4**	**2.0**	**1.6**	**1.9**	**1.3**
0.7	**0.1**	**0.4**	**0.9**	**0.3**	**0.5**	**0.1**	**0.6**	**0.7**	**0.5**	**0.2**	**0.2**	**0.7**
115.2	**111.0**	**134.8**	**123.4**	**127.5**	**103.6**	**141.3**	**127.5**	**99.9**	**109.2**	**124.8**	**100.9**	**86.2**
103.2	100.3	123.7	110.6	113.9	90.4	132.6	113.5	87.8	94.2	111.6	88.7	70.8
10.6	9.5	10.7	11.4	12.3	12.0	8.3	13.2	11.0	13.9	12.4	11.1	14.3
1.4	1.2	0.5	1.4	1.4	1.3	0.4	0.8	1.0	1.1	0.9	1.0	1.1
37.3	**34.8**	**33.4**	**26.8**	**35.2**	**32.5**	**34.6**	**36.3**	**33.1**	**30.2**	**39.4**	**31.3**	**30.8**
9.8	9.8	6.8	8.5	10.8	9.2	9.8	11.5	9.6	9.1	11.4	6.6	11.1
2.4	0.9	1.5	0.7	1.0	1.1	0.9	1.2	1.5	1.0	1.1	1.2	0.4
25.1	24.1	25.2	17.5	23.4	22.2	23.8	23.6	22.0	20.1	26.9	23.6	19.4
1.4	**0.4**	**1.4**	**1.2**	**0.8**	**1.0**	**2.4**	**0.3**	**0.6**	**0.4**	**1.6**	**0.7**	**0.8**
13.2	**14.2**	**19.2**	**13.2**	**14.6**	**13.3**	**14.7**	**15.6**	**17.8**	**15.3**	**12.0**	**16.4**	**8.7**
1.2	**2.0**	**1.6**	**2.1**	**1.1**	**1.4**	**3.2**	**3.1**	**2.2**	**2.1**	**1.5**	**0.8**	**1.0**
2.9	**2.3**	**3.2**	**3.7**	**3.2**	**2.1**	**4.8**	**4.7**	**2.8**	**3.5**	**2.9**	**1.2**	**4.0**
4.3	**4.9**	**5.3**	**2.7**	**3.8**	**4.3**	**5.8**	**2.9**	**3.0**	**4.6**	**5.5**	**3.4**	**5.0**
37.1	**31.8**	**35.5**	**31.9**	**29.3**	**27.5**	**29.3**	**30.7**	**29.9**	**36.8**	**29.5**	**30.9**	**22.2**
2.5	2.0	2.7	2.7	2.6	2.5	2.3	2.3	3.0	3.4	2.0	2.1	1.2
14.9	11.5	14.8	12.5	11.3	8.9	12.6	12.2	9.7	13.0	12.9	14.1	11.3
0.4	0.4	0.3	0.4	0.5	0.4	0.7	0.5	0.6	1.9	0.5	0.5	0.3
4.9	6.5	5.9	3.8	4.4	4.5	4.7	3.9	4.7	5.3	3.5	4.6	4.1
14.3	11.4	11.8	12.6	10.4	11.2	9.1	11.8	11.9	13.2	10.5	9.6	5.3

Table 14b Age-adjusted (world) incidence rates per 100 000 person-years by county and primary site - 2004-2008

ICD10	Site	Norway	Østfold	Akershus	Oslo	Hedmark	Oppland	Buskerud
C00-96	**All sites**	**288.4**	**293.9**	**286.9**	**295.4**	**293.4**	**278.9**	**303.7**
C00-14	**Mouth, pharynx**	**4.0**	**3.8**	**3.3**	**5.2**	**3.6**	**3.7**	**3.6**
C00	Lip	0.9	0.6	1.0	0.5	0.5	0.5	0.7
C01-02	Tongue	0.7	0.5	0.7	1.3	0.8	0.8	0.4
C03-06	Mouth, other	0.9	1.2	0.6	1.2	1.4	1.1	0.8
C07-08	Salivary glands	0.5	0.4	0.5	0.4	0.3	0.6	0.8
C09-14	Pharynx	0.9	1.0	0.5	1.8	0.4	0.8	0.9
C15-26	**Digestive organs**	**50.4**	**53.6**	**48.6**	**46.6**	**47.3**	**48.6**	**51.0**
C15	Oesophagus	1.0	0.8	1.3	1.4	1.4	0.9	1.1
C16	Stomach	4.1	2.8	3.0	3.7	3.0	3.5	4.4
C17	Small intestine	1.1	1.3	1.5	0.9	1.2	0.6	1.3
C18	Colon	23.2	25.4	21.5	21.0	21.2	22.0	24.7
C19-21	Rectum, rectosigmoid, anus	11.6	13.3	12.3	10.6	10.5	11.8	11.0
C22	Liver	1.1	0.7	1.1	1.1	2.0	1.1	0.9
C23-24	Gallbladder, bile ducts	1.4	1.5	1.1	1.1	1.6	2.4	1.0
C25	Pancreas	6.1	7.0	5.7	6.1	5.5	5.6	6.0
C26	Other digestive organs	0.9	0.9	1.0	0.8	0.8	0.7	0.6
C30-34, C38	**Respiratory organs**	**24.6**	**24.4**	**24.4**	**26.4**	**25.7**	**21.5**	**24.2**
C30-31	Nose, sinuses	0.5	0.5	0.7	0.6	0.2	0.5	0.3
C32	Larynx, epiglottis	0.4	0.2	0.3	0.8	0.4	0.4	0.6
C33-34	Lung, trachea	23.6	23.6	23.3	24.6	25.0	20.6	23.3
C38	Mediastinum, pleura (non-mesothelioma)	0.1	0.2	0.2	0.4	0.0	0.1	0.0
C40-41	**Bone**	**0.7**	**0.7**	**0.4**	**0.7**	**0.3**	**0.5**	**1.1**
C43	**Melanoma of the skin**	**16.7**	**19.9**	**15.9**	**15.4**	**14.6**	**15.0**	**20.7**
C44	**Skin, non-melanoma**	**10.2**	**13.3**	**8.4**	**8.1**	**8.0**	**6.0**	**19.1**
C45	**Mesothelioma**	**0.2**	**0.2**	**0.3**	**0.3**	**0.0**	**0.2**	**0.4**
C46	**Kaposi's sarcoma**	**0.0**	**0.0**	**0.1**	**0.0**	**0.0**	**0.0**	**0.0**
C47	**Autonomic nervous system**	**0.3**	**0.6**	**0.3**	**0.1**	**0.0**	**0.0**	**0.2**
C48-49	**Soft tissues**	**2.4**	**2.2**	**2.1**	**2.2**	**2.1**	**1.7**	**1.9**
C50	**Breast**	**74.7**	**72.8**	**78.2**	**84.9**	**76.5**	**71.5**	**76.2**
C51-58	**Female genital organs**	**39.8**	**37.6**	**39.4**	**40.8**	**45.5**	**50.6**	**39.5**
C53	Cervix uteri	8.9	8.6	9.3	9.6	8.8	8.8	10.0
C54	Corpus uteri	16.5	14.2	16.9	18.0	19.4	22.3	15.3
C55	Uterus, other	0.1	0.2	0.1	0.0	0.2	0.1	0.1
C56	Ovary	11.4	12.0	11.2	10.9	13.5	15.7	11.5
C51-52, C57	Other female genital	2.7	2.3	1.8	2.2	3.6	3.6	2.7
C58	Placenta	0.2	0.3	0.0	0.1	0.0	0.0	0.0
C64-68	**Urinary organs**	**12.1**	**14.5**	**11.5**	**12.8**	**11.7**	**9.1**	**11.9**
C64	Kidney excl. renal pelvis	5.2	7.0	4.8	5.1	4.9	3.8	5.0
C65	Renal pelvis	0.5	0.4	0.4	0.5	0.5	0.3	0.7
C66-68	Bladder, ureter, urethra	6.4	7.1	6.3	7.3	6.2	5.1	6.2
C69	**Eye**	**0.8**	**0.9**	**0.9**	**1.1**	**1.1**	**0.5**	**0.8**
C70-72, D42-43	**Central nervous system**	**16.7**	**15.8**	**15.5**	**15.3**	**17.1**	**18.2**	**18.3**
C73	**Thyroid gland**	**5.1**	**2.3**	**5.8**	**4.9**	**7.9**	**3.4**	**5.4**
C37, C74-75	**Other endocrine glands**	**3.0**	**4.4**	**2.9**	**2.7**	**2.3**	**2.8**	**2.5**
C39, C76, C80	**Other or unspecified**	**4.1**	**4.9**	**4.0**	**4.6**	**4.9**	**3.6**	**4.5**
C81-96	**Lymphoid and haematopoietic tissue**	**22.4**	**22.2**	**25.0**	**23.4**	**25.0**	**22.0**	**22.5**
C81	Hodgkin lymphoma	1.8	1.1	1.9	1.9	2.6	1.1	1.7
C82-85, C96	Non-Hodgkin lymphoma	8.7	7.0	8.9	9.9	9.0	8.5	8.2
C88	Malignant immunoproliferative diseases	0.4	0.5	0.7	0.4	0.6	0.6	0.3
C90	Multiple myeloma	3.0	3.1	3.3	3.6	2.9	3.2	3.1
C91-95	Leukaemia	8.5	10.5	10.1	7.7	9.9	8.6	9.2

Vestfold	Telemark	Aust-Agder	Vest-Agder	Rogaland	Hordaland	Sogn og Fjordane	Møre og Romsdal	Sør-Trøn-delag	Nord-Trøn-delag	Nordland	Troms	Finnmark
314.9	**295.6**	**292.9**	**302.0**	**288.8**	**277.9**	**263.1**	**283.0**	**290.1**	**272.5**	**290.7**	**260.7**	**265.3**
4.0	**4.0**	**3.8**	**5.7**	**3.6**	**3.2**	**3.9**	**3.7**	**4.1**	**3.2**	**4.9**	**5.0**	**3.0**
0.6	0.5	1.9	2.7	2.0	0.8	1.9	0.9	0.4	0.0	0.2	1.0	0.5
0.8	1.0	0.4	0.4	0.5	0.5	0.2	0.8	0.5	0.3	1.3	0.7	0.9
1.2	0.7	0.2	0.9	0.3	0.7	0.6	0.7	1.0	1.1	1.7	1.3	0.3
0.8	0.4	0.3	0.4	0.3	0.2	1.3	0.7	0.9	0.9	0.6	0.5	0.7
0.5	1.4	1.0	1.5	0.5	0.9	0.0	0.6	1.2	1.0	1.0	1.6	0.5
52.6	**45.0**	**54.1**	**45.6**	**50.1**	**55.0**	**58.4**	**56.4**	**51.2**	**44.6**	**51.7**	**49.9**	**44.3**
1.0	1.0	1.1	1.1	1.1	0.6	1.1	0.3	1.2	0.9	0.5	1.7	0.6
3.6	4.9	3.2	3.3	4.4	4.7	7.1	4.5	4.2	3.0	4.4	6.9	7.0
1.0	0.9	1.1	1.0	0.5	0.9	1.2	1.8	1.6	0.9	1.8	0.8	0.3
23.1	21.7	23.1	21.3	22.5	27.7	23.9	27.1	22.3	22.5	23.9	22.8	15.5
12.9	7.8	13.9	9.5	12.5	12.9	15.1	11.3	12.1	9.8	12.0	8.1	9.3
1.2	0.9	1.2	1.2	0.7	1.1	1.6	0.9	1.0	0.0	1.5	1.5	0.7
1.0	1.9	2.6	1.9	1.4	0.9	2.2	1.7	1.5	1.6	1.0	1.4	2.1
7.5	5.5	6.6	5.1	6.2	5.7	5.9	7.1	6.5	5.2	5.6	5.5	8.5
1.2	0.4	1.2	1.4	0.7	0.5	0.3	1.6	0.9	0.7	1.1	1.2	0.4
25.1	**24.3**	**31.2**	**32.2**	**23.4**	**21.0**	**19.5**	**21.7**	**24.9**	**23.2**	**28.0**	**23.8**	**32.7**
0.5	0.3	0.2	0.8	0.2	0.4	0.2	0.6	0.2	0.4	0.7	0.9	0.5
0.4	0.1	0.4	0.5	0.4	0.4	0.0	0.1	0.5	0.1	0.3	1.0	0.4
24.2	23.7	30.6	30.8	22.8	20.0	19.3	20.9	23.9	22.6	26.9	22.0	31.8
0.0	0.2	0.0	0.0	0.1	0.2	0.0	0.1	0.2	0.1	0.1	0.0	0.0
1.3	**0.5**	**1.0**	**0.4**	**0.3**	**1.5**	**0.8**	**0.7**	**0.4**	**0.7**	**0.3**	**0.4**	**0.8**
21.4	**20.1**	**15.7**	**18.5**	**22.0**	**17.0**	**11.0**	**15.6**	**17.5**	**17.5**	**9.3**	**9.4**	**9.6**
9.5	**15.5**	**15.5**	**17.6**	**14.7**	**9.0**	**7.8**	**6.3**	**9.6**	**10.7**	**6.4**	**5.7**	**5.9**
0.4	**0.4**	**0.8**	**0.0**	**0.1**	**0.1**	**0.1**	**0.3**	**0.1**	**0.6**	**0.0**	**0.2**	**0.4**
0.0	**0.0**	**0.1**	**0.0**	**0.0**	**0.0**	**0.1**	**0.1**	**0.0**	**0.0**	**0.3**	**0.1**	**0.1**
0.0	**0.2**	**1.0**	**0.5**	**0.1**	**0.5**	**0.0**	**0.8**	**0.3**	**0.0**	**0.4**	**0.0**	**0.0**
3.5	**2.2**	**1.8**	**2.7**	**2.2**	**1.3**	**2.8**	**2.0**	**3.0**	**4.5**	**3.5**	**3.6**	**2.7**
89.0	**70.4**	**59.4**	**72.8**	**76.7**	**70.0**	**69.9**	**74.8**	**71.2**	**66.8**	**71.5**	**66.1**	**63.5**
37.3	**45.6**	**39.8**	**40.1**	**39.9**	**38.8**	**36.5**	**32.6**	**38.2**	**34.1**	**42.5**	**39.4**	**40.2**
7.1	10.3	8.1	7.7	9.0	8.6	7.5	7.0	7.3	9.1	13.7	11.7	7.4
15.2	19.1	13.8	18.7	16.3	16.9	16.6	11.8	15.7	12.8	15.9	13.6	19.2
0.0	0.0	0.0	0.0	0.2	0.2	0.3	0.0	0.2	0.0	0.0	0.5	0.0
11.3	13.2	14.0	11.4	11.2	11.0	7.7	10.3	11.2	9.0	10.1	9.6	11.7
3.2	3.0	3.9	2.2	2.9	2.1	3.8	3.4	3.6	3.2	2.5	2.9	1.9
0.4	0.0	0.0	0.0	0.3	0.0	0.6	0.0	0.1	0.0	0.4	1.2	0.0
11.3	**11.5**	**14.0**	**13.2**	**11.1**	**9.6**	**8.2**	**11.8**	**14.5**	**12.4**	**16.5**	**13.7**	**12.5**
4.8	4.7	4.9	5.9	4.5	4.3	3.3	4.8	6.3	7.7	7.6	5.9	7.0
0.5	0.2	1.2	0.4	0.3	0.2	1.3	0.3	0.7	0.6	0.5	0.6	0.4
5.9	6.7	8.0	6.9	6.4	5.0	3.5	6.7	7.5	4.1	8.4	7.1	5.2
0.9	**0.7**	**1.2**	**1.0**	**1.0**	**0.5**	**0.5**	**1.2**	**1.0**	**0.9**	**0.5**	**0.0**	**0.8**
21.2	**18.4**	**17.0**	**17.1**	**13.6**	**16.0**	**16.9**	**17.9**	**20.6**	**19.1**	**17.2**	**16.4**	**15.6**
4.5	**7.8**	**2.0**	**5.5**	**2.9**	**6.2**	**4.4**	**6.5**	**5.1**	**5.7**	**6.7**	**4.9**	**3.5**
4.9	**2.6**	**2.8**	**1.6**	**1.7**	**2.5**	**2.3**	**4.4**	**3.9**	**3.7**	**4.4**	**1.3**	**3.3**
3.7	**3.2**	**3.8**	**3.5**	**3.7**	**4.4**	**3.9**	**2.6**	**3.8**	**4.8**	**5.3**	**4.0**	**4.1**
24.3	**23.2**	**27.9**	**23.9**	**21.6**	**21.2**	**16.2**	**23.6**	**20.6**	**20.1**	**21.4**	**16.8**	**22.4**
1.8	1.5	2.3	2.2	1.8	1.9	1.7	2.1	1.9	0.5	2.5	1.3	3.3
8.8	8.9	10.1	8.8	10.1	8.6	5.6	9.1	7.6	8.5	8.7	5.0	13.8
0.0	0.1	0.1	0.2	0.1	0.2	0.2	0.6	0.5	0.5	0.3	0.0	0.4
3.7	3.1	4.1	3.2	2.7	2.7	2.1	4.0	1.7	2.3	2.6	3.3	2.0
10.0	9.5	11.2	9.4	6.8	7.8	6.7	7.9	8.9	8.2	7.4	7.1	2.9

Table 15a Average annual number of new cases for selected primary sites, stage and period of diagnosis 1954-2008

MALES

ICD10	Site	Stage	Period										
			1954-58	1959-63	1964-68	1969-73	1974-78	1979-83	1984-88	1989-93	1994-98	1999-2003	2004-08	% 2004-08
C00-14	Mouth, pharynx	Total	210	190	191	234	238	244	258	259	258	257	267	*100.0*
		Localized	146	130	133	151	156	147	165	153	127	86	84	*31.4*
		Regional	50	46	43	55	65	86	82	91	91	105	124	*46.6*
		Distant	3	6	7	10	9	7	7	10	12	12	14	*5.1*
		Unknown	11	9	8	17	8	5	4	6	27	55	45	*16.9*
C15	Oesophagus	Total	86	82	76	80	89	88	90	106	112	124	144	*100.0*
		Localized	51	50	47	37	44	43	39	44	39	24	26	*18.3*
		Regional	11	11	9	16	19	20	23	25	21	29	36	*24.9*
		Distant	16	16	17	21	22	22	25	31	30	38	39	*26.7*
		Unknown	7	5	4	7	5	4	2	5	22	33	43	*30.1*
C16	Stomach	Total	1056	806	794	695	628	599	542	497	424	358	314	*100.0*
		Localized	299	218	216	166	179	183	176	176	110	58	55	*17.6*
		Regional	225	166	164	157	140	161	153	135	129	106	84	*26.8*
		Distant	404	356	340	312	270	223	190	162	138	129	99	*31.4*
		Unknown	128	67	74	60	39	32	22	23	47	66	76	*24.2*
C18	Colon	Total	257	266	348	372	472	591	700	817	882	970	1090	*100.0*
		Localized	106	107	139	133	151	170	211	283	197	166	169	*15.5*
		Regional	63	68	82	94	160	247	276	288	412	467	570	*52.3*
		Distant	69	78	112	126	145	153	190	214	234	252	232	*21.3*
		Unknown	19	14	15	20	16	21	23	32	39	84	119	*10.9*
C19-21	Rectum, rectosigmoid, anus	Total	174	179	211	298	390	495	527	567	594	640	664	*100.0*
		Localized	85	87	102	135	185	223	225	260	225	167	137	*20.7*
		Regional	38	44	59	80	115	170	200	192	229	259	282	*42.4*
		Distant	34	37	42	69	81	91	93	102	111	130	109	*16.4*
		Unknown	17	11	7	14	9	11	10	13	29	84	136	*20.5*
C22	Liver	Total	19	22	32	45	53	57	67	62	56	79	85	*100.0*
		Localized	9	10	17	20	25	30	35	38	25	27	26	*30.3*
		Regional	2	1	1	2	6	4	5	4	3	5	9	*10.6*
		Distant	6	9	13	18	20	15	19	10	12	19	18	*21.1*
		Unknown	2	2	1	5	2	8	8	10	16	29	32	*38.0*
C23-24	Gallbladder, bile ducts	Total	17	20	25	27	37	37	51	50	56	58	64	*100.0*
		Localized	9	7	9	8	11	12	20	18	10	12	8	*11.9*
		Regional	1	4	4	4	9	8	10	9	11	13	22	*35.0*
		Distant	5	8	11	12	16	14	15	15	16	16	17	*26.3*
		Unknown	1	1	1	2	1	4	5	8	18	17	17	*26.9*
C25	Pancreas	Total	151	152	202	244	258	284	297	284	280	291	318	*100.0*
		Localized	45	46	57	49	44	55	61	63	31	20	21	*6.6*
		Regional	13	17	26	32	34	37	38	26	35	48	72	*22.6*
		Distant	77	79	109	139	156	159	157	144	130	152	170	*53.6*
		Unknown	15	10	9	24	24	34	41	51	84	71	55	*17.2*
C33-34	Lung, trachea	Total	254	334	463	613	804	980	1137	1193	1272	1348	1439	*100.0*
		Localized	77	101	161	196	259	329	376	409	288	201	178	*12.4*
		Regional	51	71	94	116	145	171	244	218	299	348	421	*29.2*
		Distant	103	139	188	254	345	412	444	464	513	627	654	*45.4*
		Unknown	23	24	19	48	55	68	73	101	171	172	187	*13.0*
C43	Melanoma of the skin	Total	49	67	91	133	186	235	297	412	453	475	575	*100.0*
		Localized	27	43	60	90	152	192	255	350	364	273	208	*36.3*
		Regional	11	9	12	16	16	16	16	18	14	18	22	*3.9*
		Distant	7	13	16	17	14	18	17	26	24	35	28	*4.9*
		Unknown	4	1	3	10	3	9	9	18	52	149	316	*55.0*
C61	Prostate	Total	708	746	953	1132	1410	1592	1774	2143	2637	3045	3998	*100.0*
		Localized	417	445	641	727	951	1075	1172	1470	1407	1029	1626	*40.7*
		Regional	37	34	31	52	75	61	60	77	105	133	273	*6.8*
		Distant	185	200	218	245	293	358	486	436	407	384	354	*8.9*
		Unknown	69	67	63	108	90	97	57	160	717	1498	1745	*43.6*
C62	Testis	Total	61	65	65	86	98	123	156	194	217	253	277	*100.0*
		Localized	41	43	44	48	56	63	97	131	137	136	137	*49.5*
		Regional	2	3	4	11	20	34	35	35	36	38	46	*16.5*
		Distant	15	16	17	24	21	23	23	25	29	30	29	*10.3*
		Unknown	2	2	1	3	1	3	1	3	16	48	66	*23.7*
C64	Kidney except renal pelvis	Total	92	114	145	159	196	225	251	274	277	308	374	*100.0*
		Localized	49	59	76	68	80	94	110	138	124	121	152	*40.7*
		Regional	6	13	19	29	46	46	53	38	43	42	36	*9.7*
		Distant	31	37	45	58	67	78	78	78	70	73	83	*22.3*
		Unknown	5	5	4	4	4	8	10	20	40	72	102	*27.3*
C66-68	Bladder, ureter, urethra	Total	219	228	319	383	529	636	723	814	829	843	943	*100.0*
		Localized	165	187	269	302	435	537	627	725	622	438	443	*47.0*
		Regional	16	19	29	39	54	58	55	44	41	51	71	*7.6*
		Distant	24	14	16	22	29	29	28	28	30	35	34	*3.6*
		Unknown	14	8	5	19	12	12	13	16	136	319	395	*41.9*
C70-72, D42-43	Central nervous system	Total	131	127	145	155	179	204	240	257	292	375	425	*100.0*
		Non-malignant	32	39	37	47	52	63	72	92	123	170	210	*49.4*
		Malignant	100	88	108	108	127	141	168	165	169	205	215	*50.6*
C73	Thyroid gland	Total	20	24	29	37	39	49	44	47	46	52	65	*100.0*
		Localized	8	6	7	15	19	22	22	24	19	18	18	*27.1*
		Regional	7	12	14	13	14	19	14	13	15	20	29	*44.3*
		Distant	5	6	7	8	5	7	7	8	9	7	9	*13.5*
		Unknown	1	1	0	1	1	1	0	2	3	7	10	*15.1*

Table 15b Average annual number of new cases for selected primary sites, stage and period of diagnosis 1954-2008

FEMALES

ICD10	Site	Stage	Period											%
			1954-58	1959-63	1964-68	1969-73	1974-78	1979-83	1984-88	1989-93	1994-98	1999-2003	2004-08	2004-08
C00-14	Mouth, pharynx	Total	74	60	74	77	81	95	113	111	133	133	174	*100.0*
		Localized	46	34	44	41	45	55	66	75	77	49	65	*37.4*
		Regional	21	19	27	27	28	34	40	30	37	45	66	*37.7*
		Distant	2	4	2	4	4	3	4	4	5	6	5	*2.8*
		Unknown	4	4	1	5	5	4	2	2	13	33	39	*22.1*
C15	Oesophagus	Total	29	25	30	29	34	31	36	38	46	52	54	*100.0*
		Localized	20	17	20	15	20	14	21	21	19	12	11	*20.8*
		Regional	3	4	3	5	7	7	9	6	8	9	12	*21.6*
		Distant	2	3	5	7	5	7	5	8	9	12	10	*17.8*
		Unknown	4	2	2	3	2	3	1	3	10	19	21	*39.8*
C16	Stomach	Total	729	563	515	455	412	410	366	320	283	233	217	*100.0*
		Localized	214	151	141	101	107	127	132	123	84	42	40	*18.3*
		Regional	128	97	93	89	91	108	94	77	73	60	54	*24.7*
		Distant	264	235	220	217	178	141	120	102	89	80	68	*31.4*
		Unknown	122	79	61	48	36	35	20	17	38	50	56	*25.6*
C18	Colon	Total	296	308	395	454	593	730	837	923	1073	1149	1229	*100.0*
		Localized	124	124	158	162	191	209	239	326	238	203	194	*15.8*
		Regional	64	75	94	130	204	300	354	340	508	560	648	*52.7*
		Distant	78	89	124	137	176	188	208	212	254	272	247	*20.1*
		Unknown	31	20	19	25	22	34	35	46	73	114	140	*11.4*
C19-21	Rectum, rectosigmoid, anus	Total	136	132	175	249	319	406	423	479	501	516	554	*100.0*
		Localized	66	62	83	116	148	186	187	240	197	148	121	*21.9*
		Regional	33	33	47	70	94	137	147	148	186	198	223	*40.3*
		Distant	25	28	38	54	68	72	75	77	86	91	86	*15.5*
		Unknown	11	8	8	9	9	11	14	14	31	79	123	*22.3*
C22	Liver	Total	12	14	15	27	29	37	45	48	37	50	51	*100.0*
		Localized	5	6	7	12	15	16	22	24	13	12	12	*23.5*
		Regional	1	0	1	1	1	1	3	3	2	6	7	*13.3*
		Distant	5	6	7	11	12	16	12	10	8	10	10	*19.6*
		Unknown	2	2	1	3	1	4	7	11	14	22	22	*43.5*
C23-24	Gallbladder, bile ducts	Total	48	51	54	56	59	77	83	73	76	80	75	*100.0*
		Localized	14	14	15	14	16	24	30	22	16	10	12	*16.6*
		Regional	7	10	8	9	10	15	17	13	13	15	19	*24.9*
		Distant	24	25	30	30	30	34	26	24	23	27	24	*31.6*
		Unknown	3	3	1	3	4	5	10	14	24	26	20	*26.8*
C25	Pancreas	Total	103	112	136	178	201	241	291	290	317	329	333	*100.0*
		Localized	33	32	44	42	42	48	71	74	35	26	30	*9.0*
		Regional	11	10	14	20	25	31	38	27	35	46	68	*20.3*
		Distant	50	60	69	95	116	129	139	122	138	155	158	*47.5*
		Unknown	10	10	8	21	19	32	42	67	109	101	77	*23.2*
C33-34	Lung, trachea	Total	77	77	104	156	191	262	367	503	630	812	1020	*100.0*
		Localized	21	20	33	50	55	75	112	152	138	120	151	*14.8*
		Regional	10	9	14	23	30	38	66	99	134	191	268	*26.3*
		Distant	35	41	52	71	92	125	163	205	260	392	469	*45.9*
		Unknown	11	7	6	11	14	24	26	47	99	110	133	*13.0*
C43	Melanoma of the skin	Total	57	74	108	145	237	298	387	472	500	530	608	*100.0*
		Localized	43	59	85	110	213	265	355	431	413	330	245	*40.3*
		Regional	7	7	6	11	9	13	11	12	10	14	15	*2.5*
		Distant	5	6	11	11	13	11	12	14	19	22	18	*2.9*
		Unknown	2	2	6	13	2	9	9	14	58	165	330	*54.4*
C50	Breast	Total	1030	999	1150	1278	1505	1635	1798	1938	2279	2610	2770	*100.0*
		I	442	456	551	617	790	902	883	938	1220	1339	1418	*51.2*
		II	394	354	368	408	433	476	621	712	824	1033	1146	*41.4*
		III	57	64	92	87	120	88	128	108	87	90	81	*2.9*
		IV	101	96	109	113	119	106	121	137	128	133	109	*3.9*
		Unknown	35	30	30	53	42	63	46	43	21	15	15	*0.5*
C53	Cervix uteri	Total	396	343	381	420	443	380	331	363	336	297	284	*100.0*
		I	151	142	179	220	247	219	182	216	203	176	150	*52.8*
		II	117	116	134	119	108	76	76	72	68	53	62	*21.8*
		III	84	52	42	55	60	53	45	40	34	34	25	*8.9*
		IV	32	24	21	21	24	22	23	30	26	26	30	*10.4*
		Unknown	13	8	5	6	5	9	4	5	5	8	17	*6.1*
C54	Corpus uteri	Total	187	199	239	294	349	382	387	443	476	573	677	*100.0*
		Localized	147	163	194	240	283	285	295	333	350	353	411	*60.7*
		Regional	12	10	14	16	32	51	44	48	49	67	74	*10.9*
		Distant	20	20	30	33	31	36	41	56	61	74	87	*12.9*
		Unknown	8	6	2	6	3	11	7	6	17	80	105	*15.5*
C56	Ovary	Total	284	276	335	345	356	395	448	454	467	463	451	*100.0*
		Localized	87	87	108	134	120	105	121	130	108	80	81	*17.9*
		Regional	25	18	16	24	23	41	25	17	13	14	12	*2.6*
		Distant	159	156	204	181	207	238	289	290	307	305	312	*69.0*
		Unknown	13	14	6	5	5	10	13	16	39	63	47	*10.5*
C64	Kidney except renal pelvis	Total	78	87	96	116	128	147	167	185	196	194	226	*100.0*
		Localized	47	49	53	59	63	68	76	101	94	73	94	*41.7*
		Regional	7	10	10	20	25	33	30	23	22	20	20	*8.9*
		Distant	20	24	30	33	37	40	52	44	48	48	36	*16.1*
		Unknown	4	4	3	5	3	6	9	17	31	53	75	*33.3*
C66-68	Bladder, ureter, urethra	Total	122	113	136	167	202	243	253	270	290	316	333	*100.0*
		Localized	75	72	92	106	144	185	211	226	194	145	149	*44.9*
		Regional	13	14	21	27	25	24	23	16	19	23	31	*9.2*
		Distant	20	18	18	22	21	21	12	17	16	25	19	*5.8*
		Unknown	14	10	6	12	11	13	7	11	61	123	133	*40.1*
C70-72, D42-43	Central nervous system	Total	116	115	128	123	172	206	237	280	344	472	566	*100.0*
		Non-malignant	44	50	61	52	72	88	115	154	201	314	396	*70.0*
		Malignant	72	65	68	71	100	117	122	127	143	158	170	*30.0*
C73	Thyroid gland	Total	60	56	71	97	119	145	137	140	121	135	164	*100.0*
		Localized	28	23	38	52	74	96	93	91	67	63	66	*40.3*
		Regional	20	19	23	29	30	32	32	33	38	40	50	*30.6*
		Distant	9	12	10	11	13	12	9	11	9	10	11	*6.6*
		Unknown	3	2	1	5	2	4	3	4	7	22	37	*22.5*

Table 16a Age-adjusted (world) incidence rates per 100 000 person-years for selected primary sites, stage and period of diagnosis 1954-2008

MALES

ICD10	Site	Stage	Period										
			1954-58	1959-63	1964-68	1969-73	1974-78	1979-83	1984-88	1989-93	1994-98	1999-03	2004-08
C00-14	Mouth, pharynx	Total	9.4	7.8	7.2	8.2	8.1	8.0	8.5	8.4	8.2	7.8	7.4
		Localized	6.5	5.3	5.1	5.3	5.4	4.8	5.3	4.8	3.9	2.5	2.3
		Regional	2.2	1.9	1.6	1.9	2.2	2.9	2.8	3.1	3.0	3.3	3.6
		Distant	0.1	0.3	0.3	0.4	0.3	0.2	0.2	0.3	0.4	0.4	0.4
		Unknown	0.5	0.4	0.3	0.6	0.2	0.1	0.1	0.2	0.8	1.6	1.1
C15	Oesophagus	Total	3.8	3.2	2.7	2.6	2.9	2.6	2.8	3.3	3.2	3.4	3.7
		Localized	2.2	1.9	1.6	1.2	1.4	1.2	1.1	1.3	1.1	0.6	0.7
		Regional	0.5	0.5	0.3	0.5	0.6	0.6	0.7	0.9	0.7	0.9	1.0
		Distant	0.7	0.6	0.6	0.7	0.7	0.7	0.8	1.0	0.9	1.1	1.0
		Unknown	0.3	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.6	0.8	1.0
C16	Stomach	Total	46.8	31.8	28.7	23.4	19.8	17.8	15.1	13.5	11.1	9.0	7.3
		Localized	12.8	8.3	7.6	5.5	5.5	5.2	4.7	4.5	2.7	1.4	1.2
		Regional	10.4	6.8	6.1	5.4	4.5	5.0	4.4	3.9	3.6	2.8	2.0
		Distant	18.2	14.2	12.5	10.6	8.7	6.7	5.5	4.5	3.8	3.3	2.4
		Unknown	5.4	2.4	2.5	1.9	1.1	0.9	0.6	0.6	1.0	1.4	1.7
C18	Colon	Total	11.4	10.6	12.6	12.7	14.9	17.7	20.2	22.8	23.6	25.0	25.9
		Localized	4.7	4.2	5.0	4.5	4.8	5.0	5.9	7.6	5.2	4.3	4.1
		Regional	2.8	2.8	3.1	3.2	5.1	7.5	8.2	8.2	11.1	12.0	13.4
		Distant	3.1	3.1	4.1	4.3	4.5	4.6	5.6	6.2	6.5	6.7	5.9
		Unknown	0.8	0.5	0.5	0.6	0.5	0.6	0.5	0.8	0.9	2.0	2.6
C19-21	Rectum, rectosigmoid, anus	Total	7.7	7.1	7.7	10.1	12.5	15.1	15.6	16.2	16.8	17.2	16.6
		Localized	3.8	3.4	3.7	4.5	5.9	6.7	6.5	7.2	6.3	4.5	3.5
		Regional	1.7	1.8	2.2	2.8	3.7	5.2	6.1	5.7	6.5	7.0	7.0
		Distant	1.5	1.4	1.5	2.3	2.6	2.8	2.7	3.0	3.2	3.7	2.8
		Unknown	0.7	0.5	0.3	0.5	0.3	0.3	0.3	0.4	0.8	2.1	3.2
C22	Liver	Total	0.9	1.0	1.2	1.6	1.8	1.8	2.1	1.9	1.6	2.2	2.2
		Localized	0.4	0.4	0.6	0.7	0.9	0.9	1.1	1.1	0.7	0.8	0.7
		Regional	0.1	0.0	0.0	0.1	0.2	0.1	0.2	0.1	0.1	0.1	0.2
		Distant	0.3	0.4	0.5	0.7	0.7	0.5	0.6	0.3	0.3	0.5	0.5
		Unknown	0.1	0.1	0.0	0.2	0.1	0.2	0.2	0.3	0.4	0.7	0.8
C23-24	Gallbladder, bile ducts	Total	0.7	0.8	0.9	0.9	1.1	1.1	1.4	1.4	1.5	1.5	1.6
		Localized	0.4	0.3	0.3	0.3	0.3	0.3	0.6	0.4	0.3	0.3	0.2
		Regional	0.1	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.4	0.6
		Distant	0.2	0.3	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4
		Unknown	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.2	0.4	0.4	0.4
C25	Pancreas	Total	6.9	6.1	7.3	8.2	8.2	8.5	8.4	7.9	7.5	7.6	7.8
		Localized	2.0	1.8	2.0	1.6	1.3	1.5	1.6	1.6	0.8	0.5	0.4
		Regional	0.6	0.7	1.0	1.1	1.1	1.1	1.1	0.8	1.1	1.3	1.8
		Distant	3.6	3.2	4.0	4.7	5.1	4.9	4.6	4.2	3.7	4.2	4.4
		Unknown	0.6	0.4	0.3	0.8	0.7	0.9	1.1	1.3	2.0	1.6	1.2
C33-34	Lung, trachea	Total	11.8	14.0	17.8	22.0	26.9	31.3	35.1	35.7	36.9	36.6	35.7
		Localized	3.6	4.2	6.1	6.9	8.4	10.0	10.9	11.6	8.2	5.5	4.4
		Regional	2.4	3.0	3.7	4.3	5.2	5.9	7.9	6.9	8.8	9.4	10.5
		Distant	4.8	5.9	7.2	9.2	11.7	13.5	14.3	14.6	15.5	17.6	16.5
		Unknown	1.0	0.9	0.7	1.6	1.7	1.9	2.0	2.6	4.3	4.1	4.2
C43	Melanoma of the skin	Total	2.3	3.1	4.1	5.8	7.7	9.3	11.2	14.8	15.0	14.4	15.9
		Localized	1.3	2.0	2.7	3.9	6.3	7.7	9.6	12.6	12.2	8.4	6.0
		Regional	0.5	0.4	0.6	0.7	0.7	0.7	0.6	0.7	0.4	0.5	0.6
		Distant	0.3	0.6	0.7	0.7	0.5	0.7	0.6	0.9	0.7	1.1	0.7
		Unknown	0.2	0.1	0.1	0.5	0.1	0.3	0.3	0.6	1.6	4.4	8.6
C61	Prostate	Total	29.7	27.5	32.1	35.0	40.4	42.4	44.6	52.4	66.9	79.5	99.9
		Localized	17.4	16.3	21.6	22.4	27.2	28.4	29.1	35.5	36.1	28.8	42.7
		Regional	1.6	1.3	1.1	1.6	2.2	1.7	1.7	2.5	3.6	4.1	7.2
		Distant	7.8	7.4	7.4	7.7	8.5	9.7	12.3	10.8	9.8	8.9	7.7
		Unknown	2.9	2.5	2.0	3.3	2.5	2.6	1.4	3.6	17.4	37.8	42.3
C62	Testis	Total	3.3	3.6	3.6	4.4	4.9	5.8	6.9	8.3	9.2	10.5	11.3
		Localized	2.2	2.4	2.3	2.5	2.8	3.0	4.3	5.6	5.8	5.7	5.6
		Regional	0.1	0.2	0.2	0.6	1.0	1.6	1.6	1.5	1.5	1.6	1.9
		Distant	0.9	0.9	1.0	1.2	1.0	1.1	1.0	1.1	1.3	1.3	1.2
		Unknown	0.1	0.1	0.1	0.2	0.0	0.1	0.1	0.1	0.7	1.9	2.6
C64	Kidney except renal pelvis	Total	4.3	4.8	5.6	5.9	6.9	7.6	8.1	8.3	8.3	8.9	10.0
		Localized	2.3	2.5	2.9	2.5	2.9	3.3	3.7	4.3	3.9	3.7	4.2
		Regional	0.3	0.6	0.8	1.1	1.7	1.6	1.7	1.2	1.3	1.2	1.0
		Distant	1.5	1.5	1.7	2.1	2.3	2.5	2.5	2.3	2.1	2.1	2.2
		Unknown	0.2	0.2	0.1	0.2	0.1	0.2	0.3	0.5	1.1	2.0	2.7
C66-68	Bladder, ureter, urethra	Total	9.8	9.1	11.7	13.1	17.0	19.3	20.7	22.7	22.3	21.4	22.0
		Localized	7.4	7.5	9.9	10.4	14.0	16.4	18.0	20.2	17.1	11.4	10.5
		Regional	0.7	0.7	1.0	1.3	1.7	1.7	1.5	1.3	1.1	1.3	1.8
		Distant	1.1	0.6	0.6	0.8	0.9	0.9	0.8	0.8	0.8	0.9	0.8
		Unknown	0.6	0.3	0.2	0.6	0.4	0.4	0.4	0.4	3.4	7.8	8.9
C70-72, D42-43	Central nervous system	Total	7.0	6.2	6.9	7.0	7.8	8.5	9.6	9.9	10.7	13.2	13.8
		Non-malig-nant	1.7	1.9	1.7	2.1	2.1	2.4	2.7	3.2	4.5	5.7	6.6
		Malignant	5.3	4.4	5.2	5.0	5.7	6.1	7.0	6.7	6.3	7.4	7.1
C73	Thyroid gland	Total	0.9	1.0	1.2	1.5	1.5	1.7	1.5	1.7	1.6	1.7	1.9
		Localized	0.4	0.3	0.3	0.6	0.7	0.8	0.8	0.9	0.7	0.6	0.5
		Regional	0.3	0.5	0.6	0.5	0.5	0.7	0.5	0.5	0.5	0.7	0.9
		Distant	0.2	0.3	0.2	0.3	0.2	0.2	0.2	0.3	0.3	0.2	0.2
		Unknown	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.3

Table 16b Age-adjusted (world) incidence rates per 100 000 person-years for selected primary sites, stage and period of diagnosis 1954-2008

FEMALES

ICD10	Site	Stage	Period										
			1954-58	1959-63	1964-68	1969-73	1974-78	1979-83	1984-88	1989-93	1994-98	1999-03	2004-08
C00-14	Mouth, pharynx	Total	2.9	2.2	2.3	2.3	2.2	2.6	2.9	2.9	3.4	3.3	4.0
		Localized	1.8	1.3	1.4	1.3	1.2	1.6	1.7	1.9	2.0	1.3	1.5
		Regional	0.8	0.6	0.8	0.8	0.8	0.9	1.0	0.8	0.9	1.1	1.6
		Distant	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
		Unknown	0.2	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.3	0.8	0.8
C15	Oesophagus	Total	1.1	0.8	0.9	0.7	0.8	0.7	0.8	0.8	0.9	1.0	1.0
		Localized	0.7	0.5	0.6	0.4	0.4	0.3	0.4	0.4	0.4	0.2	0.2
		Regional	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.2	0.2	0.2	0.3
		Distant	0.1	0.1	0.1	0.2	0.1	0.2	0.1	0.2	0.2	0.3	0.2
		Unknown	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.2	0.3	0.3
C16	Stomach	Total	26.7	18.4	15.2	12.2	10.0	9.2	7.7	6.3	5.3	4.4	4.1
		Localized	7.5	4.7	4.0	2.5	2.5	2.7	2.5	2.2	1.4	0.8	0.7
		Regional	5.2	3.4	2.9	2.5	2.3	2.6	2.2	1.7	1.4	1.2	1.1
		Distant	10.1	8.0	6.7	6.1	4.5	3.3	2.7	2.1	2.0	1.7	1.4
		Unknown	3.9	2.3	1.5	1.1	0.7	0.6	0.3	0.3	0.5	0.7	0.8
C18	Colon	Total	11.1	10.5	11.9	13.0	15.2	17.6	18.7	19.8	22.2	22.8	23.2
		Localized	4.7	4.2	4.7	4.6	4.8	4.9	5.2	6.8	5.0	4.1	3.5
		Regional	2.5	2.7	2.9	3.8	5.4	7.5	8.1	7.5	10.7	11.2	12.3
		Distant	3.0	3.0	3.8	3.9	4.6	4.5	4.9	4.9	5.6	5.8	5.1
		Unknown	1.0	0.6	0.5	0.6	0.5	0.6	0.5	0.7	1.0	1.8	2.3
C19-21	Rectum, rectosigmoid, anus	Total	5.2	4.6	5.6	7.1	8.7	10.2	9.9	11.0	11.3	11.3	11.6
		Localized	2.5	2.2	2.7	3.3	4.0	4.7	4.4	5.4	4.3	3.4	2.6
		Regional	1.3	1.2	1.5	2.0	2.7	3.4	3.6	3.6	4.5	4.4	4.7
		Distant	1.0	0.9	1.2	1.6	1.9	1.8	1.8	1.8	1.9	2.1	1.9
		Unknown	0.4	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.5	1.4	2.4
C22	Liver	Total	0.5	0.6	0.5	0.8	0.8	1.0	1.0	1.1	0.8	1.1	1.1
		Localized	0.2	0.2	0.3	0.4	0.4	0.4	0.5	0.6	0.4	0.3	0.2
		Regional	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.2
		Distant	0.2	0.3	0.2	0.3	0.3	0.4	0.3	0.3	0.2	0.2	0.2
		Unknown	0.1	0.1	0.0	0.1	0.0	0.1	0.1	0.2	0.2	0.4	0.4
C23-24	Gallbladder, bile ducts	Total	1.8	1.7	1.6	1.5	1.4	1.7	1.6	1.5	1.5	1.5	1.4
		Localized	0.5	0.4	0.5	0.4	0.4	0.5	0.6	0.4	0.3	0.2	0.2
		Regional	0.3	0.3	0.2	0.2	0.3	0.4	0.4	0.3	0.3	0.3	0.4
		Distant	0.9	0.8	0.9	0.8	0.7	0.7	0.5	0.6	0.5	0.6	0.5
		Unknown	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.2	0.4	0.4	0.3
C25	Pancreas	Total	3.9	3.9	4.1	4.9	4.9	5.4	6.0	5.8	6.1	6.1	6.1
		Localized	1.2	1.0	1.3	1.1	1.0	1.0	1.3	1.3	0.7	0.4	0.4
		Regional	0.4	0.4	0.4	0.6	0.7	0.8	0.9	0.6	0.8	0.9	1.4
		Distant	1.9	2.2	2.1	2.7	2.9	3.1	3.1	2.8	3.0	3.2	3.2
		Unknown	0.4	0.3	0.2	0.6	0.4	0.6	0.7	1.0	1.6	1.5	1.1
C33-34	Lung, trachea	Total	3.1	2.8	3.4	4.9	5.7	7.7	10.3	14.0	17.0	20.8	23.6
		Localized	0.8	0.7	1.1	1.5	1.6	2.1	2.9	4.1	3.7	3.1	3.5
		Regional	0.4	0.3	0.5	0.8	0.9	1.2	2.1	2.9	3.7	5.0	6.4
		Distant	1.5	1.5	1.7	2.3	2.8	3.8	4.7	6.0	7.5	10.4	11.1
		Unknown	0.4	0.2	0.2	0.3	0.3	0.5	0.6	0.9	2.1	2.4	2.6
C43	Melanoma of the skin	Total	2.6	3.3	4.6	6.2	9.6	11.1	14.0	16.1	16.1	15.6	16.7
		Localized	1.9	2.6	3.7	4.8	8.8	10.1	13.0	15.0	13.6	10.1	6.9
		Regional	0.3	0.3	0.3	0.5	0.3	0.4	0.3	0.3	0.3	0.3	0.3
		Distant	0.2	0.2	0.5	0.4	0.4	0.4	0.4	0.4	0.5	0.6	0.4
		Unknown	0.1	0.1	0.2	0.5	0.1	0.3	0.2	0.4	1.8	4.6	9.1
C50	Breast	Total	43.9	39.0	42.4	44.7	49.8	51.5	53.4	56.0	66.3	74.4	74.7
		I	18.8	17.7	20.1	21.5	26.0	27.7	25.8	26.5	34.7	37.6	37.9
		II	17.3	14.4	14.3	15.0	15.3	16.1	19.6	21.9	25.6	30.9	32.0
		III	2.2	2.3	3.2	2.8	3.4	2.4	3.3	2.8	2.1	2.3	1.9
		IV	4.1	3.6	3.7	3.6	3.6	3.3	3.4	3.8	3.6	3.3	2.6
		Unknown	1.4	1.1	1.0	1.8	1.5	2.1	1.3	0.9	0.4	0.3	0.4
C53	Cervix uteri	Total	18.1	15.1	16.5	18.0	18.5	14.9	12.1	12.8	11.5	9.7	8.9
		I	7.0	6.7	8.4	10.4	11.5	9.4	7.3	8.1	7.5	6.3	5.2
		II	5.4	5.1	5.6	4.7	4.0	2.7	2.7	2.5	2.2	1.6	1.8
		III	3.8	2.1	1.6	2.0	2.1	1.7	1.4	1.2	1.0	0.9	0.6
		IV	1.4	1.0	0.8	0.7	0.8	0.6	0.6	0.9	0.7	0.7	0.8
		Unknown	0.6	0.3	0.2	0.2	0.1	0.4	0.1	0.1	0.1	0.2	0.5
C54	Corpus uteri	Total	8.1	7.8	8.7	10.1	11.5	12.5	11.9	13.3	13.4	14.9	16.5
		Localized	6.4	6.5	7.1	8.4	9.6	9.7	9.3	10.2	10.1	9.5	10.4
		Regional	0.5	0.4	0.5	0.5	0.9	1.5	1.2	1.4	1.3	1.7	1.7
		Distant	0.8	0.8	1.0	1.0	0.9	1.0	1.2	1.5	1.7	1.9	2.0
		Unknown	0.3	0.2	0.0	0.2	0.1	0.3	0.2	0.1	0.3	1.9	2.3
C56	Ovary	Total	12.6	11.2	12.5	12.7	12.7	13.3	13.9	13.8	13.4	12.5	11.4
		Localized	4.0	3.8	4.3	5.1	4.6	3.8	4.1	4.3	3.6	2.6	2.4
		Regional	1.1	0.7	0.6	0.9	0.8	1.4	0.8	0.5	0.3	0.3	0.3
		Distant	6.9	6.2	7.5	6.4	7.1	7.9	8.8	8.6	8.7	8.1	7.7
		Unknown	0.6	0.5	0.2	0.2	0.2	0.3	0.2	0.3	0.8	1.5	1.0
C64	Kidney except renal pelvis	Total	3.4	3.2	3.3	3.6	3.9	4.1	4.3	4.6	4.7	4.5	5.2
		Localized	2.0	1.8	1.9	1.8	2.0	2.0	2.0	2.6	2.6	1.9	2.4
		Regional	0.3	0.4	0.3	0.7	0.7	0.9	0.8	0.7	0.6	0.4	0.5
		Distant	0.8	0.9	1.0	0.9	1.1	1.1	1.3	1.0	1.1	1.0	0.8
		Unknown	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.5	1.1	1.6
C66-68	Bladder, ureter, urethra	Total	4.6	3.8	4.1	4.5	5.1	5.7	5.6	5.9	5.9	6.4	6.4
		Localized	2.8	2.4	2.8	2.9	3.6	4.3	4.7	5.0	4.1	3.2	3.0
		Regional	0.5	0.5	0.6	0.7	0.6	0.6	0.5	0.4	0.4	0.5	0.6
		Distant	0.8	0.6	0.5	0.6	0.6	0.5	0.3	0.3	0.4	0.5	0.4
		Unknown	0.5	0.3	0.2	0.3	0.3	0.3	0.1	0.2	1.0	2.2	2.4
C70-72, D42-43	Central nervous system	Total	5.8	5.3	5.6	5.3	7.0	8.0	8.8	9.7	11.4	14.8	16.7
		Non-malignant	2.1	2.2	2.5	2.1	2.9	3.2	3.9	4.9	6.3	9.5	11.4
		Malignant	3.7	3.1	3.1	3.2	4.2	4.8	4.8	4.8	5.1	5.3	5.4
C73	Thyroid gland	Total	2.5	2.3	2.8	3.8	4.7	5.2	5.0	4.9	4.0	4.4	5.1
		Localized	1.2	1.0	1.6	2.2	3.1	3.7	3.6	3.3	2.4	2.2	2.2
		Regional	0.9	0.8	0.9	1.1	1.2	1.2	1.1	1.2	1.2	1.3	1.6
		Distant	0.4	0.4	0.3	0.3	0.4	0.3	0.2	0.3	0.2	0.2	0.2
		Unknown	0.1	0.1	0.0	0.2	0.1	0.1	0.1	0.1	0.2	0.6	1.1

Table 17 Number of cancer deaths in Norway by primary site and sex - 2007

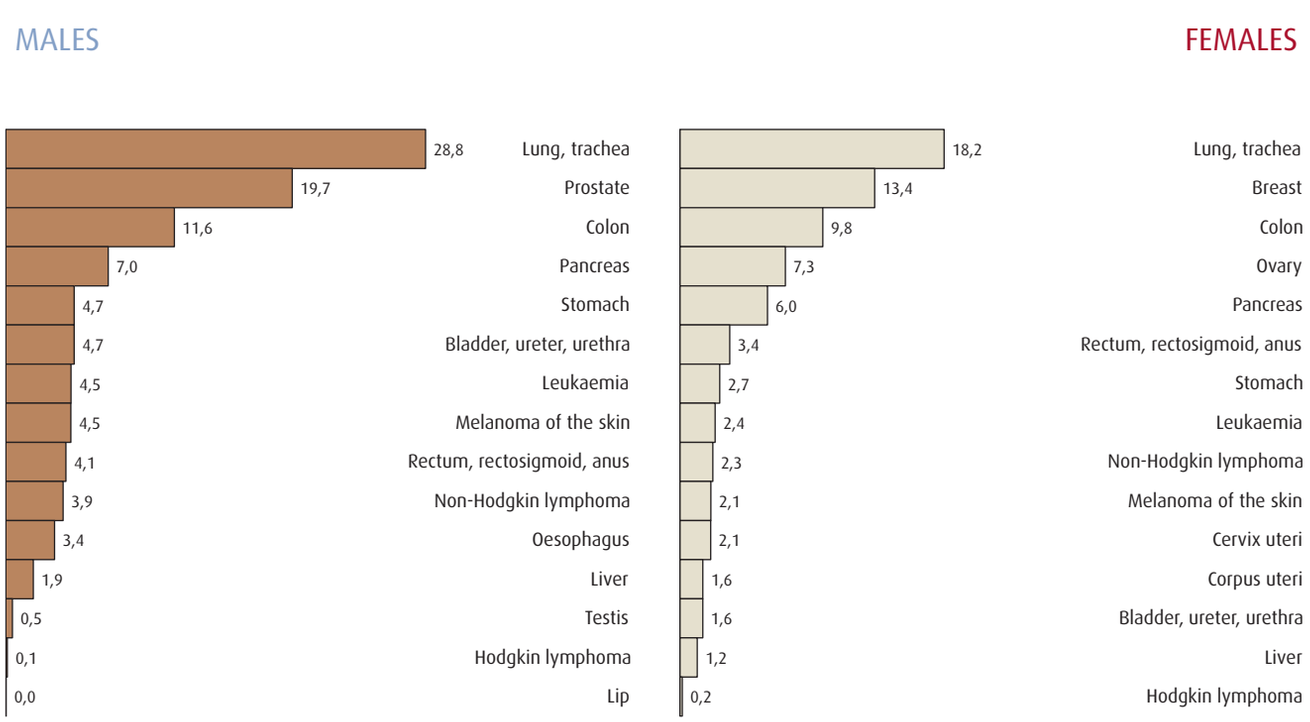
ICD-10	Site	Males	Females	Total
C00-96	**All sites**	**5655**	**5012**	**10667**
C00-14	**Mouth, pharynx**	**93**	**54**	**147**
C00	Lip	1		1
C01-02	Tongue	16	15	31
C03-06	Mouth, other	21	18	39
C07-08	Salivary glands	6	12	18
C09-14	Pharynx	49	9	58
C15-26	**Digestive organs**	**1572**	**1537**	**3109**
C15	Oesophagus	141	39	180
C16	Stomach	219	166	385
C17	Small intestine	29	24	53
C18	Colon	536	610	1146
C19-21	Rectum, rectosigmoid, anus	194	203	397
C22	Liver	78	66	144
C23-24	Gallbladder, bile ducts	40	40	80
C25	Pancreas	309	350	659
C26	Other digestive organs	26	39	65
C30-34, C38	**Respiratory organs**	**1265**	**886**	**2151**
C30-31	Nose, sinuses	3	1	4
C32	Larynx, epiglottis	29	5	34
C33-34	Lung, trachea	1224	876	2100
C38	Mediastinum, pleura (non-mesothelioma)	9	4	13
C40-41	**Bone**	**12**	**17**	**29**
C43	**Melanoma of the skin**	**177**	**98**	**275**
C44	**Skin, non-melanoma**	**22**	**15**	**37**
C45	**Mesothelioma**	**51**	**17**	**68**
C46	**Kaposi's sarcoma**	**1**	**1**	**2**
C47	**Autonomic nervous system**	**1**		**1**
C48-49	**Soft tissues**	**25**	**42**	**67**
C50	**Breast**	**4**	**662**	**666**
C51-58	**Female genital organs**		**642**	**642**
C53	Cervix uteri		84	84
C54	Corpus uteri		85	85
C55	Uterus, other		69	69
C56	Ovary		351	351
C51-52, C57	Other female genital		53	53
C58	Placenta			
C60-63	**Male genital organs**	**1107**		**1107**
C61	Prostate	1090		1090
C62	Testis	14		14
C60, C63	Other male genital	3		3
C64-68	**Urinary organs**	**404**	**217**	**621**
C64	Kidney excl. renal pelvis	158	90	248
C65	Renal pelvis	4	4	8
C66-68	Bladder, ureter, urethra	242	123	365
C69	**Eye**	**2**	**2**	**4**
C70-72, D42-43	**Central nervous system**	**174**	**132**	**306**
C73	**Thyroid gland**	**16**	**21**	**37**
C37, C74-75	**Other endocrine glands**	**13**	**13**	**26**
C39, C76, C80	**Other or unspecified**	**188**	**240**	**428**
C81-96	**Lymphoid and haematopoietic tissue**	**528**	**416**	**944**
C81	Hodgkin lymphoma	6	6	12
C82-85, C96	Non-Hodgkin lymphoma	170	143	313
C88	Malignant immunoproliferative diseases	6	5	11
C90	Multiple myeloma	121	101	222
C91-95	Leukaemia	225	161	386

Mortality

There were 10 667 deaths from cancer in Norway in 2007, of which 5655 were among men and 5012 among women (Table 17). Cancers of the lung, colorectal, prostate and female breast account for about half of the total cancer mortality. As previously, lung mortality cancer ranked first in men in terms of cancer mortality numbers, responsible for 1224 deaths, followed by prostate cancer (1090 deaths) and colorectal cancer (730 deaths). For females, lung cancer mortality (876 deaths) has surpassed those from colorectal cancer (813 deaths), with breast cancer the third most frequent cause of cancer death (662 deaths). Figure 8 shows the distribution of age-standardised mortality rates for selected cancer site. There is at least a 100-fold variation in rates across these cancers, with lung cancer the leading cause of cancer death in both sexes. Given the very poor prognosis associated with pancreatic cancer, the disease ranks among the top 5 causes of cancer death among both men and women.

The *Trends* section in this report examines the mortality time trends in relation to those of incidence and survival for 23 cancers.

Figure 8: Age-standardised (world) mortality rates in Norway 2007 for selected cancers
(Source: Statistics Norway)



Survival

Long-term estimates of survival are becoming increasingly relevant as life expectancy amongst cancer patients increases and cancer care continues to advance (Brenner and Hakulinen, 2002). Given that cancer patients survive longer, there is a need to communicate information not only on prognosis at the time of diagnosis, but for a period of time thereafter, among those who survive their cancer diagnosis (Janssen-Heijnen et al, 2007). Figures 9-A to 9-X overleaf aims to depict these two aspects of cancer survival in Norway for all cancers combined and for 23 specific cancer types. Relative survival estimates are presented by sex and age, 1 to 15 years after diagnosis, with age strata determined cancer-specifically according to relevant biological and/or clinical criteria. Table 18 provides the 5-year relative survival estimates (with 95% confidence intervals) over the last four decades by stage, as well as for cancer site and sex. Table 19 gives the 1-, 5-, 10- and 15-year relative survival estimates for the follow-up period 2006-8 by cancer site and sex.

For some sites, these cumulative survival curves tend to level off a certain number of years after diagnosis, indicative that from this point forward, the cancer patient group has a similar mortality to the group without cancer, or in other words, statistical cure is reached (Lambert, 2007). This concept – involving attributes of survival observed among patients as a group – should be distinguished from clinical cure, as is determined on the basis of a lack of specific symptoms in the individual.

Estimates of 5-year relative survival conditional on being alive 1 to 10 years after diagnosis are included in the sex-specific Figures, and better quantify the prognosis of cancer patients beyond their initial diagnosis. When conditional 5-year relative survival reaches beyond 90-95%, we commonly say that there is little or no excess mortality among the cancer patients, with mortality equivalent to that experienced in the general population, analogous to the notion of cure that may be observed in the long-term relative survival estimates.

The overall profile of the sex- and age-specific survival of all cancer patients 1 to 15 years after diagnosis in Norway is captured in Figure 9-A. The levelling-off of the 5-year relative survival occurs some 8 to 10 years after diagnosis, while the attainment of 5-year conditional relative survival estimates of 90-95% is reached in patients alive 3-5 years after diagnosis. Cure appears to be attained more rapidly in women than men. As was mentioned in the Trends section, the combined-cancer estimates are an aggregate of many different cancer forms with contrasting diagnostic and treatment capacities, and sex-specific survival estimates will be particularly influenced by PSA testing for prostate cancer and mammographic screening for breast cancer, respectively.

The cumulative 5-year relative survival described by cancer site, sex and age, and 5-year conditional relative survival by site and age (Figures 9-B to 9-X) are fairly self-explanatory and highlight the wide variations in patient survival according to these three variables. The 90 percentage point difference in 5-year survival among patients with testicular or pancreatic cancer strikingly illustrates the wide differential in prognosis according to the type of cancer diagnosed. Long-term survival following diagnoses of melanoma and cancers of the oral cavity, bladder, central nervous system and thyroid clearly varies in men and women, and contributing factors may be biological or anatomical, or may relate to sex-specific differences in stage at presentation, subsite or histological distribution, or levels of co-morbidity. The overall cancer survival tends to diminish with increasing age at diagnosis, yet the age-specific differences are rather narrow for the likes of colon cancer relative to, for example, ovarian cancer or leukaemia. For certain cancers including breast and prostate cancer, long-term survival among patients diagnosed aged under 50 is actually lower than for patients diagnosed aged 50-59. This in part represents the diagnosis of more aggressive tumours in the younger age group, and possibly the impact of screening on the older group.

The Figures also illustrate a very positive aspect of cancer survival; cancer patients who are alive for a certain time after diagnosis begin to have very good prospects of surviving their cancer and becoming cured. In fact, for about two-thirds of the cancer types diagnosed in Norway, the 5-year conditional relative survival reaches 90% 2-5 years after diagnosis. This means that in general terms, survivors of these cancers, will, within a few years of diagnosis have mortality rates similar to that of the general population, and would be considered (statistically) cured. The extent to which survivors may be considered cured does however vary; 5-year conditional survival from breast reaches 90% 2 years after diagnosis (Figure 9-L) and slowly increases to 95% 10 years from diagnosis. As is evident from the continual declines in long-term breast cancer survival by age however, the cancer represents a disease for which a proportion may be considered cured long-term, but for which there remains a group of survivors with a persistent excess mortality.

Table 18a Five-year relative survival (%) by primary site, stage and period of diagnosis 1969-2008

MALES

ICD10	Site	Stage	Relative survival (%)							
			1969-73	1974-78	1979-83	1984-88	1989-93	1994-98	1999-03	2004-08
C00-96	All sites	Total	27.9	32.8	36.1	38.9	42.8	48.0	54.2	63.5
C00-14	Mouth, pharynx	Total	59.6	64.4	60.6	58.2	55.4	57.0	57.1	59.4
		Localized	78.7	83.0	81.3	79.8	75.1	78.4	81.2	81.9
		Regional	20.6	25.5	27.7	24.4	28.4	32.8	39.9	47.3
		Distant	3.3	14.6	10.6	0.0	5.1	16.8	14.5	11.6
		Unknown	65.0	36.7	38.7	17.8	60.6	52.1	56.9	67.3
C15	Oesophagus	Total	2.5	3.4	2.7	4.3	5.2	5.1	8.6	8.4
		Localized	4.2	3.6	3.1	5.0	8.2	10.9	19.5	21.3
		Regional	0.4	5.7	3.5	9.7	5.2	5.3	9.6	10.8
		Distant	0.4	0.0	0.3	0.0	0.9	0.0	2.3	0.2
		Unknown	0.0	15.0	4.5	0.0	11.9	0.0	7.2	6.0
C16	Stomach	Total	10.7	14.4	15.9	16.4	17.7	17.1	17.8	20.0
		Localized	33.8	39.7	37.7	38.2	36.1	40.1	56.0	57.8
		Regional	12.2	16.3	19.7	20.1	20.0	19.0	20.7	21.8
		Distant	1.5	1.5	0.9	1.0	0.6	0.5	1.5	1.3
		Unknown	2.2	8.0	2.0	1.7	6.5	5.6	15.4	22.4
C18	Colon	Total	33.7	40.3	44.8	47.3	47.3	51.2	54.0	58.1
		Localized	64.6	69.5	72.8	77.6	77.3	83.8	89.5	86.3
		Regional	37.3	47.0	54.2	56.9	55.9	63.1	68.7	70.6
		Distant	4.5	5.1	5.6	4.0	4.1	4.4	6.1	9.6
		Unknown	6.5	26.9	17.4	11.0	10.4	15.0	49.6	62.5
C19-21	Rectum, rectosigmoid, anus	Total	29.3	36.1	41.6	45.6	46.7	52.7	57.0	61.3
		Localized	50.8	58.6	61.7	66.6	66.9	75.0	85.7	85.6
		Regional	20.2	25.2	38.5	41.9	45.6	53.3	63.4	69.6
		Distant	3.0	4.0	3.8	2.8	3.2	5.4	8.8	12.3
		Unknown	19.5	8.9	12.7	30.8	38.0	28.7	45.9	58.7
C22	Liver	Total	0.0	1.3	1.8	1.2	3.3	3.0	5.5	7.4
		Localized	0.0	3.4	2.1	2.8	4.2	7.3	14.6	17.1
		Regional	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.2
		Distant	0.0	0.0	0.8	0.0	0.0	0.1	0.0	1.2
		Unknown	0.0	0.0	0.0	0.0	4.5	0.6	2.3	3.1
C23-24	Gallbladder, bile ducts	Total	2.2	5.1	6.6	9.8	8.8	8.1	13.2	15.0
		Localized	3.6	9.2	11.7	17.5	14.5	27.4	24.2	34.8
		Regional	4.7	13.6	14.3	14.0	19.3	13.5	24.6	16.8
		Distant	0.6	0.0	0.7	1.5	0.5	1.7	1.2	3.2
		Unknown	0.0	0.0	0.0	5.2	5.6	0.0	9.1	8.5
C25	Pancreas	Total	1.0	1.0	0.9	1.1	1.6	1.7	2.3	4.6
		Localized	4.7	3.8	2.2	1.7	2.7	5.5	7.2	20.1
		Regional	2.7	2.4	3.7	2.9	4.8	6.3	6.0	8.1
		Distant	0.1	0.2	0.1	0.4	0.5	0.4	1.4	1.5
		Unknown	0.0	1.1	3.0	3.0	2.2	1.3	1.6	5.6
C33-34	Lung, trachea	Total	7.7	6.8	7.6	7.7	7.4	8.1	8.2	11.0
		Localized	18.9	16.4	16.9	19.0	15.2	22.3	32.1	44.1
		Regional	10.1	8.8	10.8	8.4	11.5	9.4	9.8	13.1
		Distant	0.6	0.6	0.8	0.5	0.7	0.6	0.6	1.2
		Unknown	2.9	2.3	4.0	2.5	3.1	7.0	6.5	13.3
C43	Melanoma of the skin	Total	54.8	62.7	70.9	70.9	76.9	79.1	78.4	76.8
		Localized	66.4	72.4	79.9	79.6	85.4	85.6	87.9	87.2
		Regional	33.7	30.6	34.4	27.3	37.9	33.1	38.6	44.4
		Distant	9.2	6.6	10.5	0.4	8.0	12.7	10.5	6.5
		Unknown	65.7	55.1	57.1	56.3	41.0	69.2	77.4	77.1
C61	Prostate	Total	48.7	53.4	54.9	56.7	58.0	66.4	77.5	85.2
		Localized	61.2	66.5	70.1	72.4	70.8	77.3	92.0	96.4
		Regional	40.9	37.8	37.5	42.3	57.9	71.6	78.6	81.8
		Distant	17.6	19.2	18.5	19.9	24.4	24.5	23.9	30.3
		Unknown	50.9	41.1	35.7	42.7	52.0	65.0	81.1	86.6
C62	Testis	Total	67.6	70.7	87.1	93.1	95.5	96.2	95.7	97.2
		Localized	85.3	88.0	96.0	98.3	98.5	100.0	98.5	99.2
		Regional	78.5	70.1	94.1	95.7	94.8	98.8	95.4	98.0
		Distant	21.7	27.3	51.4	74.0	80.9	75.3	82.8	84.0
		Unknown	75.9	24.5	87.1	44.7	98.3	86.3	97.0	98.1
C64	Kidney except renal pelvis	Total	33.3	36.2	36.6	41.5	42.5	48.1	53.0	61.3
		Localized	61.3	70.0	66.2	71.9	67.7	73.9	80.0	85.5
		Regional	32.7	43.7	44.7	47.4	50.0	52.7	56.1	52.9
		Distant	4.5	4.1	4.7	4.7	5.3	5.0	7.3	8.7
		Unknown	27.3	21.1	27.9	28.0	28.8	27.9	56.9	70.7
C66-68	Bladder, ureter, urethra	Total	55.1	61.0	66.2	68.2	71.2	70.8	72.3	74.1
		Localized	63.9	70.8	74.9	75.5	77.3	77.7	84.5	85.3
		Regional	14.5	21.0	25.5	25.1	27.3	21.9	31.0	25.5
		Distant	5.9	4.3	1.0	2.8	8.6	3.4	5.2	4.9
		Unknown	45.2	31.5	24.9	42.5	50.1	61.7	68.7	75.4
C70-72, D42-43	Central nervous system	Total	25.3	26.5	34.0	38.5	42.6	49.5	53.2	62.6
		Non-malignant	53.8	47.9	63.7	76.6	72.9	86.9	91.9	94.6
		Malignant	14.5	18.4	23.4	24.6	30.2	27.6	24.6	31.6
C73	Thyroid gland	Total	64.9	78.8	76.2	79.1	79.2	74.3	86.5	82.6
		Localized	96.3	89.5	94.5	90.1	93.1	99.5	98.7	98.0
		Regional	65.9	81.2	80.5	88.4	87.0	79.3	91.3	83.4
		Distant	13.2	31.1	14.3	16.7	16.7	19.7	34.1	28.2
		Unknown	0.0	22.0	6.2	133.7	52.3	22.0	86.5	94.9
C81	Hodgkin lymphoma	Total	44.2	49.4	63.2	66.8	82.9	85.1	89.2	90.0
C82-85, C96	Non-Hodgkin lymphoma	Total	28.4	34.5	43.4	43.8	47.1	51.7	54.7	65.8
C91-95	Leukaemia	Total	12.7	19.8	22.6	27.6	37.7	41.9	50.0	54.9

Table 18b Five-year relative survival (%) by primary site, stage and period of diagnosis 1969-2008

FEMALES

ICD10	Site	Stage	Relative survival (%)							
			1969-73	1974-78	1979-83	1984-88	1989-93	1994-98	1999-03	2004-08
C00-96	All sites	Total	40.7	44.9	48.2	50.1	53.8	56.8	61.2	66.7
C00-14	Mouth, pharynx	Total	55.8	57.6	60.7	56.6	64.0	63.1	60.3	70.2
		Localized	68.8	73.3	78.2	73.4	76.0	80.0	84.1	84.5
		Regional	35.2	39.9	36.3	35.8	44.6	37.8	40.1	55.3
		Distant	19.6	22.7	21.4	11.4	13.8	9.6	5.4	24.7
		Unknown	85.9	45.7	46.4	42.2	26.4	56.0	54.3	79.0
C15	Oesophagus	Total	3.5	5.7	8.7	8.4	6.4	9.8	7.7	12.4
		Localized	4.2	4.8	16.6	7.0	12.2	11.9	24.8	23.8
		Regional	4.1	11.8	7.9	11.4	4.0	11.7	2.7	9.6
		Distant	0.0	0.5	0.0	3.4	0.0	0.0	0.0	8.7
		Unknown	0.0	0.0	0.0	18.0	0.0	16.4	5.9	9.1
C16	Stomach	Total	9.5	12.7	16.2	19.2	21.7	20.5	22.3	21.9
		Localized	29.9	33.7	42.3	39.8	39.2	45.4	67.0	57.6
		Regional	13.5	17.7	17.8	19.8	25.9	24.1	28.6	25.5
		Distant	1.0	2.3	0.8	1.0	1.4	0.7	2.2	3.3
		Unknown	2.0	5.8	4.0	7.2	11.9	13.2	12.6	20.8
C18	Colon	Total	37.6	39.4	45.3	47.8	52.0	55.3	56.0	61.7
		Localized	64.1	71.0	73.6	77.8	81.0	88.2	87.8	91.0
		Regional	43.1	42.8	56.8	56.9	60.0	65.3	68.5	73.1
		Distant	4.2	4.6	4.0	4.0	4.5	6.4	8.1	10.7
		Unknown	17.8	21.0	18.8	9.3	20.6	24.3	49.0	65.7
C19-21	Rectum, rectosigmoid, anus	Total	33.3	43.1	45.8	48.5	53.6	57.5	60.6	66.4
		Localized	55.6	68.4	68.6	71.2	72.8	78.2	90.0	90.9
		Regional	21.1	30.9	39.1	44.0	51.9	57.8	64.5	71.9
		Distant	3.3	4.1	6.3	4.1	5.9	4.5	7.5	12.5
		Unknown	31.1	21.0	15.9	18.4	26.9	47.3	49.0	68.9
C22	Liver	Total	2.5	2.0	1.7	2.2	6.3	6.7	8.5	10.9
		Localized	6.5	1.9	6.3	4.2	11.4	11.2	21.0	25.3
		Regional	0.0	0.0	0.0	0.0	5.7	12.9	5.5	3.8
		Distant	0.5	0.0	0.0	0.0	0.3	2.2	0.0	0.0
		Unknown	0.0	0.0	0.0	0.0	2.4	4.0	6.6	9.5
C23-24	Gallbladder, bile ducts	Total	3.6	6.2	7.6	8.7	7.4	7.6	11.7	10.8
		Localized	14.8	20.7	23.7	17.1	18.8	26.0	30.5	20.1
		Regional	9.2	17.0	5.5	15.8	13.7	11.5	24.9	21.6
		Distant	0.4	0.0	0.0	0.0	0.0	0.0	1.2	0.0
		Unknown	0.0	0.0	22.0	4.1	2.7	1.7	11.2	5.3
C25	Pancreas	Total	1.2	1.0	1.0	1.6	1.9	2.3	2.3	3.1
		Localized	4.2	5.3	2.6	2.1	5.2	10.0	10.0	11.6
		Regional	4.2	1.2	3.7	5.9	5.8	5.9	3.3	4.6
		Distant	0.2	0.2	0.3	0.5	0.2	0.7	0.5	1.1
		Unknown	0.0	0.0	0.0	1.9	1.6	1.5	3.6	3.9
C33-34	Lung, trachea	Total	11.5	9.4	11.2	6.6	10.3	10.2	13.3	14.3
		Localized	28.1	27.2	27.3	20.9	22.2	30.6	50.2	52.2
		Regional	12.0	15.6	15.0	4.9	14.4	11.3	13.7	15.9
		Distant	1.8	0.7	1.4	0.2	1.6	0.9	2.4	1.8
		Unknown	15.3	3.4	11.5	8.1	5.1	4.5	14.3	16.9
C43	Melanoma of the skin	Total	78.0	79.5	84.0	86.6	88.6	89.4	89.1	88.8
		Localized	87.2	85.9	89.5	91.1	92.7	93.6	95.1	93.6
		Regional	37.5	35.4	40.4	51.0	35.5	54.6	54.6	55.1
		Distant	25.4	18.0	12.5	6.4	12.1	18.2	15.5	21.9
		Unknown	76.3	50.6	71.5	67.0	67.0	81.1	88.9	90.3
C50	Breast	Total	65.2	68.4	72.0	73.7	75.3	78.4	84.4	87.8
		I	84.7	85.0	86.4	86.8	88.1	89.9	93.3	95.2
		II	55.2	58.7	62.1	67.2	73.2	76.2	81.8	86.8
		III	38.9	47.6	51.6	48.7	54.5	59.2	65.0	68.4
		IV	11.8	14.6	14.0	14.5	17.9	17.7	17.3	17.8
C53	Cervix uteri	Total	68.1	70.9	69.6	67.8	67.6	72.0	73.5	77.5
		I	86.4	89.6	87.2	86.3	83.9	88.1	92.6	93.9
		II	60.9	65.3	62.4	58.5	58.4	59.0	61.0	71.4
		III	33.4	28.6	34.1	30.3	27.2	33.1	37.2	47.3
		IV	6.1	11.0	6.8	10.0	20.8	18.7	8.7	21.4
C54	Corpus uteri	Total	71.7	76.8	77.1	75.7	76.9	79.7	82.9	83.2
		Localized	82.2	83.9	87.1	86.3	86.6	88.5	94.5	92.1
		Regional	31.6	57.4	60.6	59.2	64.2	75.8	73.6	76.5
		Distant	14.8	25.2	18.4	24.2	28.6	37.3	34.7	43.4
		Unknown	56.8	43.1	42.1	27.6	27.4	36.5	73.3	84.1
C56	Ovary	Total	37.2	39.0	39.0	37.0	38.2	40.9	45.9	44.2
		Localized	72.1	72.3	79.9	82.3	81.0	87.2	90.7	91.1
		Regional	42.2	43.4	44.5	51.0	47.8	46.3	57.7	75.0
		Distant	13.8	15.7	19.7	16.6	18.4	22.5	29.4	28.1
		Unknown	22.8	24.8	49.7	24.6	17.8	24.8	58.7	52.4
C64	Kidney except renal pelvis	Total	40.7	40.2	41.4	44.3	51.1	50.4	52.8	66.9
		Localized	64.9	67.1	69.0	73.1	76.6	79.3	84.4	86.9
		Regional	54.6	38.9	50.8	48.2	48.4	51.7	44.3	46.3
		Distant	3.5	4.8	2.6	7.5	7.0	3.7	8.3	12.6
		Unknown	14.3	0.0	0.0	9.9	25.0	20.8	55.8	71.2
C66-68	Bladder, ureter, urethra	Total	44.3	48.8	53.6	60.1	62.3	59.7	62.5	66.2
		Localized	61.4	63.4	67.5	69.7	72.0	71.0	83.8	80.9
		Regional	13.3	15.9	13.9	15.1	13.9	25.7	27.1	19.8
		Distant	4.0	5.3	3.6	4.8	2.8	3.9	4.2	3.0
		Unknown	43.0	14.6	19.4	25.0	33.3	44.4	55.7	68.5
C70-72, D42-43	Central nervous system	Total	33.1	37.5	43.9	50.7	59.7	61.7	69.3	77.5
		Non-malignant	58.7	72.1	77.1	84.9	84.2	88.8	91.9	95.5
		Malignant	16.0	16.5	20.6	24.1	34.8	29.8	29.2	35.3
C73	Thyroid gland	Total	74.8	82.0	84.8	88.0	89.5	89.1	91.2	92.5
		Localized	86.0	95.3	94.4	95.9	97.3	98.7	101.6	101.0
		Regional	75.0	80.3	81.2	85.4	85.9	85.4	87.9	89.3
		Distant	21.1	10.1	16.0	7.3	17.2	34.8	33.5	39.0
		Unknown	83.6	66.0	88.1	78.7	95.9	46.2	89.3	90.4
C81	Hodgkin lymphoma	Total	55.3	44.4	66.8	69.9	75.3	85.6	89.3	84.7
C82-85, C96	Non-Hodgkin lymphoma	Total	31.2	41.7	45.3	49.2	54.0	54.2	59.4	65.2
C91-95	Leukaemia	Total	12.3	19.1	23.8	28.5	34.4	46.6	48.5	55.2

There is also a spectrum of cancers associated with particularly poor survival on diagnosis, and for which cure is not indicated, including cancers of the oesophagus, liver and pancreas.

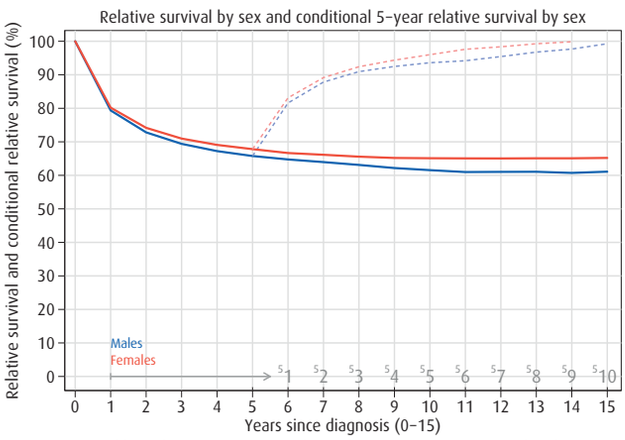
Table 18 describes the stage-specific relative survival, 5 years after diagnosis for selected cancers in consecutive 5-year periods of follow-up 1969 to 2008. While the stage-specific count of cases by 5-year period of diagnosis in Tables 15a and b are not equivalent to the size of patient groups used in the survival calculations, the underlying numbers do provide a reasonable indication of the absolute number of patients involved in the survival analyses at different time periods and their relative distribution. Caution is generally required in interpreting cancer-specific incidence and survival according to stage, particularly given the time-varying proportion of staging recorded as unknown. A visual description of survival trends in colon, breast and prostate cancer by stage was given in the Special Issue included in *Cancer in Norway 2007*.

Table 19: 1-, 5-, 10-, and 15-year relative survival by cancer site and sex 2006-8

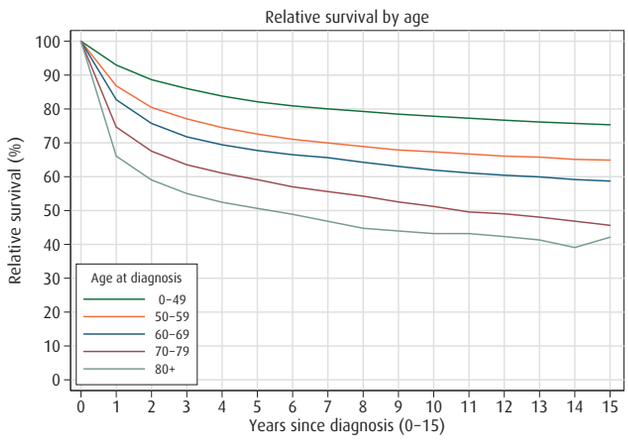
Cancer site	Sex	1-year	5-year	10-year	15-year
Mouth, pharynx	Males	81.9 (79.3, 84.3)	60.7 (57.0, 64.2)	51.0 (46.7, 55.2)	44.9 (40.0, 50.1)
	Females	85.6 (82.5, 88.3)	72.0 (67.2, 76.4)	64.8 (58.3, 71.2)	58.8 (50.7, 67.0)
Oesophagus	Males	37.8 (33.8, 41.8)	8.9 (6.4, 11.8)	7.2 (4.7, 10.6)	5.5 (2.7, 10.1)
	Females	36.0 (29.7, 42.3)	12.9 (8.4, 18.5)	10.3 (5.5, 17.1)	11.5 (5.3, 21.4)
Stomach	Males	46.6 (43.7, 49.5)	23.4 (20.6, 26.3)	20.9 (17.8, 24.4)	19.0 (15.3, 23.1)
	Females	44.2 (40.9, 47.5)	23.4 (20.3, 26.7)	20.9 (17.4, 24.7)	16.7 (12.9, 21.1)
Colon	Males	77.2 (75.8, 78.5)	59.5 (57.5, 61.4)	55.2 (52.6, 57.9)	56.5 (52.8, 60.3)
	Females	78.5 (77.2, 79.7)	62.6 (60.8, 64.3)	57.5 (55.2, 59.9)	55.5 (52.4, 58.6)
Rectum etc	Males	84.1 (82.5, 85.6)	61.8 (59.4, 64.2)	56.9 (53.7, 60.0)	55.5 (51.2, 60.0)
	Females	83.6 (81.8, 85.2)	66.3 (63.7, 68.8)	61.1 (57.8, 64.4)	59.1 (54.9, 63.4)
Liver	Males	27.3 (22.9, 31.8)	9.7 (6.0, 14.4)	9.8 (5.5, 15.8)	13.4 (7.5, 21.8)
	Females	32.9 (26.9, 39.1)	10.4 (6.5, 15.5)	11.6 (6.9, 17.9)	15.4 (9.2, 23.8)
Gallbladder	Males	44.1 (37.7, 50.3)	14.9 (10.2, 20.6)	16.1 (10.2, 23.6)	20.3 (12.0, 31.3)
	Females	37.6 (32.2, 43.1)	11.6 (7.7, 16.5)	11.0 (6.8, 16.7)	10.9 (6.1, 17.7)
Pancreas	Males	18.3 (16.4, 20.3)	5.7 (4.4, 7.3)	4.5 (2.8, 6.7)	3.0 (1.2, 6.3)
	Females	18.0 (16.0, 20.0)	3.1 (2.2, 4.3)	2.9 (1.9, 4.3)	1.9 (1.0, 3.5)
Lung, trachea	Males	35.2 (34.0, 36.4)	11.7 (10.7, 12.7)	8.6 (7.6, 9.7)	7.7 (6.5, 9.0)
	Females	40.4 (38.9, 41.9)	14.9 (13.7, 16.2)	11.4 (10.1, 12.8)	8.4 (7.0, 10.0)
Melanoma of the skin	Males	92.6 (91.2, 93.8)	77.8 (75.4, 80.1)	73.7 (70.7, 76.7)	72.6 (68.9, 76.2)
	Females	96.9 (95.9, 97.7)	90.7 (88.8, 92.4)	88.0 (85.5, 90.4)	86.8 (83.8, 89.8)
Breast	Females	97.5 (97.1, 97.8)	88.3 (87.5, 89.2)	81.2 (80.0, 82.4)	77.0 (75.3, 78.6)
Uterine cervix	Females	89.8 (87.9, 91.5)	77.3 (74.5, 79.9)	75.1 (71.9, 78.1)	73.8 (70.2, 77.2)
Uterine corpus	Females	92.6 (91.4, 93.7)	83.5 (81.5, 85.4)	81.8 (79.1, 84.4)	80.3 (76.7, 83.8)
Ovary	Females	75.8 (73.7, 77.8)	43.9 (41.4, 46.4)	37.6 (34.9, 40.3)	36.8 (33.7, 39.9)
Prostate	Males	97.8 (97.4, 98.2)	87.1 (86.1, 88.1)	76.0 (74.3, 77.8)	63.7 (60.5, 66.9)
Testis	Males	98.4 (97.5, 99.1)	97.2 (95.8, 98.2)	96.5 (94.8, 97.9)	95.9 (93.7, 97.7)
Kidney	Males	80.1 (77.7, 82.2)	62.8 (59.6, 65.9)	56.1 (51.7, 60.4)	51.3 (45.6, 57.3)
	Females	82.4 (79.6, 84.9)	69.6 (65.5, 73.6)	61.7 (56.1, 67.2)	55.3 (48.1, 62.7)
Bladder etc	Males	88.0 (86.7, 89.2)	74.9 (72.7, 77.0)	69.3 (66.2, 72.3)	67.6 (63.4, 71.8)
	Females	79.3 (76.8, 81.6)	65.6 (62.1, 69.0)	65.8 (61.2, 70.4)	61.7 (55.7, 68.0)
CNS	Males	77.0 (74.8, 78.9)	63.2 (60.5, 65.8)	60.8 (57.5, 64.0)	58.9 (54.8, 62.9)
	Females	85.5 (83.9, 87.0)	77.0 (74.8, 79.1)	76.7 (73.9, 79.4)	75.4 (71.6, 79.1)
Thyroid gland	Males	87.3 (82.6, 91.0)	79.0 (72.4, 84.7)	76.4 (68.0, 83.8)	78.7 (68.2, 88.2)
	Females	93.1 (90.6, 95.0)	94.6 (91.5, 97.1)	92.0 (87.6, 95.9)	93.2 (87.7, 98.2)
Hodgkin Lymphoma	Males	93.7 (89.9, 96.2)	89.4 (84.4, 93.2)	87.8 (81.9, 92.6)	86.5 (79.5, 92.3)
	Females	91.2 (86.2, 94.5)	86.2 (79.7, 91.3)	86.1 (78.7, 92.2)	85.2 (76.4, 92.4)
Non-Hodgkin Lymphoma	Males	77.6 (75.5, 79.5)	67.5 (64.6, 70.3)	61.7 (57.9, 65.5)	56.3 (51.4, 61.2)
	Females	80.8 (78.6, 82.8)	67.7 (64.5, 70.6)	60.7 (56.7, 64.6)	58.3 (53.2, 63.5)
Leukemia	Males	71.6 (68.9, 74.2)	55.9 (52.4, 59.3)	45.9 (41.8, 50.1)	46.3 (41.2, 51.6)
	Females	71.5 (68.3, 74.4)	56.3 (52.4, 60.2)	48.4 (43.7, 53.1)	44.7 (39.1, 50.5)

Relative survival (RS) up to 15 years after diagnosis by sex and age (2006–8)

Figure 9-A: All sites (ICD10 C00–96)

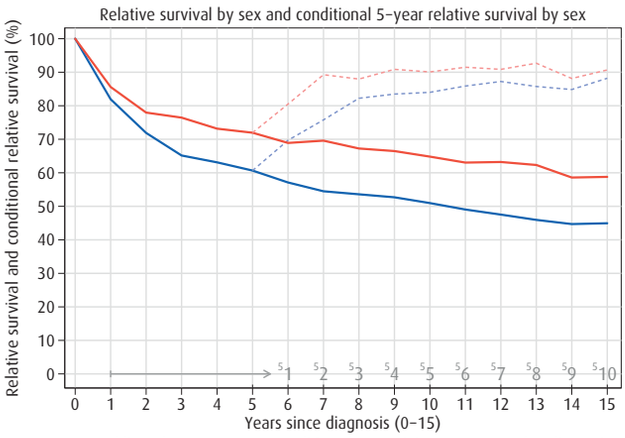


Dotted lines denote 5-year RS conditioned on surviving 1–10 years after diagnosis

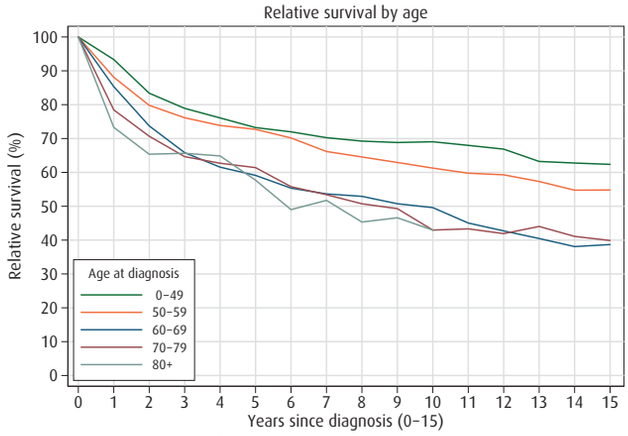


Estimates are plotted if 20 or more patients are alive at start of follow-up year

Figure 9-B: Mouth, pharynx (ICD-10 C00–14)

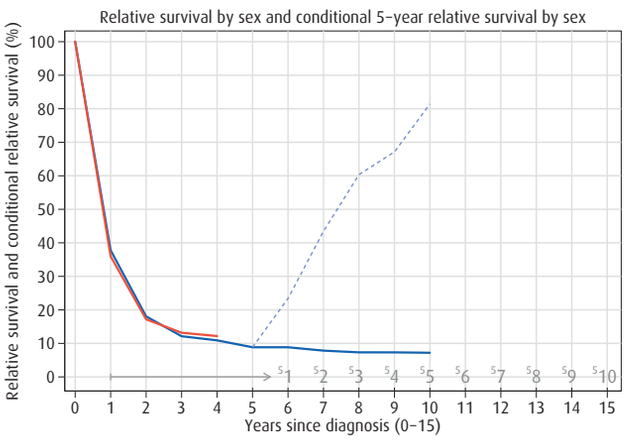


Dotted lines denote 5-year RS conditioned on surviving 1–10 years after diagnosis

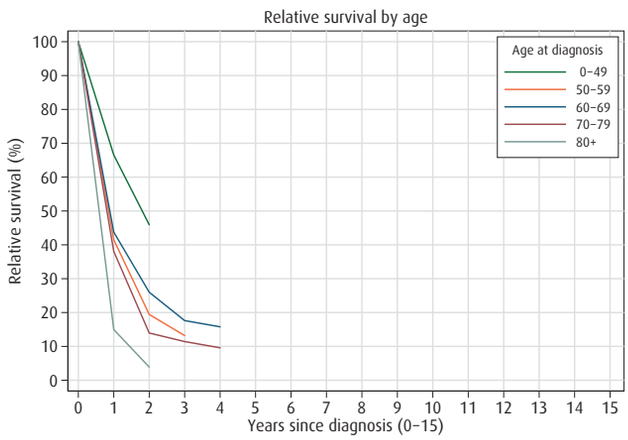


Estimates are plotted if 20 or more patients are alive at start of the follow-up year

Figure 9-C: Oesophagus (ICD-10 C15)



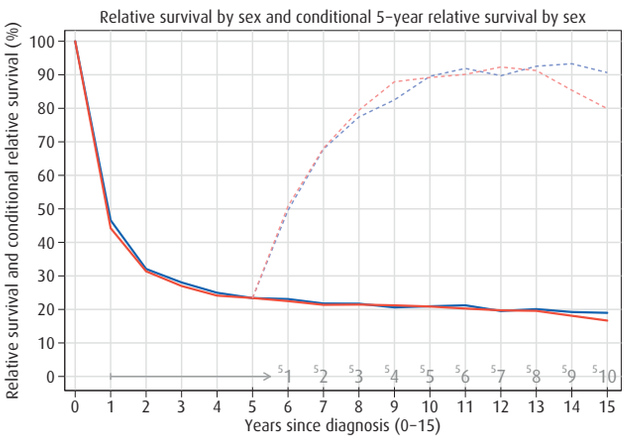
Dotted lines denote 5-year RS conditioned on surviving 1–10 years after diagnosis



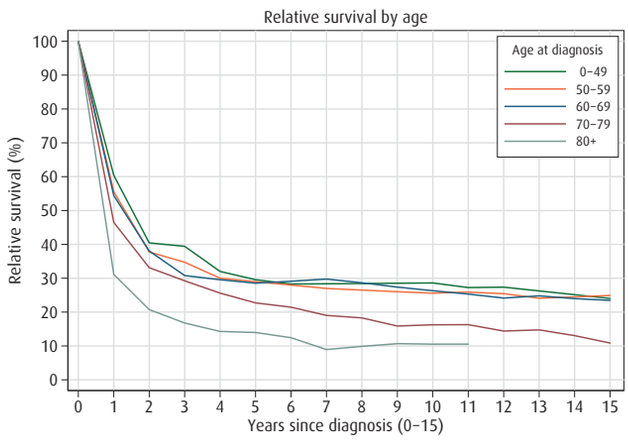
Estimates are plotted if 20 or more patients are alive at start of the follow-up year

Relative survival (RS) up to 15 years after diagnosis by sex and age (2006–8)

Figure 9-D: Stomach (ICD-10 C16)

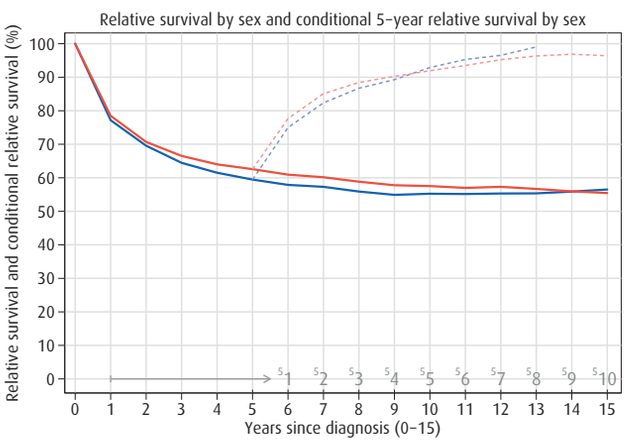


Dotted lines denote 5-year RS conditioned on surviving 1–10 years after diagnosis

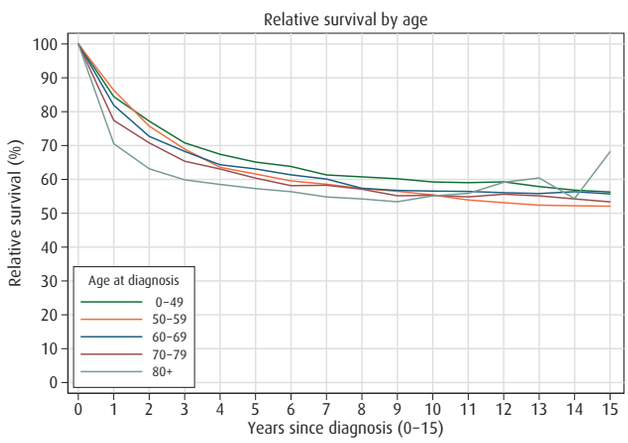


Estimates are plotted if 20 or more patients are alive at start of the follow-up year

Figure 9-E: Colon (ICD-10 C18)

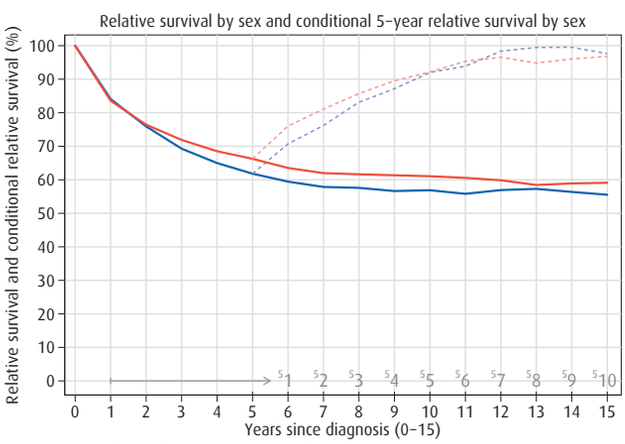


Dotted lines denote 5-year RS conditioned on surviving 1–10 years after diagnosis

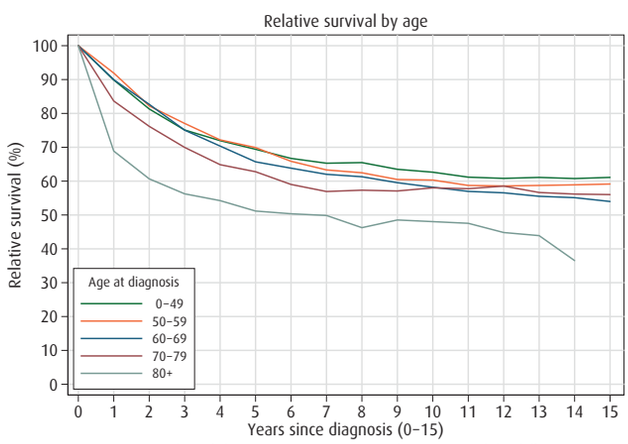


Estimates are plotted if 20 or more patients are alive at start of the follow-up year

Figure 9-F: Rectum, rectosigmoid, anus (ICD-10 C19–21)



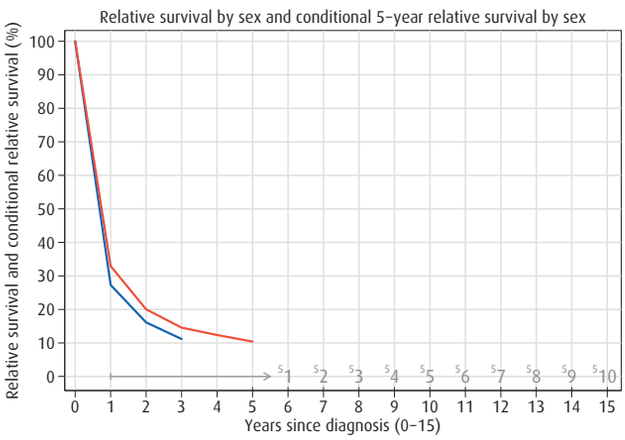
Dotted lines denote 5-year RS conditioned on surviving 1–10 years after diagnosis



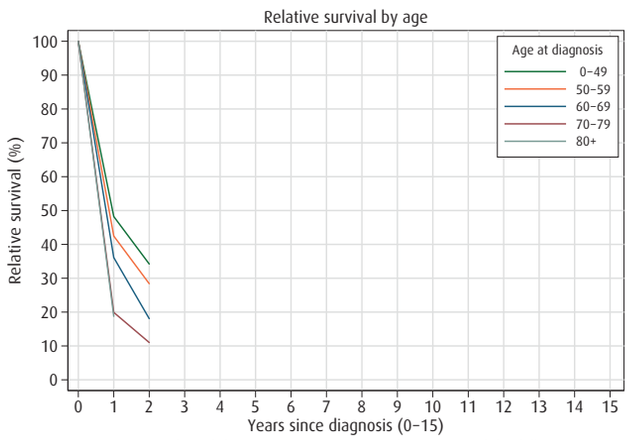
Estimates are plotted if 20 or more patients are alive at start of the follow-up year

Relative survival (RS) up to 15 years after diagnosis by sex and age (2006–8)

Figure 9-G: Liver (ICD-10 C22)

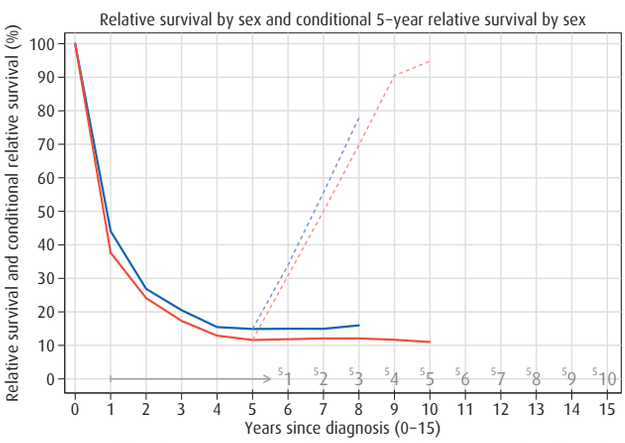


Dotted lines denote 5-year RS conditioned on surviving 1–10 years after diagnosis

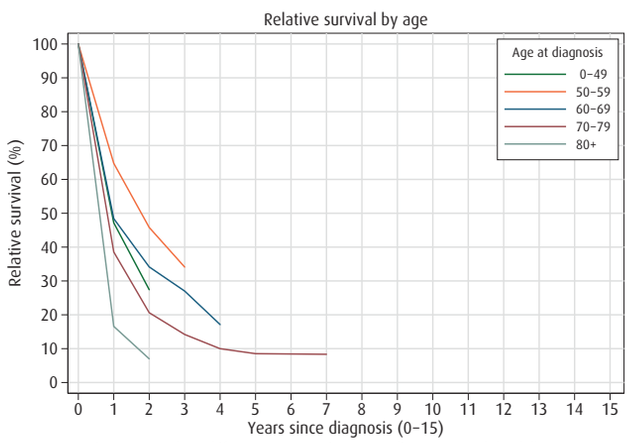


Estimates are plotted if 20 or more patients are alive at start of the follow-up year

Figure 9-H: Gallbladder, bile ducts (ICD-10 C23–24)

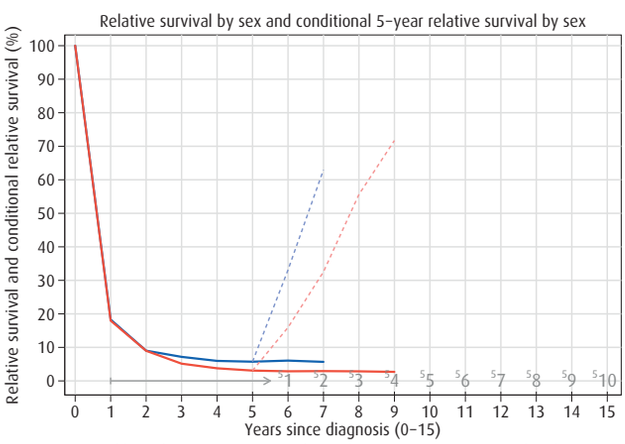


Dotted lines denote 5-year RS conditioned on surviving 1–10 years after diagnosis

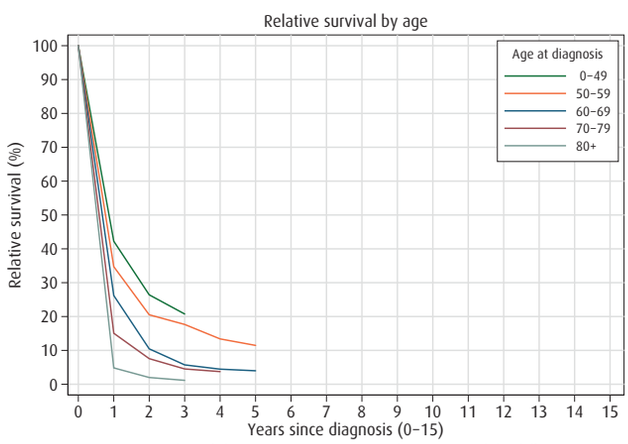


Estimates are plotted if 20 or more patients are alive at start of the follow-up year

Figure 9-I: Pancreas (ICD-10 C25)



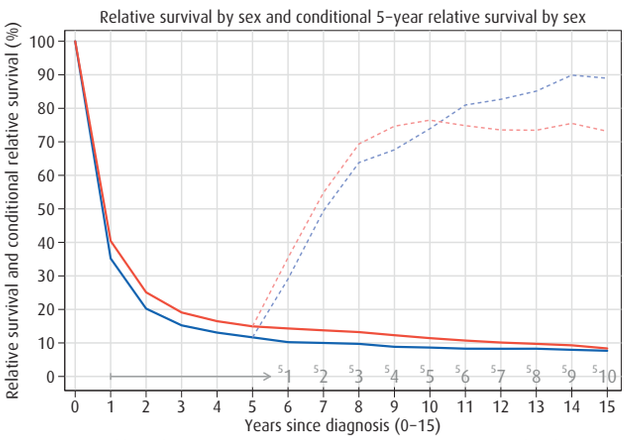
Dotted lines denote 5-year RS conditioned on surviving 1–10 years after diagnosis



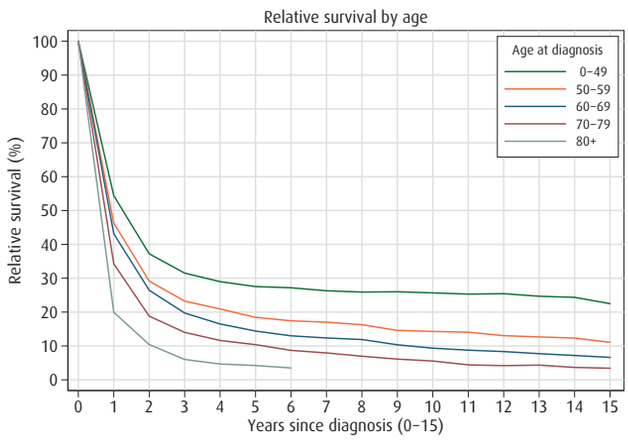
Estimates are plotted if 20 or more patients are alive at start of the follow-up year

Relative survival (RS) up to 15 years after diagnosis by sex and age (2006–8)

Figure 9-J: Lung, tranchea (ICD-10 C33–34)

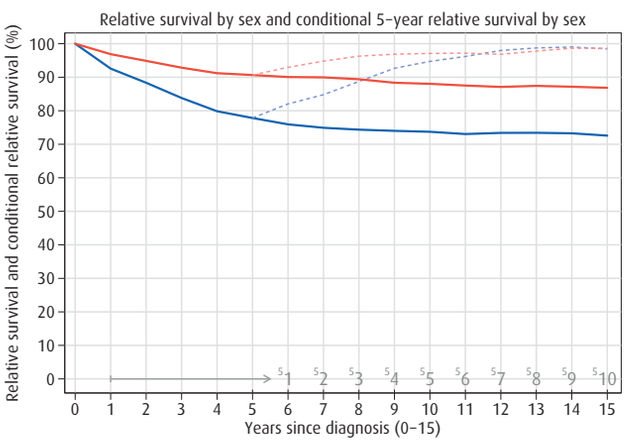


Dotted lines denote 5-year RS conditioned on surviving 1–10 years after diagnosis

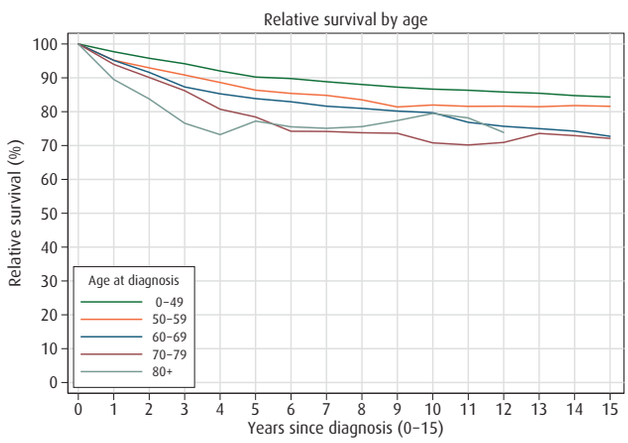


Estimates are plotted if 20 or more patients are alive at start of the follow-up year

Figure 9-K: Melanoma of the skin (ICD-10 C43)

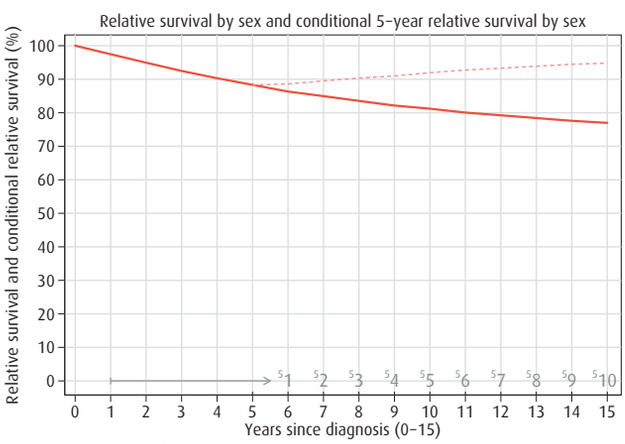


Dotted lines denote 5-year RS conditioned on surviving 1–10 years after diagnosis

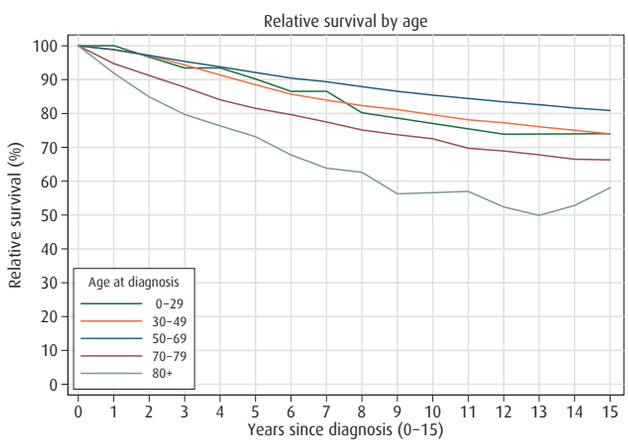


Estimates are plotted if 20 or more patients are alive at start of the follow-up year

Figure 9-L: Breast, females (ICD-10 C50)



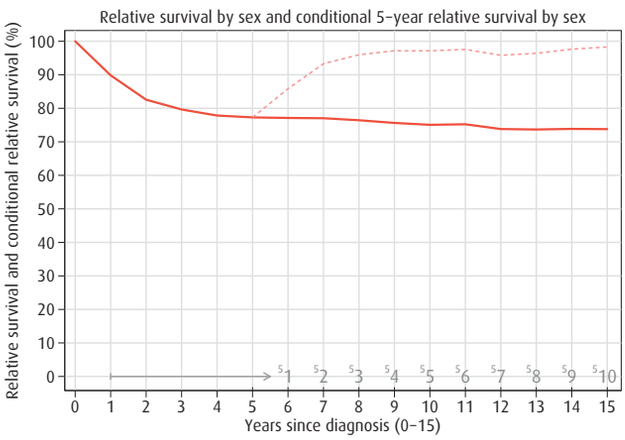
Dotted lines denote 5-year RS conditioned on surviving 1–10 years after diagnosis



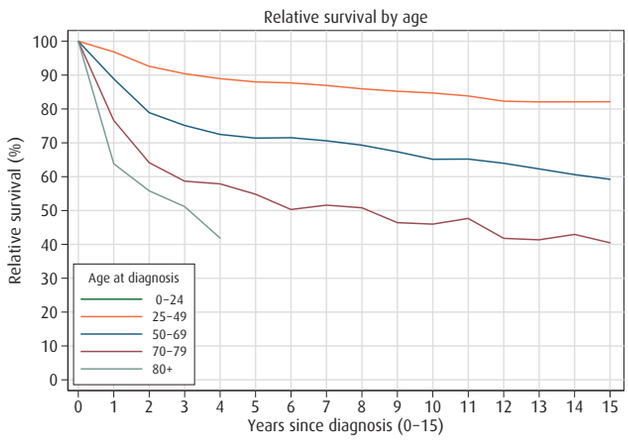
Estimates are plotted if 20 or more patients are alive at start of the follow-up year

Relative survival (RS) up to 15 years after diagnosis by sex and age (2006–8)

Figure 9-M: Cervix uteri (ICD-10 C53)

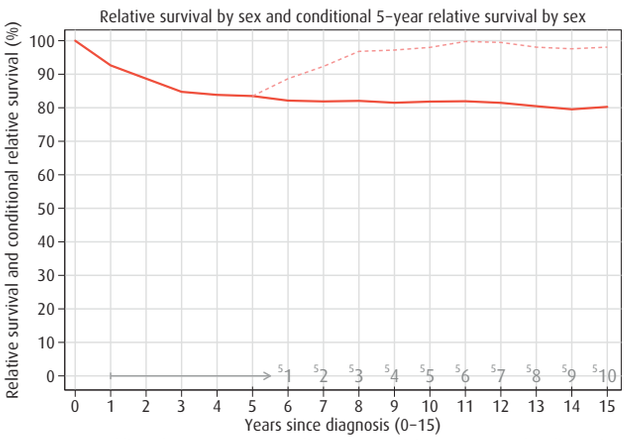


Dotted lines denote 5-year RS conditioned on surviving 1–10 years after diagnosis

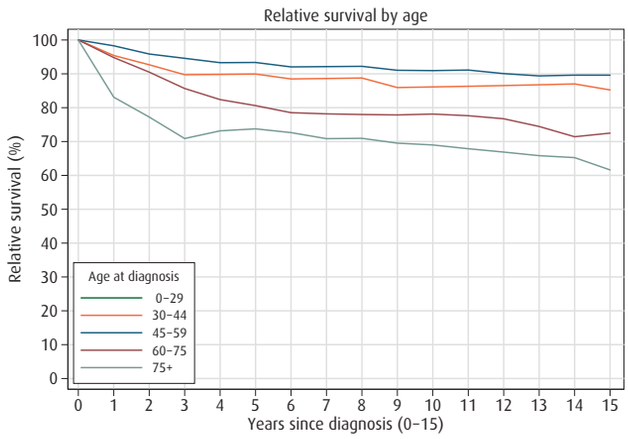


Estimates are plotted if 20 or more patients are alive at start of the follow-up year

Figure 9-N: Corpus uteri (ICD-10 C54)

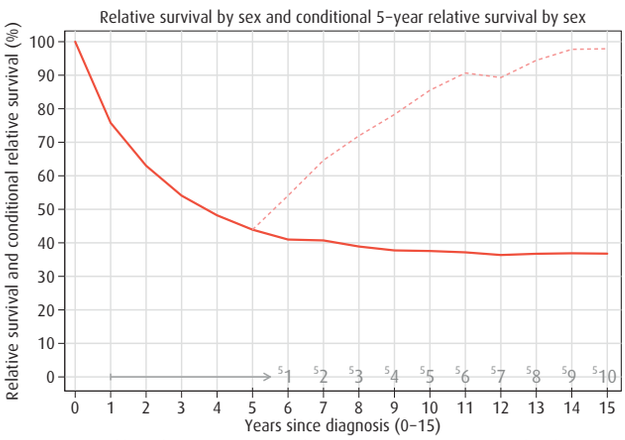


Dotted lines denote 5-year RS conditioned on surviving 1–10 years after diagnosis

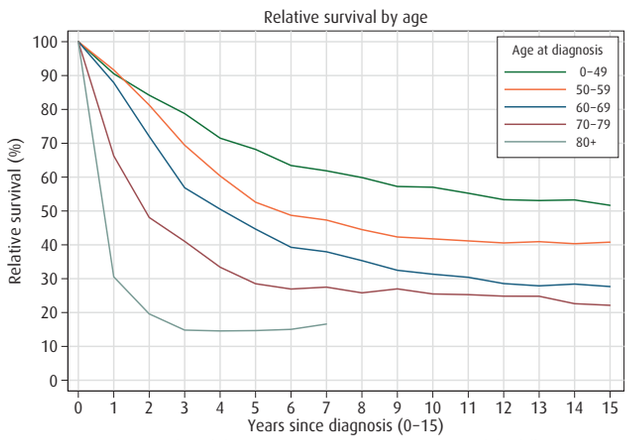


Estimates are plotted if 20 or more patients are alive at start of the follow-up year

Figure 9-O: Ovary (ICD-10 C56)



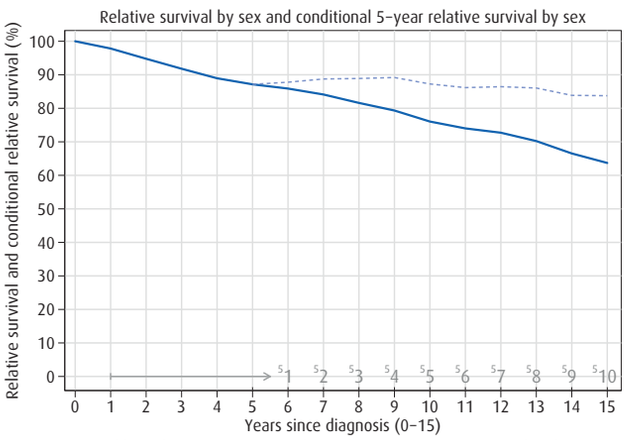
Dotted lines denote 5-year RS conditioned on surviving 1–10 years after diagnosis



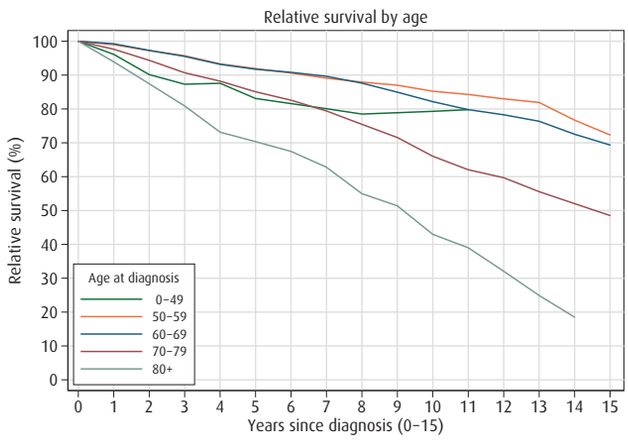
Estimates are plotted if 20 or more patients are alive at start of the follow-up year

Relative survival (RS) up to 15 years after diagnosis by sex and age (2006–8)

Figure 9-P: Prostate (ICD-10 C61)

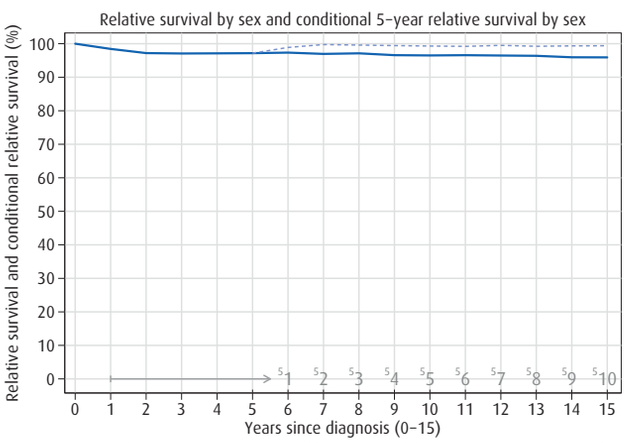


Dotted lines denote 5-year RS conditioned on surviving 1–10 years after diagnosis

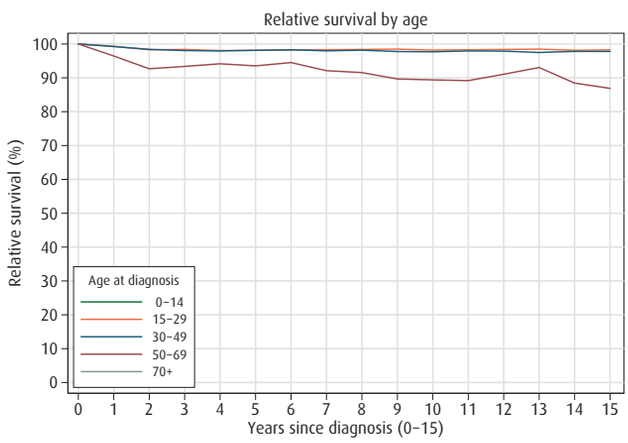


Estimates are plotted if 20 or more patients are alive at start of the follow-up year

Figure 9-Q: Testis (ICD-10 C62)

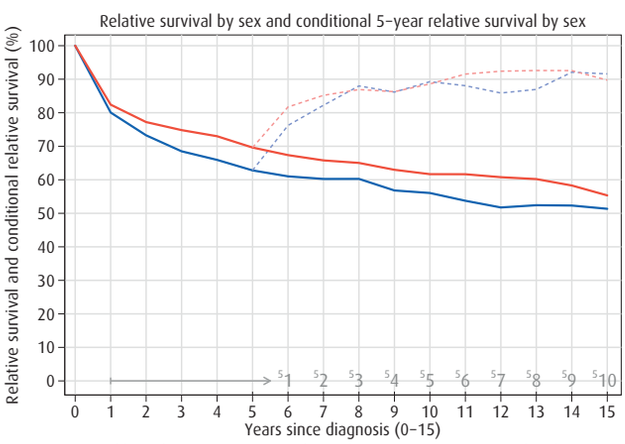


Dotted lines denote 5-year RS conditioned on surviving 1–10 years after diagnosis

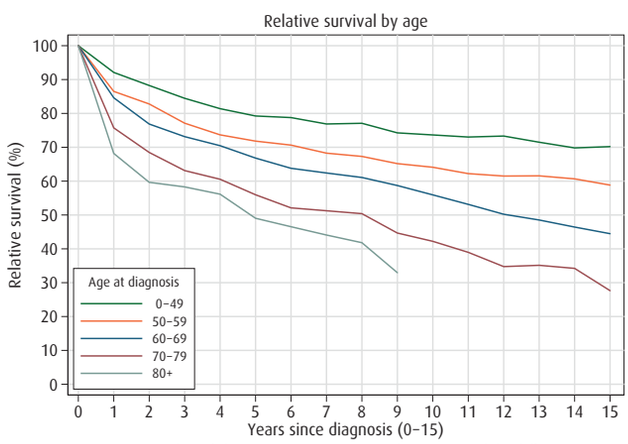


Estimates are plotted if 20 or more patients are alive at start of the follow-up year

Figure 9-R: Kidney excluding renal pelvis (ICD-10 C64)



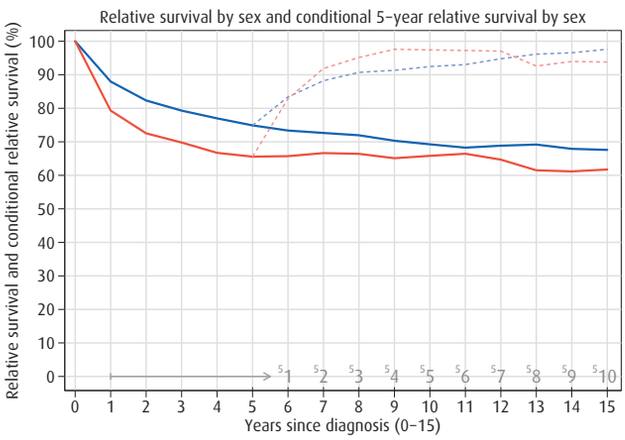
Dotted lines denote 5-year RS conditioned on surviving 1–10 years after diagnosis



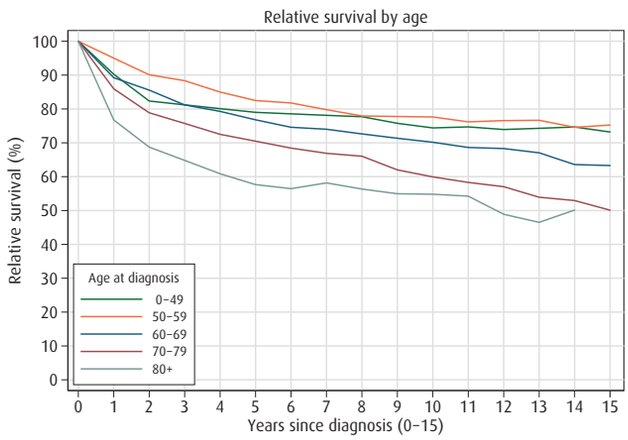
Estimates are plotted if 20 or more patients are alive at start of the follow-up year

Relative survival (RS) up to 15 years after diagnosis by sex and age (2006–8)

Figure 9-S: Bladder, ureter, urethra (ICD-10 C66–68)

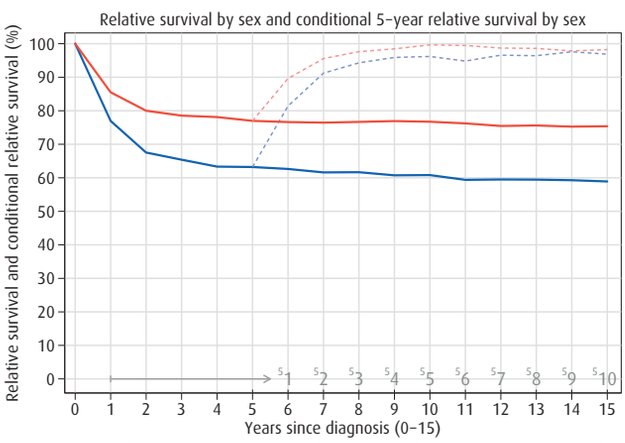


Dotted lines denote 5-year RS conditioned on surviving 1–10 years after diagnosis

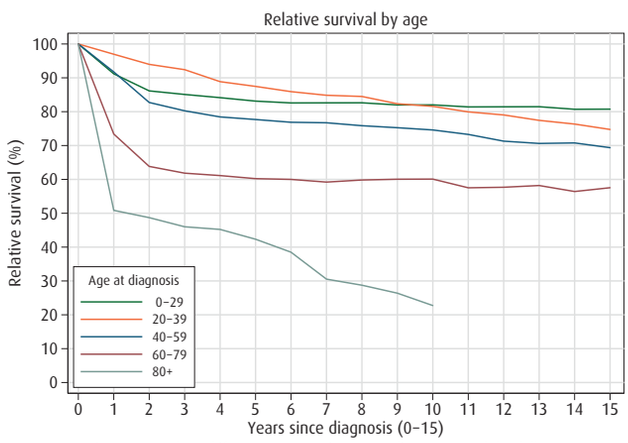


Estimates are plotted if 20 or more patients are alive at start of the follow-up year

Figure 9-T: Central nervous system (ICD-10 C70–72, D42–43)

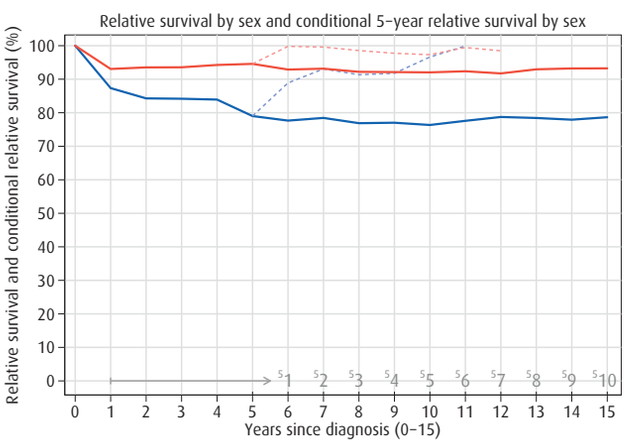


Dotted lines denote 5-year RS conditioned on surviving 1–10 years after diagnosis

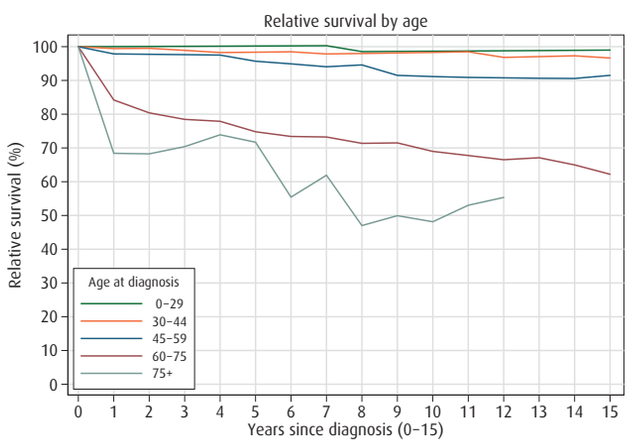


Estimates are plotted if 20 or more patients are alive at start of the follow-up year

Figure 9-U: Thyroid gland (ICD-10 C73)



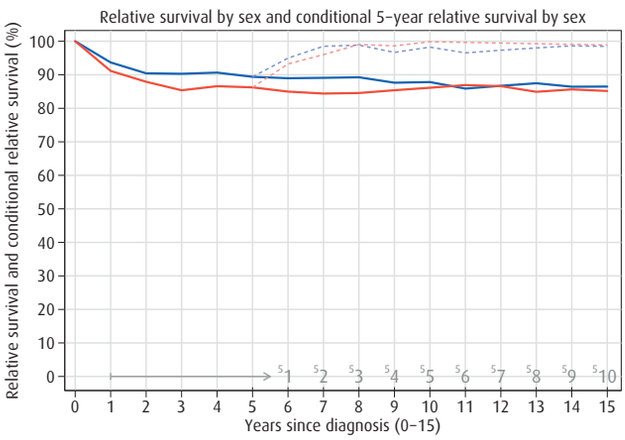
Dotted lines denote 5-year RS conditioned on surviving 1–10 years after diagnosis



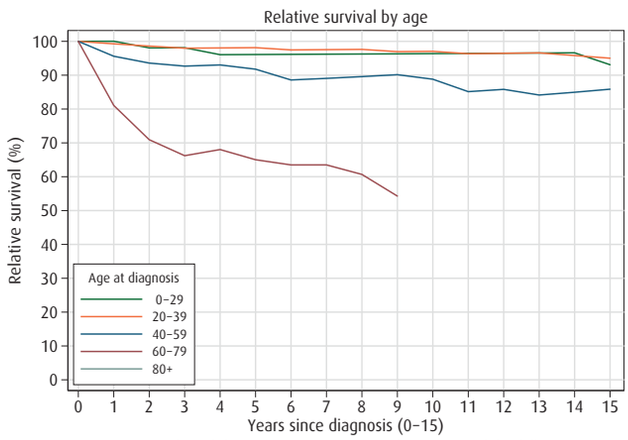
Estimates are plotted if 20 or more patients are alive at start of the follow-up year

Relative survival (RS) up to 15 years after diagnosis by sex and age (2006–8)

Figure 9-V: Hodgkin lymphoma (ICD-10 C81)

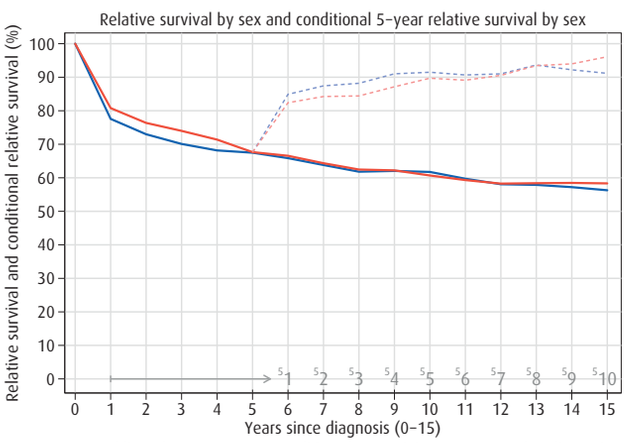


Dotted lines denote 5-year RS conditioned on surviving 1–10 years after diagnosis

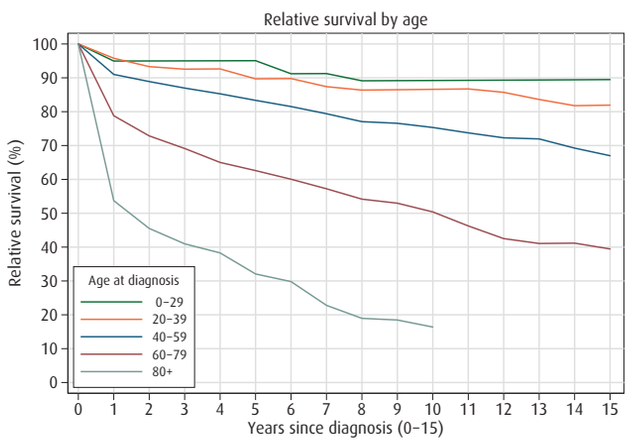


Estimates are plotted if 20 or more patients are alive at start of the follow-up year

Figure 9-W: Non-Hodgkin lymphoma (ICD-10 C82–85, C96)

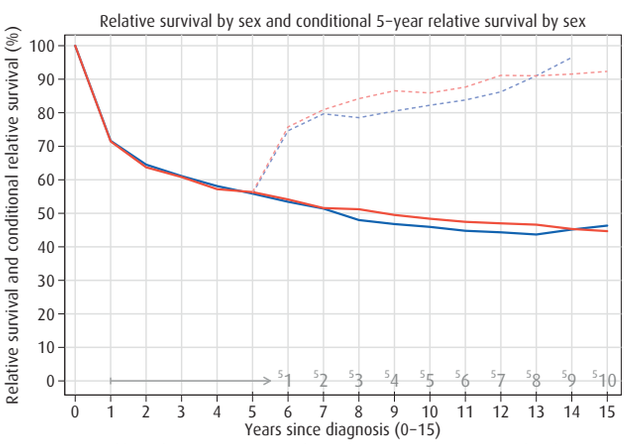


Dotted lines denote 5-year RS conditioned on surviving 1–10 years after diagnosis

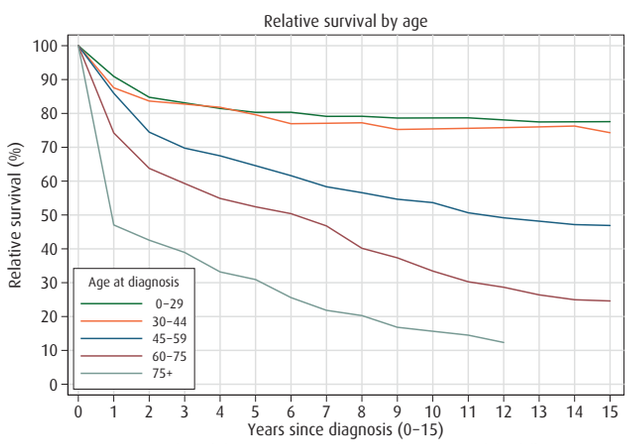


Estimates are plotted if 20 or more patients are alive at start of the follow-up year

Figure 9-X: Leukaemia (ICD-10 C91–95)



Dotted lines denote 5-year RS conditioned on surviving 1–10 years after diagnosis



Estimates are plotted if 20 or more patients are alive at start of the follow-up year

Prevalence

As of 31 December 2008, over 190 000 persons were alive and previously diagnosed with cancer in Norway. The cancer prevalence in Table 20 provides the numbers of cancer survivors a given number of years after diagnosis (<1, 4-9, 5-9 and ≥10 years), and approximates the number of patients in Norway (of both sexes) potentially requiring some form of cancer care. Breast, colorectal and prostate cancer, commonly-diagnosed cancers with reasonable 5-year patient survival, have the highest 10-year prevalence in Norway. The 8605 persons alive and diagnosed with melanoma of the skin 10 or more years after diagnosis ranks second only to breast cancer (13 674 persons), while the prevalence of melanoma is eleven times that of lung cancer (756 persons). Differences in prognosis - rather than incidence – may explain much of the site-specific variability in prevalence. Lung cancer in terms of new cases, for example, doubles that of melanoma in Norway, and the considerably higher melanoma prevalence reflects the vast differentials in survival between the two cancers.

Table 20 Prevalence of cancer 31.12.1998 and 31.12.2008, both sexes

		Total no. of persons alive		Years after diagnosis			
ICD10	Site	31.12.98	31.12.08	<1	1-4	5-9	10+
C00-96	**All sites**	**134372**	**190865**	**19081**	**56754**	**43975**	**71055**
C00-14	**Mouth, pharynx**	**3091**	**3609**	**395**	**1076**	**785**	**1353**
C00	Lip	1381	1262	99	333	221	609
C01-02	Tongue	404	604	88	184	157	175
C03-06	Mouth, other	551	623	76	203	133	211
C07-08	Salivary glands	375	466	36	110	112	208
C09-14	Pharynx	420	707	110	270	171	156
C15-26	**Digestive organs**	**22140**	**29166**	**3782**	**9464**	**6687**	**9233**
C15	Oesophagus	208	320	128	106	49	37
C16	Stomach	2301	1940	301	547	351	741
C17	Small intestine	365	671	93	244	183	151
C18	Colon	11840	16184	1910	5318	3821	5135
C19-21	Rectum, rectosigmoid, anus	7138	9512	1025	3084	2282	3121
C22	Liver	121	230	72	70	28	60
C23-24	Gallbladder, bile ducts	217	300	66	108	50	76
C25	Pancreas	373	577	254	197	70	56
C26	Other digestive organs	92	130	27	60	17	26
C30-34, C38	**Respiratory organs**	**4206**	**6108**	**1588**	**2156**	**1119**	**1245**
C30-31	Nose, sinuses	229	301	30	115	61	95
C32	Larynx, epiglottis	993	1078	120	303	284	371
C33-34	Lung, trachea	2946	4711	1442	1736	777	756
C38	Mediastinum, pleura (non-mesothelioma)	52	45	5	10	6	24
C40-41	**Bone**	**445**	**635**	**44**	**123**	**118**	**350**
C43	**Melanoma of the skin**	**12066**	**16930**	**1243**	**3774**	**3308**	**8605**
C44	**Skin, non-melanoma**	**7423**	**11326**	**1349**	**4121**	**2791**	**3065**
C45	**Mesothelioma**	**57**	**88**	**45**	**32**	**4**	**7**
C46	**Kaposi's sarcoma**	**104**	**89**	**6**	**24**	**15**	**44**
C47	**Autonomic nervous system**	**229**	**244**	**10**	**33**	**27**	**174**
C48-49	**Soft tissues**	**880**	**1187**	**121**	**314**	**211**	**541**
C50	**Breast**	**24212**	**34890**	**2666**	**9583**	**8967**	**13674**
C51-58	**Female genital organs**	**17565**	**20158**	**1366**	**4222**	**3830**	**10740**
C53	Cervix uteri	6746	6707	250	893	997	4567
C54	Corpus uteri	6379	8414	668	2119	1876	3751
C55	Uterus, other	46	45	3	11	12	19
C56	Ovary	3634	4095	376	933	758	2028
C51-52, C57	Other female genital	907	1091	101	328	251	411
C58	Placenta	122	142	0	14	15	113
C60-63	**Male genital organs**	**17822**	**33596**	**4295**	**13573**	**8732**	**6996**
C61	Prostate	13795	27570	3981	12458	7494	3637
C62	Testis	3771	5722	287	1039	1166	3230
C60, C63	Other male genital	297	410	49	128	93	140
C64-68	**Urinary organs**	**11590**	**14887**	**1578**	**4730**	**3525**	**5054**
C64	Kidney excl. renal pelvis	2856	4192	495	1437	956	1304
C65	Renal pelvis	419	522	74	141	122	185
C66-68	Bladder, ureter, urethra	8475	10411	1042	3253	2495	3621
C69	**Eye**	**743**	**900**	**59**	**192**	**176**	**473**
C70-72, D42-43	**Central nervous system**	**4972**	**9149**	**731**	**2734**	**2233**	**3451**
C73	**Thyroid gland**	**3242**	**4124**	**208**	**739**	**681**	**2496**
C37, C74-75	**Other endocrine glands**	**1325**	**2239**	**183**	**569**	**502**	**985**
C39, C76, C80	**Other or unspecified**	**476**	**535**	**123**	**161**	**97**	**154**
C81-96	**Lymphoid and haematopoietic tissue**	**9044**	**14627**	**1726**	**4933**	**3265**	**4703**
C81	Hodgkin lymphoma	1440	2057	106	404	427	1120
C82-85, C96	Non-Hodgkin lymphoma	3976	6287	698	2120	1449	2020
C88	Malignant immunoproliferative diseases	219	313	32	134	82	65
C90	Multiple myeloma	1064	1423	288	664	291	180
C91-95	Leukaemia	2354	4612	621	1644	1027	1320

Trends in Incidence, Mortality and Survival

There has been considerable deliberation as to the relative merits of incidence, mortality and survival in cancer research generally, and in time trend analyses specifically (Peto et al, 2000; Coleman, 2000; Doll and Peto, 1981; Boyle, 1989). Analysing trends in incidence may provide some insight into changes in the prevalence and distribution of risk factors, and to the impact of interventions aimed at prevention and early diagnosis. Mortality rates and survival proportions are both key measures of disease outcome, and may alert us to the beneficial effects of screening, or to the introduction of more effective therapies and better disease management, where applicable.

The importance of determining artefacts and considering their contribution to observed cancer incidence and mortality trends have been comprehensively addressed by the papers by Saxén (1982) and Muir et al (1994), while many studies have investigated the accuracy of death certificates (e.g. Percy et al, 1981). Other than artefacts related to registration practices, many of the factors that affect incidence equally apply to mortality, given that both rely on the accuracy of the initial cancer diagnosis. As with incidence, survival estimates are susceptible to changes in diagnostic practices and disease classifications, as well as the spread of screening tools that detect cases earlier.

There is a general consensus that a combined description of trends in incidence, mortality and survival often serves to confirm and clarify understanding of the underlying biological, epidemiological and clinical processes. As each indicator is subject to unique or shared artefacts that tend to vary according to cancer type over time, their simultaneous assessment often enables the identification of systematic deviations in one or more of the three measures. Figure 10-A to 10-X present annual age-standardised (world) incidence (1965-2008) and mortality (1965-2007) rates together with period-based (3-year window 1965-2008) 5-year relative survival probabilities for all cancers combined and for 23 specific cancer sites. The survival trends are plotted as crude rather than age-adjusted estimates for purposes of consistency; the age-specific numbers were sparse for certain neoplasms for certain years, and thus standardised estimates could not be calculated. It should be noted that these summary measures will often fail to reflect true underlying age-calendar year interactions for specific cancers, such as differentials in survival and mortality trends by age with respect to calendar time, or the presence of strong birth cohort influences in incidence trends.

The trends for all "all sites" in Figure 10-A conveys a general picture of uniform increases in cancer incidence and survival in Norway over the last four decades, coupled with fairly constant mortality trend up until the early-1990s. The decline in mortality that follows is more evident in men than in women. The interpretation of these aggregated estimates is evidently a non-trivial exercise, in that they comprise many different cancer forms variable in terms of their capacity to be diagnosed as well as treated. In combination however, prostate, breast, lung and colorectal cancer represent half of the total incidence and mortality burden, specifically, 49.8% of the new cancers cases in Norway in 2008, and 50.6% of the deaths in 2007.

For men, close to one-third of all cancers diagnosed in 2008 were of the prostate. The marked increases in both incidence and 5-year relative survival from 1990 (Figure 10-O) reflects the availability of the PSA test and the upsurge in its use in the detection of the disease in a subsequent biopsy. Mortality has declined from around 1996 and both early diagnosis and improved and more active treatment may have had an impact.

Breast cancer among women comprises almost one-quarter of all female cancer cases, and as with prostate in men, the incidence and 5-year relative survival has increased in the last two decades, while mortality began declining around 1996 (Figure 10-M). The Norwegian mammographic programme began screening women aged 50-69 at the end of 1995 as a four-year pilot project in four of the 19 Norwegian counties, and gradually expanded to become national by 2005. The implementation of screening may explain much of the increase in incidence from the mid-1990s, and, partly as a consequence of advancing time of diagnosis, the increasing survival. The recent declines in mortality in Norway likely reflect a number of interventions acting in combination, amongst them improvements in breast cancer therapy and management from the 1990s, as well as the increasing screening coverage.

Trends in lung cancer incidence and mortality are quite similar and reflect the uniformly poor survival over time, whereas the varying trends by sex reflect the differing phases of the smoking epidemic in Norwegian men and women (Figure 10-J). Overall lung cancer

incidence and mortality rates among males began to plateau in the early-1990s and suggest a decline in the last five years, in contrast to the continuing increases in female rates. As these rates are for all ages however, they do not capture a possible recent plateau in trends among generations of women born around 1950. While five-year relative survival for lung cancer patients has not changed substantively, the observation of moderately increasing survival in the 1990s, more evident in women, is intriguing. It is not clear as to the degree to which these changes are real and might reflect genuine improving lung cancer management, earlier stage at presentation, less co-morbidity, or changes in other factors that contribute to improved life expectancy.

Both colon and rectal cancer incidence has been increasing for many decades, but the overall picture is one of stabilisation for colon cancer and possibly recent declines for rectal cancer (Figure 10-E and 10-F). Of particular note is the increasing survival and declining mortality following rectal cancer in Norway in both sexes. Among the likely determinants is the introduction of total mesorectal excision, increasing specialisation, and use of preoperative radiation.

In summarising the overall cancer survival developments, the increasing trends in both sexes likely reflect artefact, for example, increasing diagnostic intensity and screening in the populations, but also reflect genuine but complex mechanisms that contribute to improved survival. For prostate and breast cancer these relate to both early diagnosis and the introduction and increasing use of curative treatment. The recent increments in rectal cancer survival in both sexes will also have partially contributed to the recently overall decline in cancer mortality.

The remaining cancer forms as a group contribute substantially to explaining the overall trends. Among specific sites, several are worthy of note. The constant declines in stomach cancer incidence and mortality, for example, is considered part of an unplanned success of primary prevention of the intestinal type, with survival only moderately increasing over time (Figure 10-D). In contrast, the uniform and presently-unexplained increases in testicular cancer incidence in the last decades (Figure 10-Q) are contrary to the rapid increases in survival (and concomitant declines in mortality) in the 1970s following the introduction of cisplatin therapy for advanced germ-cell tumours, and a correspondingly improved prognosis in these young- and middle-aged men.

Trends in incidence and mortality rates and 5-year relative survival proportions

Figure 10-A: All sites (ICD10 C00–96)

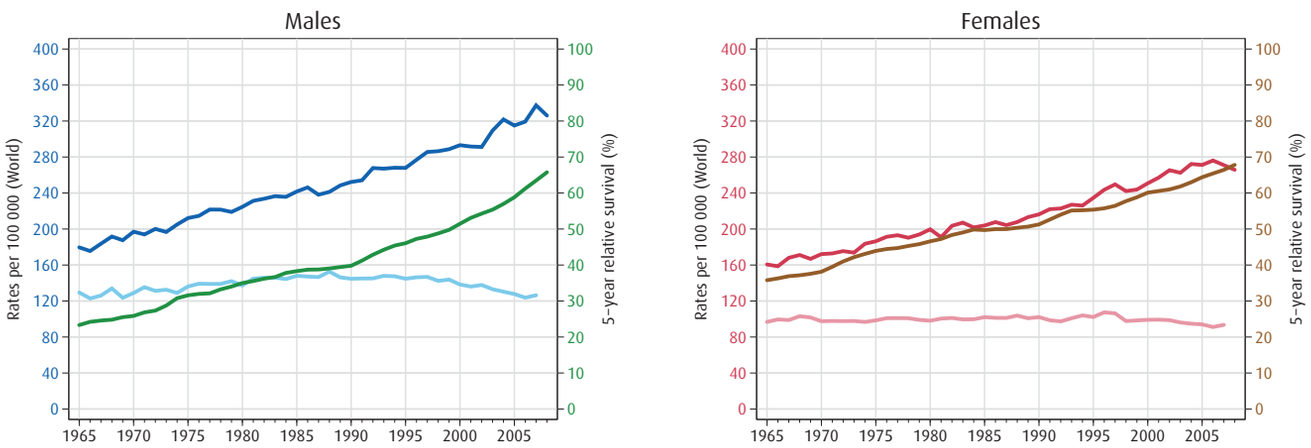


Figure 10-B: Mouth, pharynx (ICD-10 C00–14)

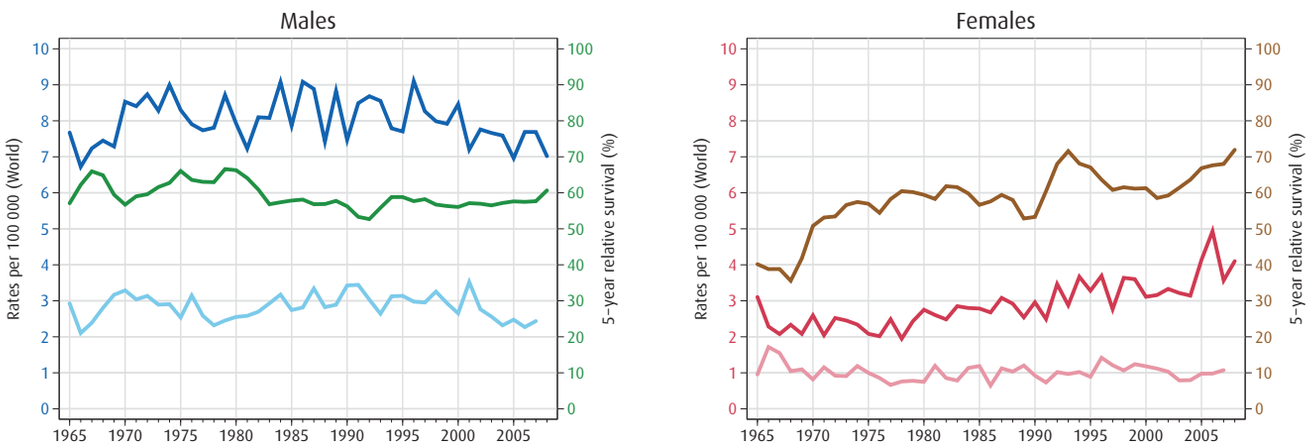


Figure 10-C: Oesophagus (ICD-10 C15)

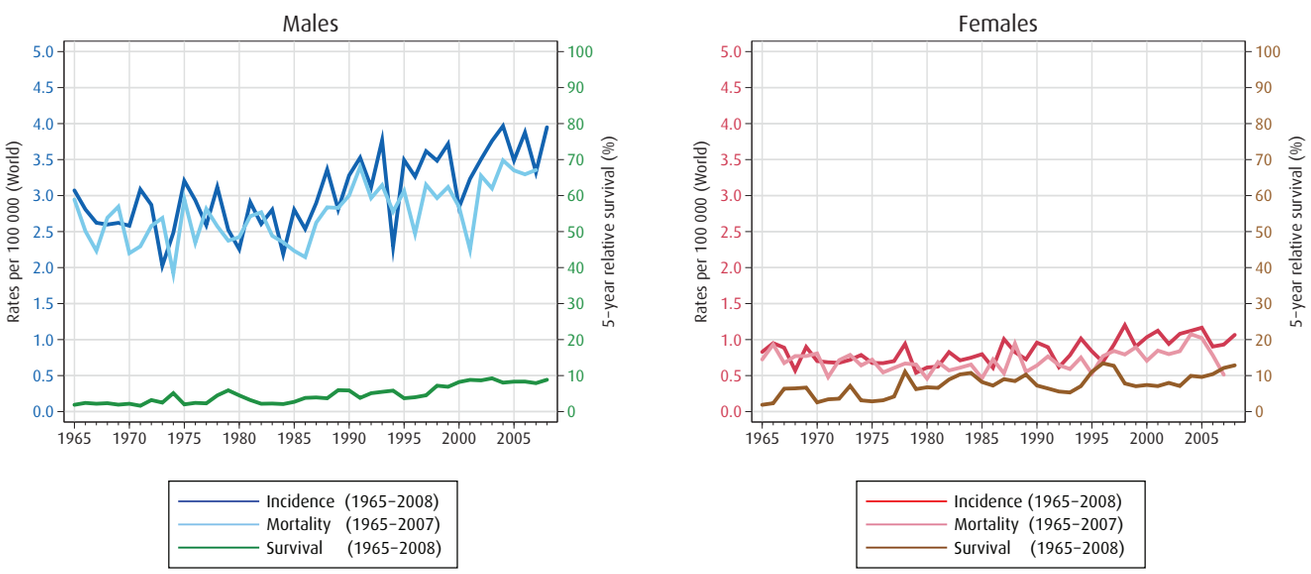


Figure 10-D: Stomach (ICD-10 C16)

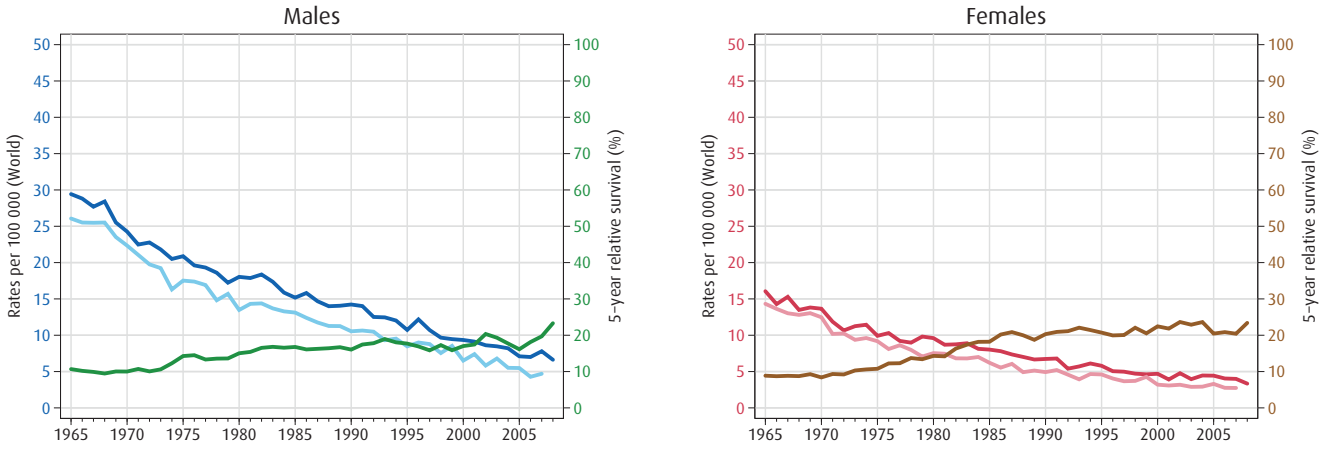


Figure 10-E: Colon (ICD-10 C18)

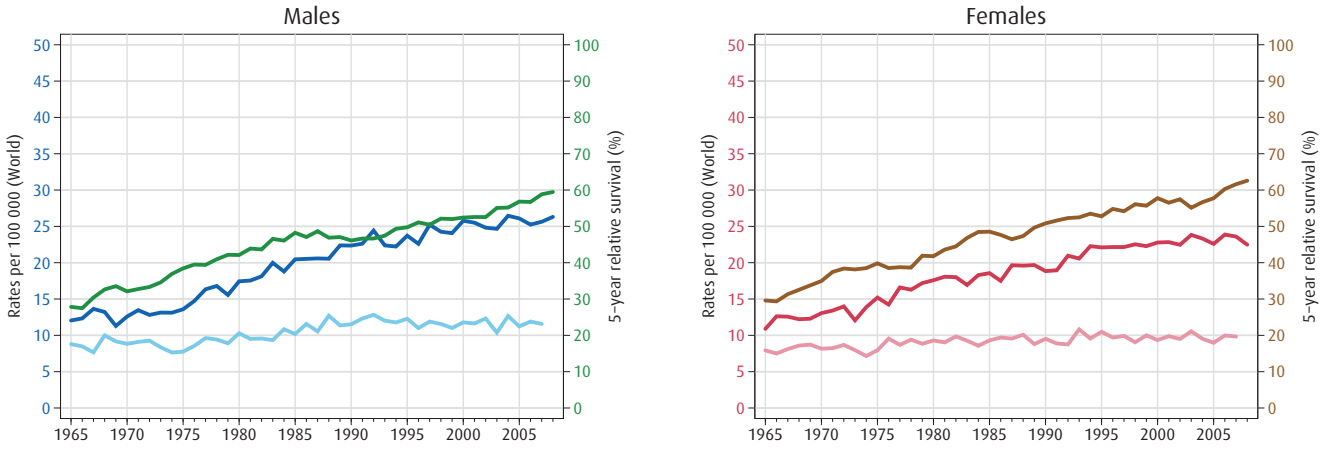


Figure 10-F: Rectum, rectosigmoid, anus (ICD-10 C19–21)

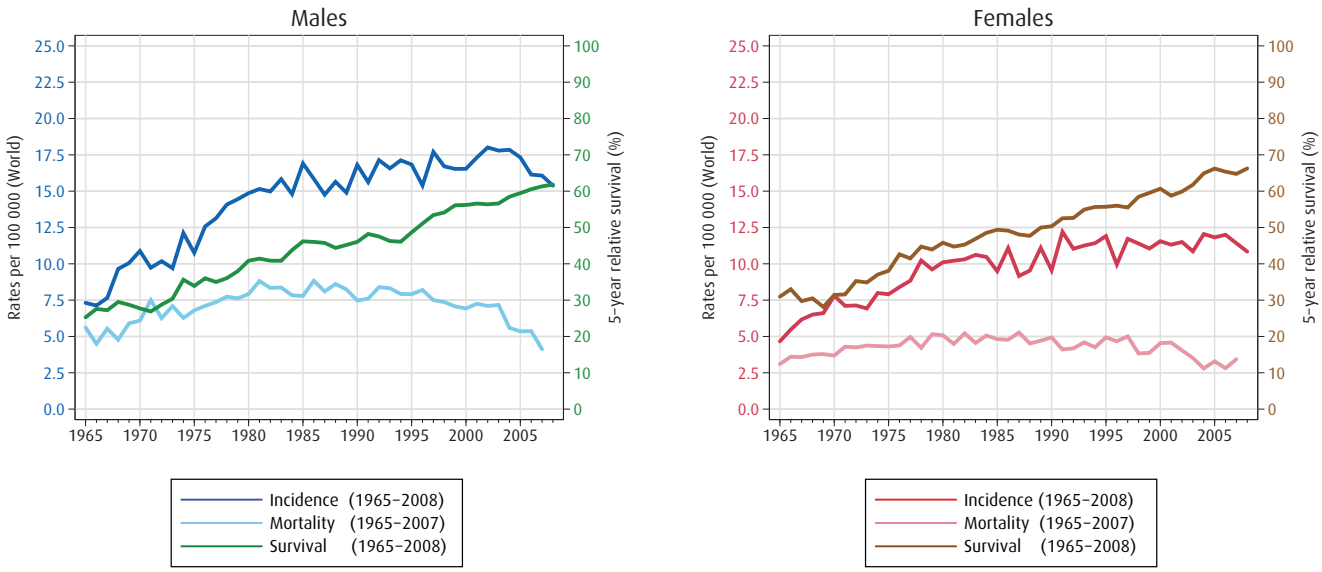


Figure 10-G: Liver (ICD-10 C22)

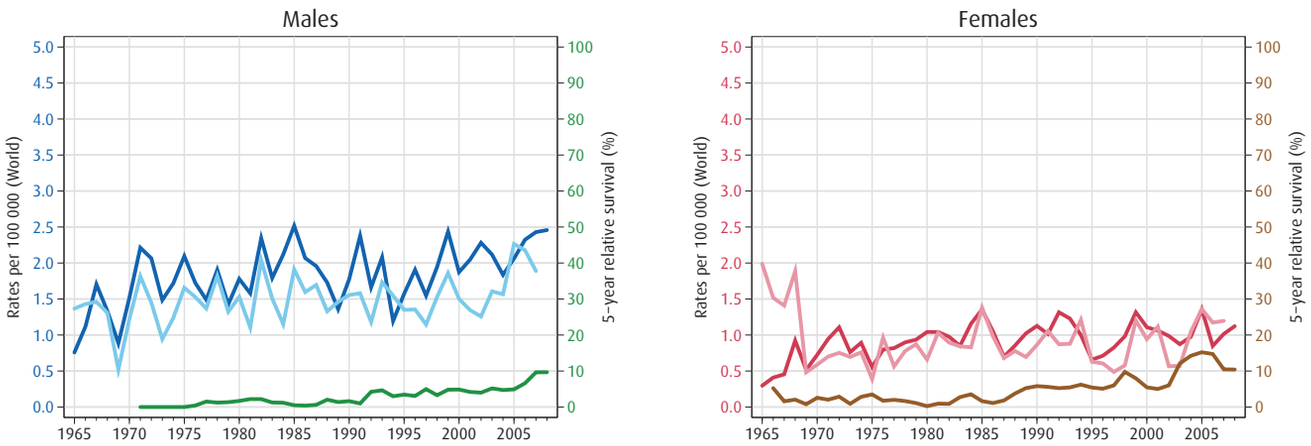


Figure 10-H: Gallbladder, bile ducts (ICD-10 C23–24)

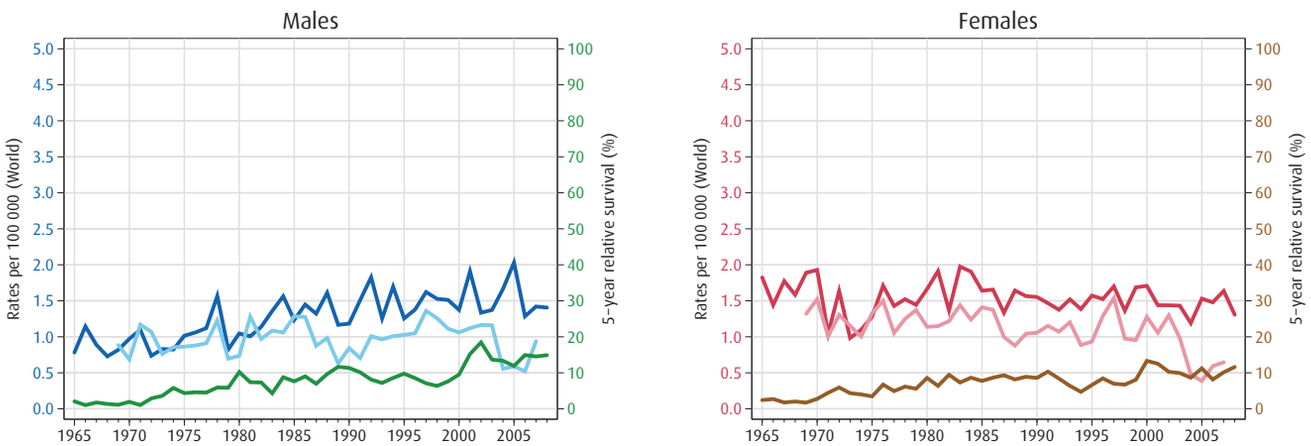


Figure 10-I: Pancreas (ICD-10 C25)

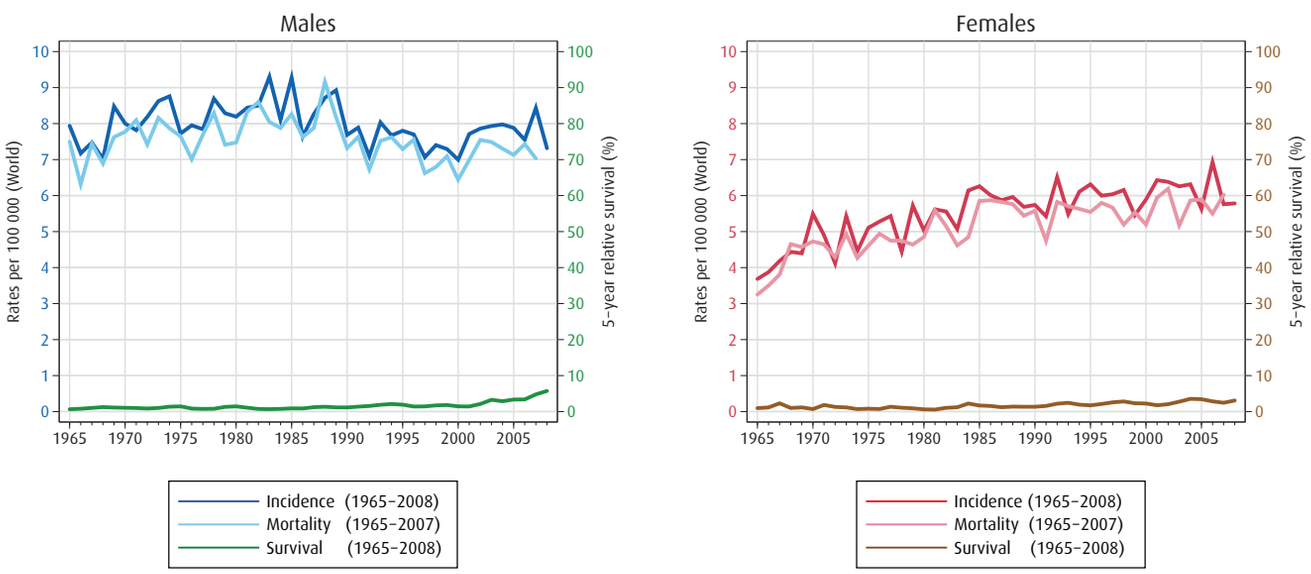


Figure 10-J: Lung, tranchea (ICD-10 C33–34)

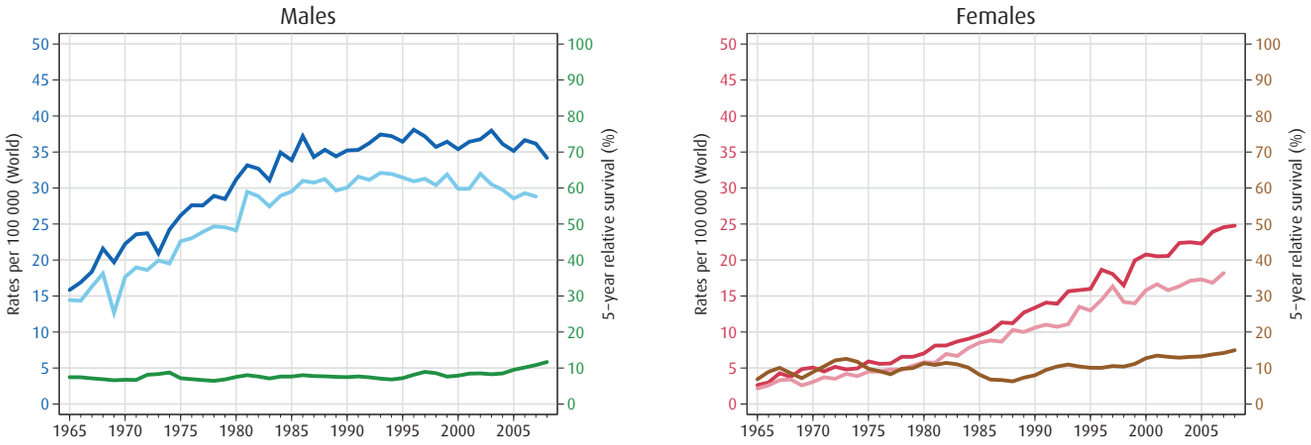


Figure 10-K: Melanoma of the skin (ICD-10 C43)

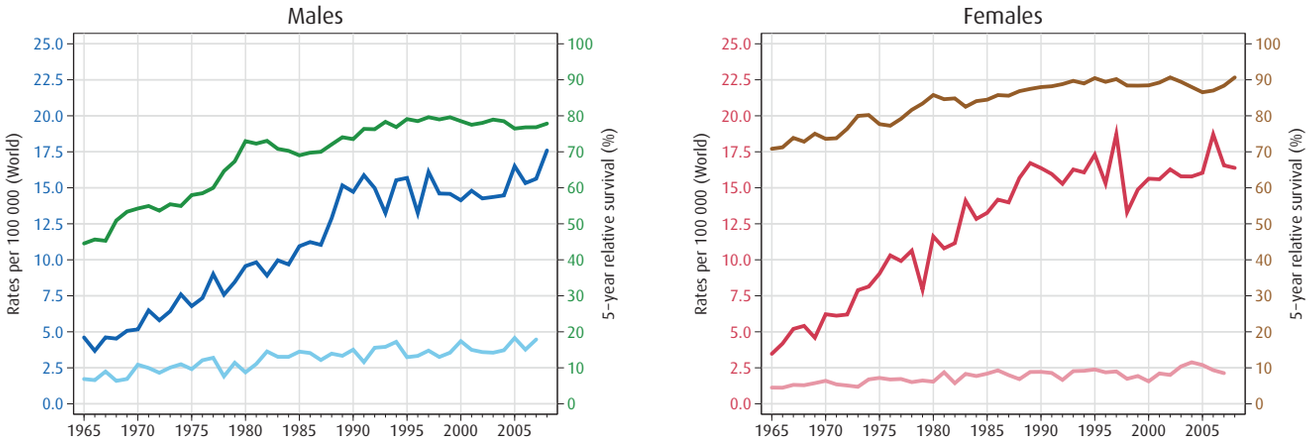
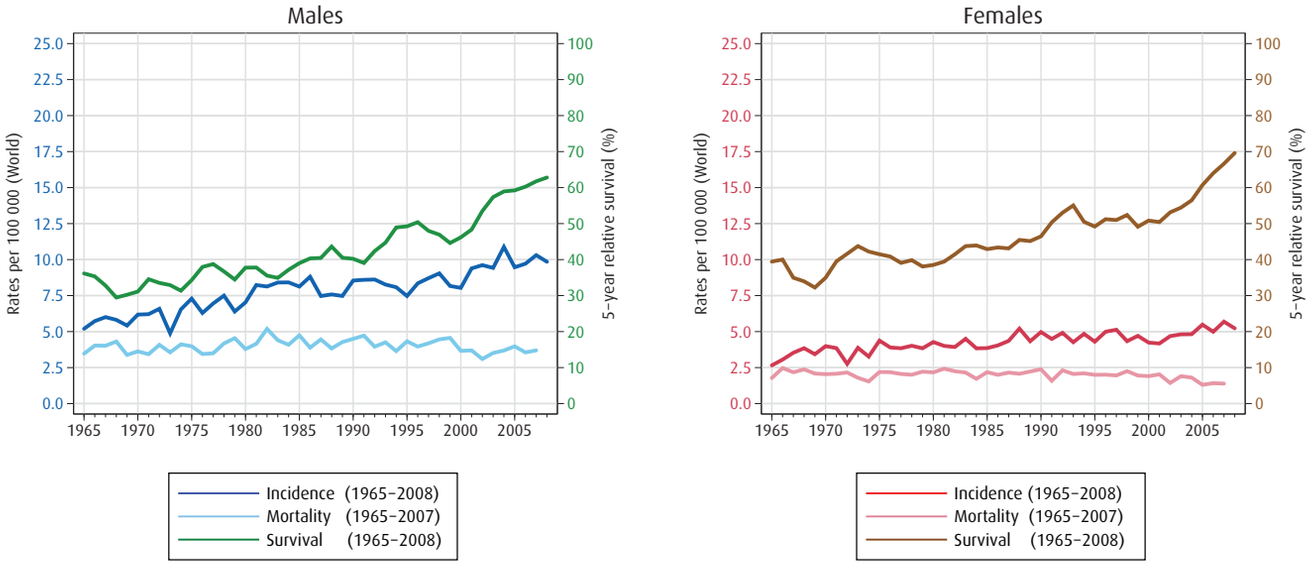


Figure 10-L: Kidney excluding renal pelvis (ICD-10 C64)



Trends in incidence and mortality rates and 5-year relative survival proportions

Figure 10-M: Breast (ICD-10 C50)

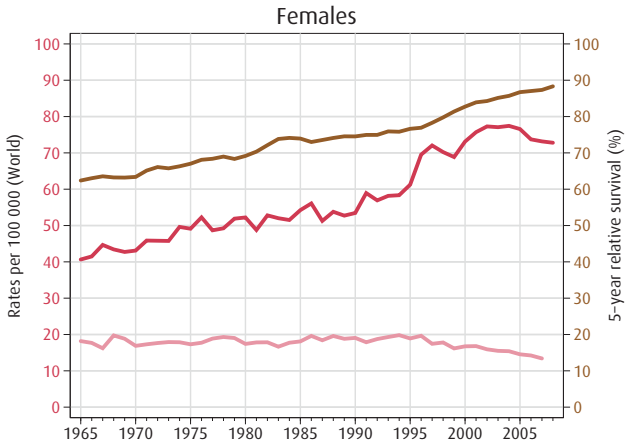


Figure 10-N: Cervix uteri (ICD-10 C53)

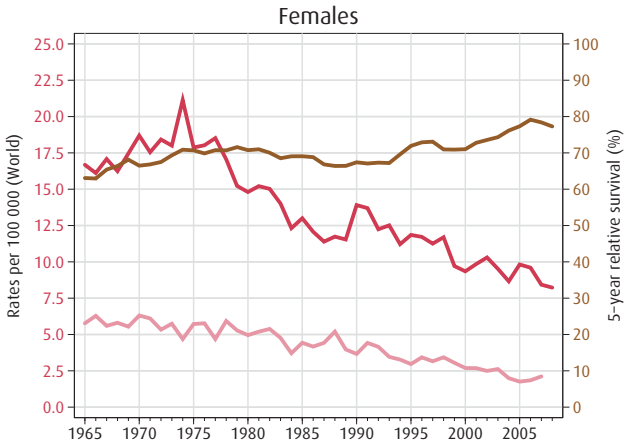


Figure 10-O: Prostate (ICD-10 C61)

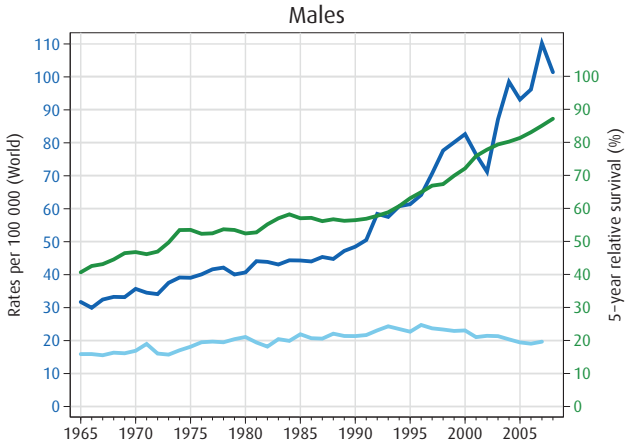


Figure 10-P: Corpus uteri (ICD-10 C54)

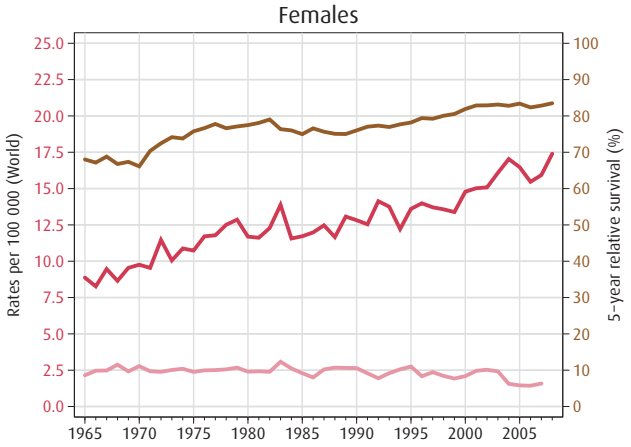


Figure 10-Q: Testis (ICD-10 C62)

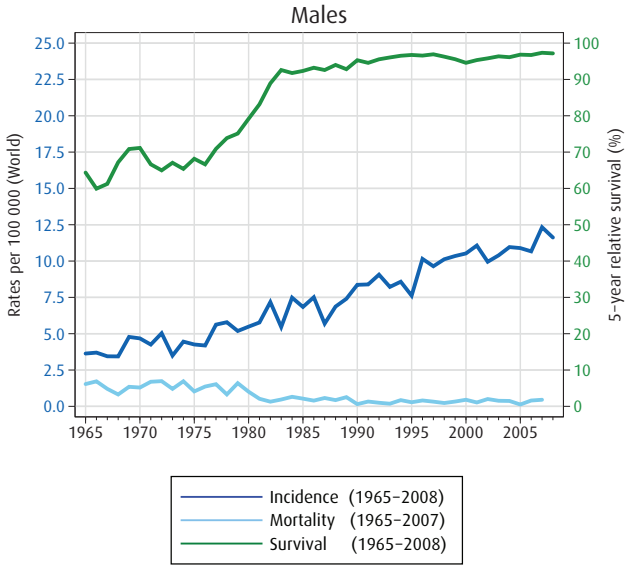


Figure 10-R: Ovary (ICD-10 C56)

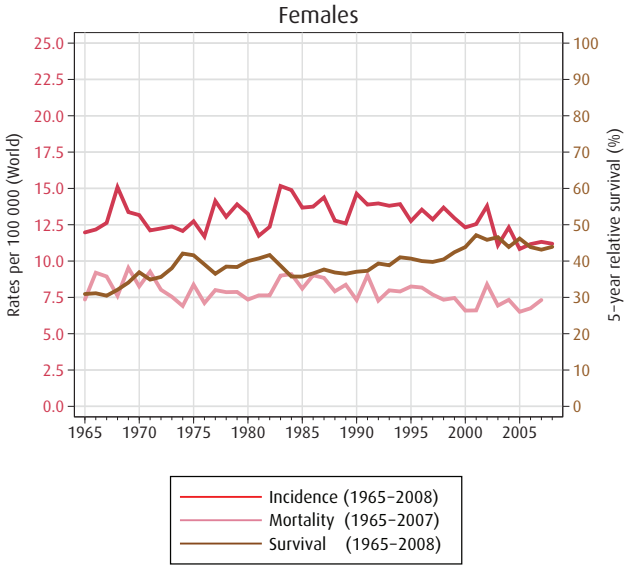


Figure 10-S: Bladder, ureter, urethra (ICD-10 C66–68)

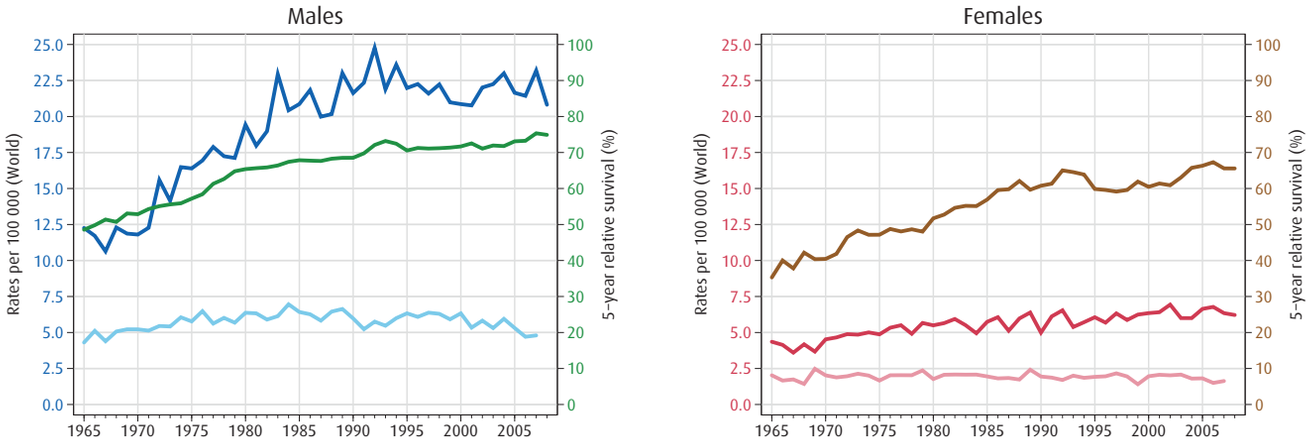


Figure 10-T: Central nervous system (ICD-10 C70–72, D42–43)

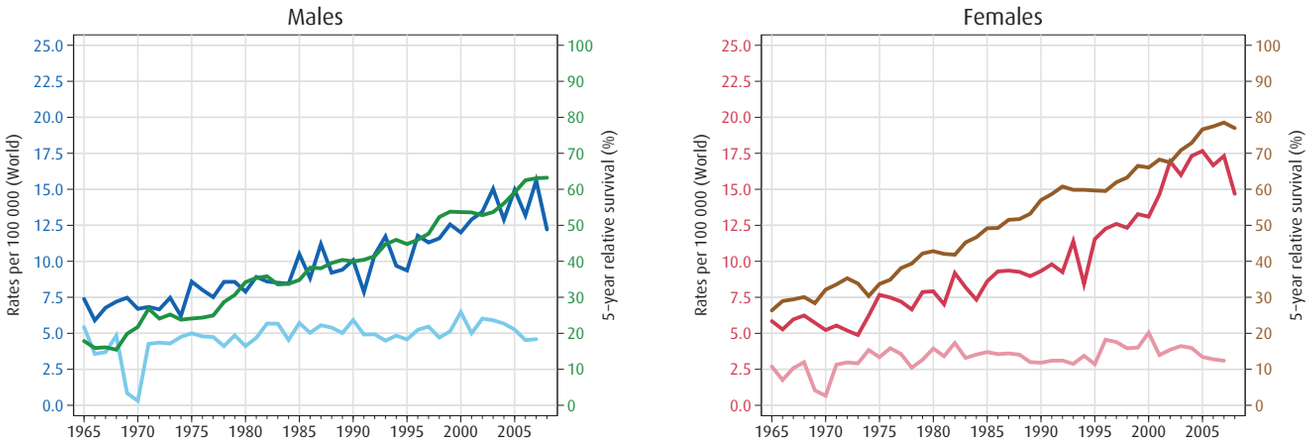


Figure 10-U: Thyroid gland (ICD-10 C73)

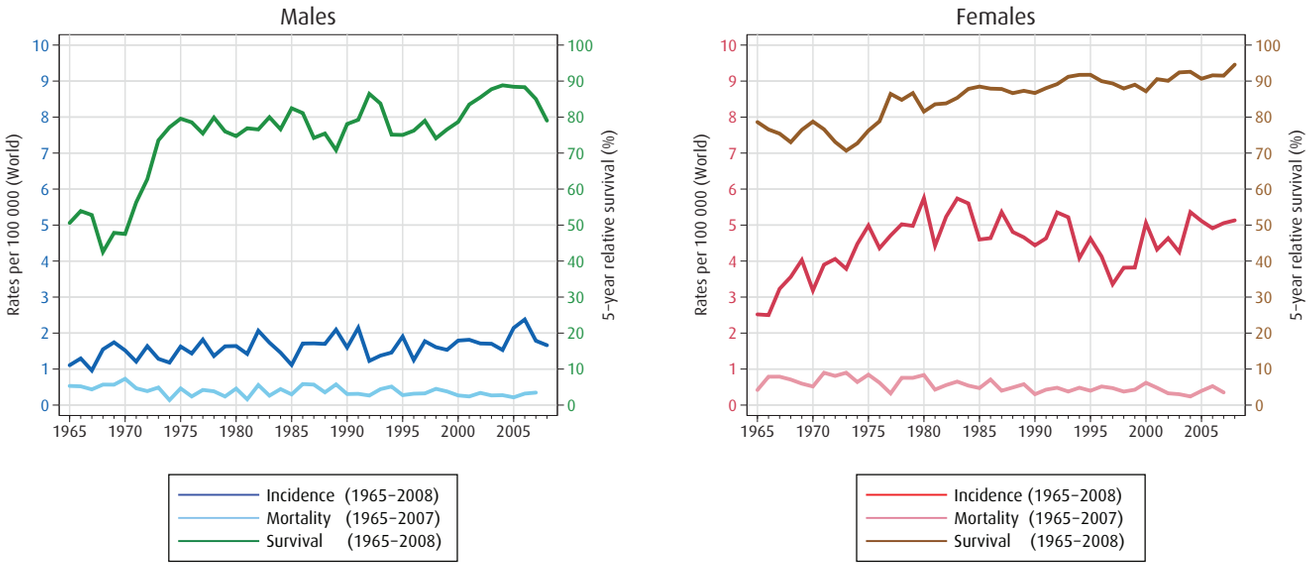


Figure 10-V: Hodgkin lymphoma (ICD-10 C81)

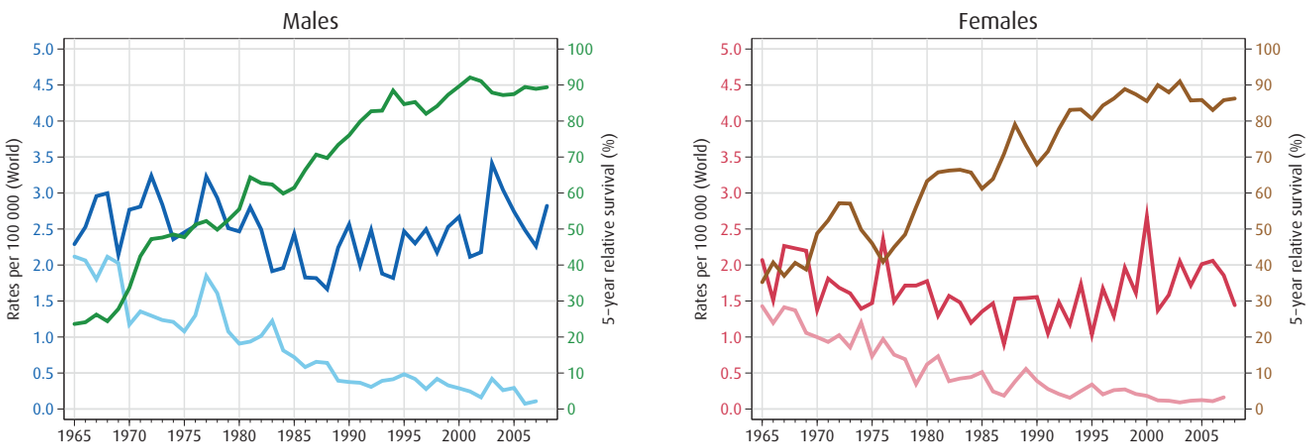


Figure 10-W: Non-Hodgkin lymphoma (ICD-10 C82–85, C96)

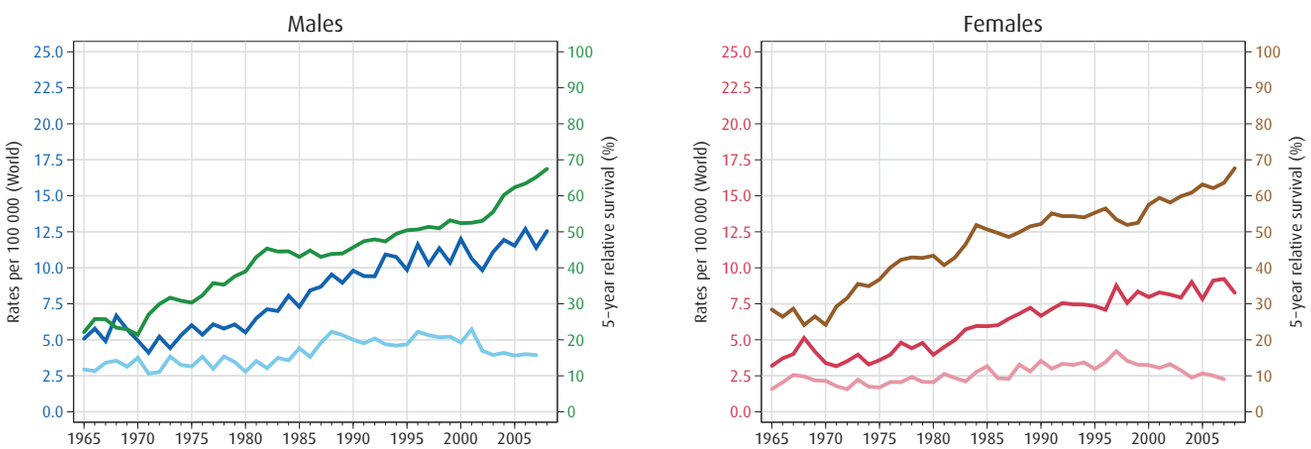
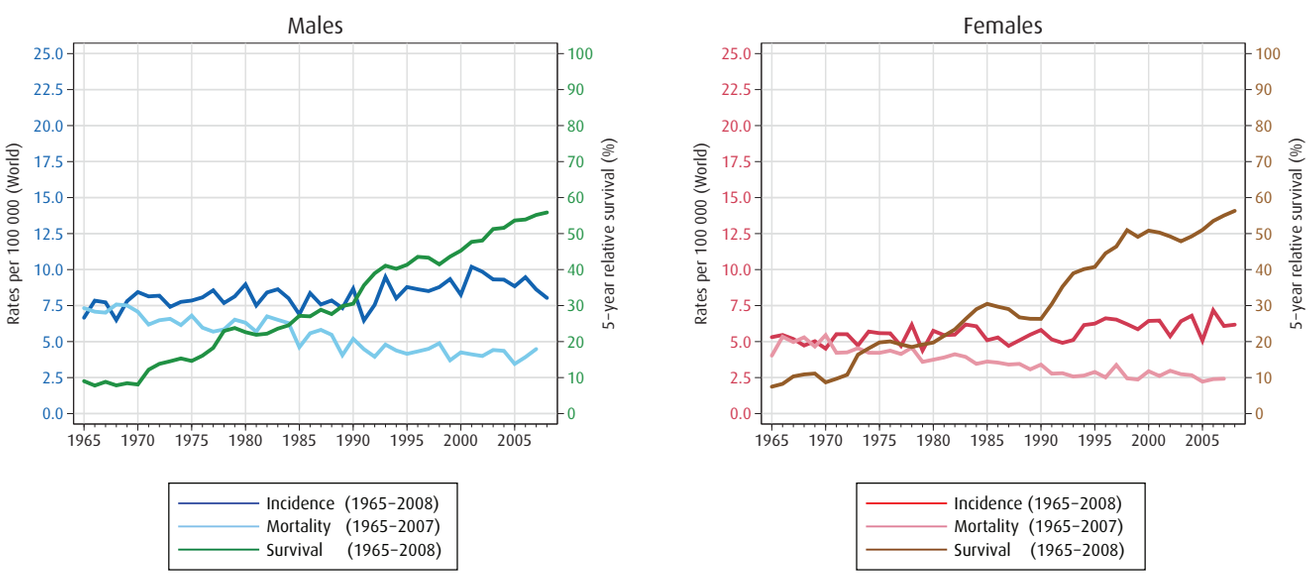


Figure 10-X: Leukaemia (ICD-10 C91–95)



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Larsen IK, Småstuen M, Johannesen TB, Langmark F, Parkin DM, Bray F, Møller B. Data quality at the Cancer Registry of Norway: an overview of comparability, completeness, validity and timeliness. Eur J Cancer. 2009;45:1218-31.

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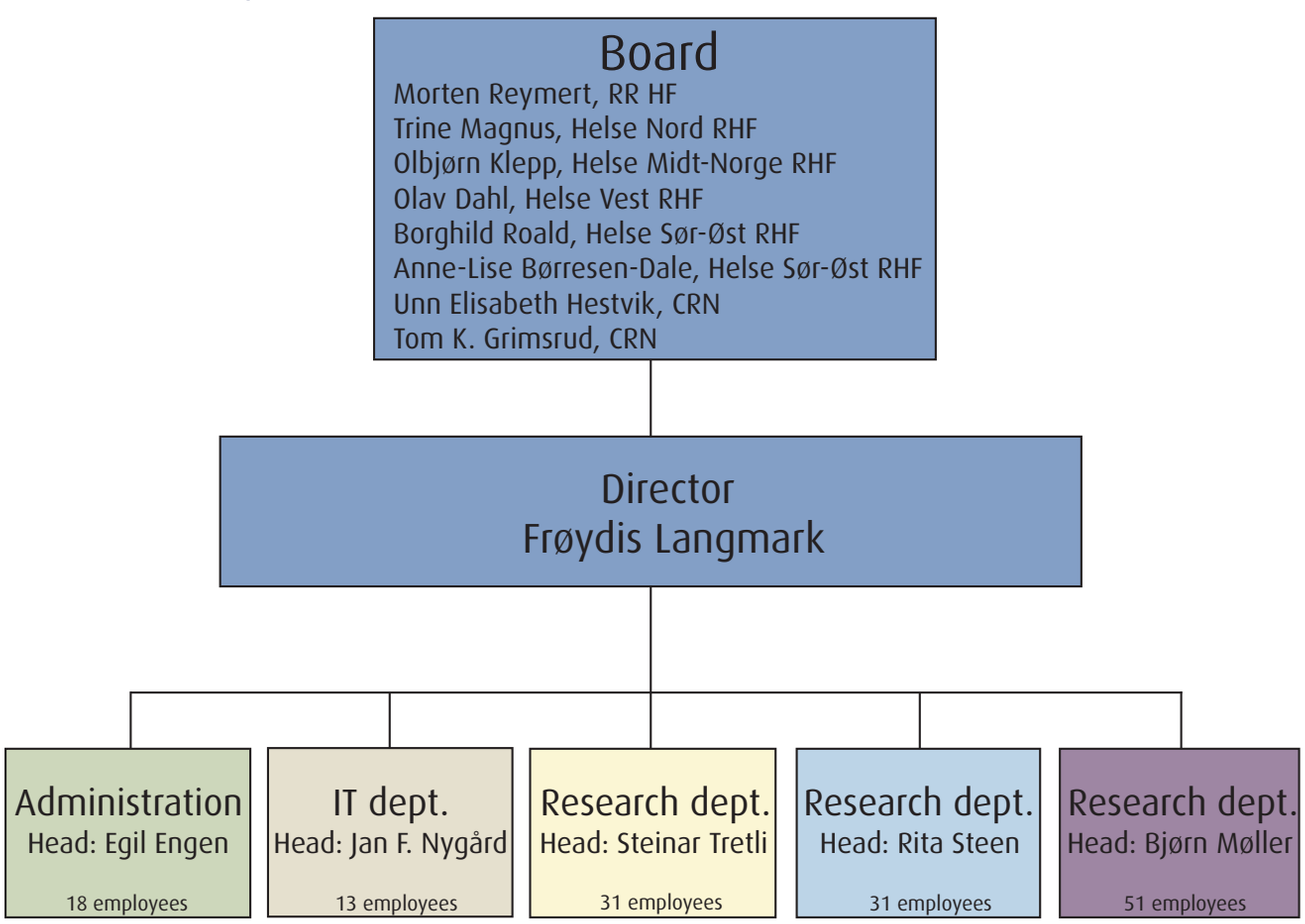
Research activities at the Registry

Organisation and founding principles

The Cancer Registry of Norway is a national, population-based cancer research institute, which was founded and financed by the Cancer Society 1951-1979. Since then the institution has been governmental, with a board (except for the period 1994-2002) and a chapter in the National Budget plan. Since 2002 it has been allied to the Norwegian Radium Hospital and from 2009 to Oslo University Hospital Trust. This organisational platform signals the importance attached to close links with cancer research milieus and cancer clinics. It also increases the possibilities for Norway as a nation to move towards the Comprehensive Cancer Centre organisational model. As early as 1951, reporting of cancer and some precancers has been mandatory from all milieus that diagnose and treat cancer. From 2002 however, new regulations have strongly enforced the legal premises, substantially improving the Registry's capacity to perform clinical population-based research and evaluate the quality control of health care. Comparative advantages are compulsory reporting without patients' consent and the uniquely identifying personal number. As a result of these advantages, organ-specific treatment quality registries are increasingly part of the Registry's duties, in close collaboration with the clinical milieus.

Structure of the Cancer Registry of Norway 2009

CANCER Registry of Norway
INSTITUTE OF POPULATION-BASED CANCER RESEARCH



Department of Etiological Research

Head: Steinar Tretli PhD

Department objectives

The principal goal of the Department of Etiological Research is to bring forth new knowledge on carcinogenesis and the causes of cancer. The focal points for research in recent years have been cancer risk and its relation to occupational and environmental factors, and to hormonal status and diet. In future studies, an increased emphasis will be put on testable biologically-founded hypotheses, using biological markers of exposures, and collaboration with researchers in the relevant fields. Specifically this will include utilization of the JANUS serum bank. In addition, a focus on the development of bio-statistical methods in cancer epidemiology will be important. The tradition of collaboration with the different research milieus in the other Nordic countries, as well as international collaboration will be continued and expanded. The high quality population-based registries in the Nordic countries make such partnerships especially valuable.

Current research priorities

Research on long-term effects of exposures during fetal life, childhood, youth and adult life ("life course epidemiology") will have high priority in the department. Several of our studies have already investigated the impact of early life on adult cancer risk, specifically for hormone-related cancers such as breast, prostate, and testicular cancer. Studies on cancer development related to life style and environmental and societal factors will also be emphasized. This life course epidemiology will often include the study of molecular, genetic, and hereditary aspects of cancer development, in for instance the study of gene-environment interactions.

Research on cancers associated with occupational and environmental exposures has a long tradition in the Department, and the identification and quantification of such risks will still be important. Studies on working populations may often be the only method to obtain knowledge of possible population effects of low-dose exposures. Occupation is also an important classification variable concerning the knowledge on differences in cancer risk by social class.

The understanding of the carcinogenic process has traditionally been based on three sources of information: experimental, clinical, and epidemiological research. Through modelling and simulation we will assess the importance of different mechanisms in the disease process.

Long time follow-up of cancer patients is an important research field. This will include the study of medical, social and economic consequences of a cancer diagnosis.

Recent important results

In 2008, the research activity at the department led to 47 scientific publications in national and international journals. The publications focused on gene-environment interactions, on risk factors such as occupational exposures, diet/body mass index, viral and bacterial infections, in addition to publications on epidemiological methods and life conditions after cancer. Some of the results are from international collaboration studies. In addition, two doctoral dissertation were defended in 2008.

Theses published in 2008

Weedon-Fekjær H. Modelling breast cancer incidence, progression and screening test sensitivity using screening data. Faculty of Medicine, University of Oslo, 2008.

Frostad A. Respiratory symptoms as risk factors for mortality from all causes and from respiratory and cardiovascular disease and for indcidence of lung cancer: a 30-year follow-up of a community study in Oslo. University of Bergen, Cancer Registry of Norway, Oslo, 2008

Department of Screening-based Research

Head: Rita Steen MD PhD

Department objectives

The Screening Department administers two programmes for early detection of cancer and premalignant disease, the Breast Cancer Screening Programme and the Cervical Cancer Screening Programme. Since 1995, the Cervical Cancer Screening Programme has recommended women aged 25-69 years to undergo a PAP smear every third year, whereas all women aged 50-69 years are offered mammography screening every two years. The Cervical Cancer Screening Programme mails a personal letter to women whom have not had a PAP test in the last three years, with a recommendation to take a test. Invitation to mammography screening is mailed to eligible women, together with a prespecified date of examination.

The Screening Department monitors the programmes' effectiveness and efficacy by examining early

quality indicators (e.g. coverage/attendance, detection rate, tumour stage for breast cancer, and stage of premalignant lesions of the cervix), as well as changes in rates of incidence and mortality of the cancers. The main objective of the Norwegian Breast Cancer Screening Programme is to reduce mortality by 30% among women invited to mammography screening. For the Cervical Cancer Screening Programme, the main objective is to achieve a reduction of 50% in the incidence and mortality rates of cervical cancer compared to the rates prior to the programme launch. The most important factor determining the success of these screening programmes is high coverage. In 2008, coverage was 75% in the Cervical Cancer Screening Programme, and the attendance rate was also 75% in the Breast Cancer Screening Programme, raising expectations that the programmes will accomplish these objectives.

Current Research Priorities

The current research priorities of the Cervical Cancer Screening Programme are:

1) Evaluation of the CIN (cervical intraepithelial neoplasia) register, a follow-up register with data on treatment, established in 1997.

2) Study of the impact of HPV-testing in triage after PAP smear screening on CIN 2+.

3) Studies of the efficacy and effectiveness of screening in women aged 25-69 years.

4) Study of the screening history of women diagnosed with cervical cancer before reaching the age of 25, including a re-examination of their PAP tests, pathological tissue and samples.

5) Study of the screening history of women aged over 70 years diagnosed with cervical cancer.

6) Investigate the need for a more individual-orientated approach to Cervical Cancer Screening Programme, dependent on vaccination status.

7) Long-term follow-up after HPV vaccination of women participating in the vaccine trials. Study of HPV prevalence among women 18-45 years, both in the general population and in those with premalignant disease and cervical cancer.

The current research priorities of the Breast Cancer Screening Programme are:

1) Further investigations of early (process) indicators and tumor characteristics in screening.

2) Study of the effectiveness of the programme in relation to breast cancer survival and mortality.

3) Study of overdiagnosis associated with the Breast Cancer Screening Programme.

4) Study of breast cancer screening in Norway and the U.S. (Vermont).

5) Study of hormone therapy and risk of breast cancer

For the Breast Cancer Screening Programme, one PhD student is currently investigating effects of mammography screening on breast cancer survival. Another PhD student is evaluating the Norwegian Breast Cancer Screening Program with regards to DCIS, overdiagnosis and implementation of new technology . Within the Cervical Cancer Screening Programme, one PhD student is undertaking a population-based follow-up study on women diagnosed with severe cervical dysplasia in Norway.

Registries at the Department of Screening-based Research

For administration of the screening programs several registries have been established. These registries are presented in the table below.

Name	Date of launch
Mammography Screening Registry	20.11.1995
Cervical Cytology Registry	01.11.1991
Cervical Intraepithelial Lesion Follow-up and Treatment Registry (CIN Registry)	01.01.1997
Cervical Histology Registry	01.01.2002

Department of Clinical- and Registry-based Research

Head: Bjørn Møller PhD

Department objectives

The Clinical Research department has a broad remit. One of its fundamental responsibilities is the continued collection, storage and quality control of data on all cases of cancer in Norway, as defined by the Statutory Regulations. This information is collected from clinicians, pathologists, administrative patient discharge files, and the Cause of Death Registry.

The Department provides relevant information on cancer patterns and changes in cancer over time in Norway, via various dissemination routes including scientific publications and reports such as the Cancer in Norway series. The Department has put an emphasis on activating and collaborating in good research projects at the national and international level, initiated in-house, or via external requests or invitations, and focusing on building strong ties with the clinical community in Norway.

The Department is organised into two sections, according to the key areas of ongoing activity:

1) Section for Registration. Management of the incidence register and development of the clinical registries. The section is divided into four organ-defined groups, which manages all the cancer types within the group. The clinical registries offer novel opportunities for population-based research into cancer care (see below).

2) Section for Research. Research using the incidence register, focusing on areas of particular public health importance alongside the application of appropriate methodologies

In addition, the department has a medical advisory group, with the responsibility for documentation of quality control, the revision of in-house coding procedures and guidance in medical coding.

Clinical registries

The Statutory Regulations for the Cancer Registry of Norway include the registration of treatment and follow-up of Norwegian cancer patients. Clinical registries – comprehensive registration schemes dedicated to specific cancers – have been established to include detailed information on diagnostic measures, therapy, and follow-up. By fostering strong collaborative links with the clinical community, the aims are to provide an empirical base for scientific studies concerning prognostic factors and treatment outcomes as well as evaluation of quality of cancer care.

The ongoing and expanding activities of these clinical registries is a major focus for the Registry, and several clinical registries are now established. Each clinical register is underpinned by a Reference Group, a panel of multi-disciplinary experts drawn from the clinical and research milieu in Norway, whose remit is to advise on the operations of the registry, and its strategic direction. These newly-established clinical registries will be integrated into the Registry's coding and registration activities. The table below indicates the status of these subregistries as of December 2009.

Theses published in 2008

Strand TE. A population-based study of lung cancer in Norway: Epidemiological aspects and evaluation of surgical treatment. Faculty of medicine, University of Oslo, 2008

Status of the clinical registries, December 2009

National clinical registry for	Clinical reference group established	Established with extended data*	Clinical parameters for electronical report specified	Electronical report form developed
Colorectal cancer	Yes	Yes	Yes	Yes
Malignt melanoma	Yes	Yes	Yes	2009
Breast cancer	Yes	2010	Yes	2010
Prostate cancer	Yes	Yes	Yes	2010
Lymphoma	Yes	Yes	Yes	2010
Lung cancer	Yes	Yes**	Yes	2010/2011
Childhood cancer	Yes	Yes***	Yes	2010/2011
Ovarian cancer	Yes	Yes****	Yes	>2010
Leukaemia	Yes	>2010	Yes	>2010
Central nervous system	Yes	>2010	Yes	>2010
Gallbladder, pancreas and liver cancer	Yes	>2010	Yes	>2010
Oesophagus and stomach cancer	Yes	>2010	Yes	>2010
Polyposis family	Yes	Yes	No	>2010

* Either by having a separate clinical report form and/or by having a database with extended information beyond the incidence registry. The delay compared to the timeline outlined in Cancer in Norway 2007 for some of the registries are due to lack of funding.

** Established for surgically treated patients, planned to be extended to all lung cancer patients.

*** Will be extended with treatment data when integrated with the incidence registry.

**** Planned to be extended to all gynecological cancer patients.

List of publications 2008

Registry staff and affiliated researchers collaborated on 80 research papers in 2008.

Aasbrenn M, Langmark F, Wisloff F. [Is registration of multiple myeloma in the Norwegian Cancer Registry good enough?]. Tidsskr Nor Laegeforen 2008; 128(23):2712-2714.

Arbyn M, Dillner J, Schenck U, Nieminen P, Weiderpass E, Da Silva JD et al. Methods for screening and diagnosis. In: Arbyn M, Anttila A, Jordan J, Ronco G, Schenck U, Segnan N et al., editors. European guidelines for quality assurance in cervical cancer screening. Brüssels: European Community, Office for Official Publications, 2008.

Aschim EL, Haugen TB, Tretli S, Grotmol T. Subfertility among parents of men diagnosed with testicular cancer. Int J Androl 2008; 31(6):588-594.

Banura C, Franceschi S, van Doorn LJ, Wabwire-Mangen F, Mbidde EK, Weiderpass E. Detection of cervical human papillomavirus infection in filter paper samples: a comparative study. J Med Microbiol 2008; 57(Pt 2):253-255.

Banura C, Franceschi S, Doorn LJ, Arslan A, Wabwire-Mangen F, Mbidde EK et al. Infection with Human Papillomavirus and HIV among Young Women in Kampala, Uganda. J Infect Dis 2008; 197(4):555-562.

Banura C, Franceschi S, van Doorn LJ, Arslan A, Kleter B, Wabwire-Mangen F et al. Prevalence, incidence and clearance of human papillomavirus infection among young primiparous pregnant women in Kampala, Uganda. Int J Cancer 2008; 123(9):2180-2187.

Bjorge T, Engeland A, Tretli S, Heuch I. Birth and parental characteristics and risk of neuroblastoma in a population-based Norwegian cohort study. Br J Cancer 2008; 99(7):1165-1169.

Bjorge T, Cnattingius S, Lie RT, Tretli S, Engeland A. Cancer risk in children with birth defects and in their families: a population based cohort study of 5.2 million children from Norway and Sweden. Cancer Epidemiol Biomarkers Prev 2008; 17(3):500-506.

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JANUS serumbank

Special issue

The Janus Serum Bank - From sample collection to cancer research

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Summary

The Janus Serum Bank is one of the world's oldest and largest population-based research biobanks. It is available for researchers with specific interest in cancer research. Janus has been involved in a large number of projects in cancer research that have had implications on early detection of cancer and treatment regimes for cancer patients. Janus was established in 1973 to collect and store blood samples from a large number of presumably healthy individuals for future use in cancer research. The intention was to look retrospectively to the preclinical stage in cancer patients, or look further back at the latent period before the tumor itself has developed, to detect important factors in the pathogeneses or aetiology of cancer.

At present the Janus repository consists of 674 386 vials from 452 376 blood draws among 316 951 donors. The cohort members consist of I) persons undergoing routine health examinations in different counties in Norway (more than 90%), and II) Red Cross blood donors from Oslo and the surroundings (less than 10%). For a small group of previous Janus donors referred to the Norwegian Radium Hospital for cancer treatment, samples are collected before treatment starts.

The Janus cohort is annually linked by personal identification numbers to the Cancer Registry of Norway to identify new cancer cases. As of 31 December 2008, the number of incident cancer cases in Janus was 48 076. Of these 26 216 cases were identified among male donors and 21 860 among female donors, 3396 of which have donated post-diagnostic samples at the Norwegian Radium Hospital. The most common cancer site among female donors is breast cancer (n=6407) and among males, prostate cancer (n=6521).

The long follow-up, the large number of cancer cases and the close interface to the Cancer Registry of Norway make the Janus biobank a unique sample collection for cancer research.

1 Development of the Janus Serum Bank

Historical background and establishment

The JANUS project was established in 1973 on the initiative of the Norwegian professor in pathology, Olav Torgersen (1907–1978). Back in 1975 he wrote about the intention of the Janus project (1) and referred to the longstanding maxim that "prevention is better than cure". From the onset, Janus has been dedicated to cancer research and the investigation of cancer aetiology and early detection, by measuring biochemical and immunological changes several years before the patient's diagnosis. The intention was to collect and store blood samples from a large number of presumably healthy individuals for future use in cancer research. The Janus project was named after the Roman god, Janus. The dual-faced image symbolises the multipurpose nature of the project for retrospective as well as prospective investigations of cancer. Most human cancer studies involve data from patients after the tumor has been diagnosed. The opportunity to detect important factors in the pathogeneses or aetiology of cancer may then be lost. Janus enables retrospect assessment of the preclinical stage in cancer patients, or the latent period before the tumor has been established (1). The idea was first raised in 1957 by a group of Norwegian researchers, but they did not get any support or funds to establish a biobank. A further aim was to collect post-diagnostic serum samples from different hospitals where the cancer patients were treated, to investigate biochemical changes after diagnosis. This collection was feasible only at the Norwegian Radium Hospital (NRH). Due to financial issues, there was a break in the sample collection from 1992 to 1997.

Olav Torgersen

The Janus initiative was a collaboration between former National X-ray examinations, the National Health Screening Services, Ullevål University Hospital and the Cancer Registry of Norway (CRN). The material in Janus consisted of the biological samples and the data attached to them. The health examinations were administrated by the National Health Screening Services (2;3), who sent the lists of participants to the CRN. They were responsible for the data handling, and prepared lists of the Janus donors and allocated placing of the samples in storage. The sample collection was administered by different health institutions and analysed at Ullevål University Hospital for risk factors for cardiovascular diseases. Residue material was sent to the Janus Serum Bank.

Vil kreft kunne bli påvist ved blodprøve?

Enestående prosjekt går ut på å finne krefttegn i blodet

Dosent Egil Jellum og Anne-Karine Thorsrud

Meticulous collection of samples over the last decades from a large number of volunteers at several health institutions, and the great willingness of volunteers to donate blood for the purpose of cancer research, have made Janus one of the world's oldest and largest biobanks. From the outset, the philosophy of Janus was that the data and samples from the Janus biobank were invaluable and should be made available to researchers worldwide for relevant cancer research projects.

The Janus biobank has been run by a number of visionaries and enthusiasts that managed the sample collection and its utilisation in research projects. The resources were limited but the expectations were high that this collection would be of great importance in future research (4). Throughout the collection period the biobank has been supported by strong scientific communities at the Ullevål University Hospital, National Hospital-Rikshospitalet and NRH (from 1 January 2009 organised as Oslo University Hospital). Professor Egil Jellum and biomedical laboratory scientist Anne-Karine Thorsrud as well as chief physician Harald Ørjasæter were key persons in the management of the biologi-

Aage Andersen

Janus-prosjektet
– tidlig diagnose av kreft?

Blodprøvene fra Janusprosjektet er blitt et ettertraktet forskningsmateriale. Forskere både i Norge og andre land har brukt prøvene i ulike kreftforskningsprosjekter.
– De foreløpige resultatene fra enkelte prosjekter ser lovende ut. Dette dreier seg om kreft i eggstokker, skjoldbruskkjertel og lunger, der forskerne har kunnet påvise forandringene i blodet før sykdommen ble klinisk diagnostisert, sier professor Egil Jellum ved Rikshospitalet.

Overlege Harald Ørjasæter med noen av Janusprøvene som lagres i temperaturer helt ned mot −40°C. De aller fleste av blodets bestanddeler tåler å bli nedfrosset på denne måten.

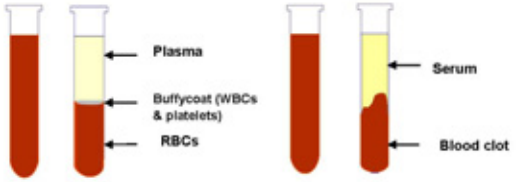
cal samples in the Janus Serum Bank. Former head of research department, Aage Andersen at the CRN was responsible for the data management.

Biobanks and biological material

A biobank can be defined as a systematic collection of human biological material prepared and stored for a certain time, with the information derived from the material's analysis, commonly linked to clinical data. The biological material is typically samples of body fluids or tissues. Storage conditions can vary with respect to temperature, environmental humidity, light exposure and type of vials and caps. With respect to research biobanks, the sample collection can only be used for research purposes, that are considered to be of benefit to the population.

The Janus biobank consists of serum samples that contain small amounts of leukocytes due to incomplete separation. A blood sample in a glass tube will clot after 0.5–1 hours if no anticoagulant is added. Red blood cells (RBC), white blood cells (WBC), and platelets are trapped in the clot separating them from the serum. In contrast to plasma, serum does not contain fibrinogen. Serum consists of approximately 90% water, and normally holds proteins (immunoglobulins transport proteins, enzymes), lipids, hormones, vitamins, minerals, salts and ions, amino acids, water-soluble components, inorganic electrolytes, sugar, carbon dioxide and oxygen. Plasma is obtained from a blood sample to which an anticoagulant (EDTA, heparin or citrate) is added (Figure S1).

Figure S1: Illustration of different blood components



The Janus repository

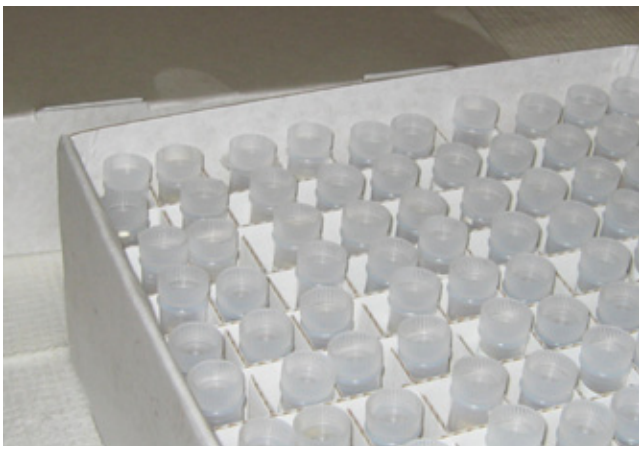
Today the samples in Janus are stored at a commercial freezer department outside Oslo with quality requirements at an ISO certificate level. The storage maintains, a constant temperature of −25 °C. Historically the samples have been located at three different freezer departments in Oslo and the surrounding areas. Parts of the sample collection were stored at −40 °C for a short time. There has been a continuous

Figure S2: Parts of the Janus storage in 2009

work to upgrade the storage conditions. Lately, the old racks have been replaced by new specially designed steel racks (Figure S2).

In the early years of collecting, the Red Cross blood donor samples were stored in bundles of 4–5 vials secured by a rubber band. The samples were placed in boxes but had no specific position. The health examination samples arrived in zip lock bags, marked by county and municipality. During the years all samples have been catalogued in cardboard boxes holding 100 vials each (Figure S3) and stored in racks containing about 150 boxes (64 racks in total). Approximately 90% of the sample collection in Janus is organised in new boxes. The total number of vials in the biobank is 674 386, which includes 452 376 blood draws from 316 951 donors.

Figure S3: Serum sample box with 100 vials



The Janus laboratory

For many years, the Janus laboratory was located at Rikshospitalet in Oslo. Aliquoting of samples in all research projects was performed there up to 2004. The Janus laboratory is today located at the CRN (Figure S4). It is a small laboratory with two workstations. The workbench and ventilation system were upgraded in 2009 into a modern system where ventilation is integrated in the worktop. The serum samples are kept on dry ice during the aliquoting process. Carbon dioxide, which is produced by the dry ice, is effectively removed by the ventilation system. The laboratory fulfils the hygienic and security requirements for biobank operation.

Figure S4: The Janus laboratory at the Cancer Registry of Norway

Biobanks worldwide

The idea of organising biological repositories has existed for many decades. Large-scale collections of human sera have partly been organised on an international level and supported by WHO in 1959 and 1970 (5;6). The International Agency for Research on Cancer (IARC) has published a systematic overview of biological material banks (7). An overview of selected research biobanks worldwide is given in Table S1, and is based on information from the Biobanking and Biomolecular Resources Research infrastructure (BBMRI, http://www.bbmri.eu), and Public Population Project in Genomics (P3G, http://www.p3gobservatory.org). Additional information was gathered from a recent journal article on Nordic biobanks (8). As Table S1 illustrates, the Janus biobank is among the world's oldest and largest biobanks.

In the early days of biobanking the normal storage temperature was between –20 °C to –25 °C. Biobanks established in later years store their specimens at –80 °C and at –196 °C. There has also been a de-

velopment in the type of biological material which is sampled. The older biobanks typically collected serum only. Newer biobanks collect most blood components as well as tissue, urine, breast milk etc. The number of participants varies greatly. Many of the newer biobanks are currently in their enrolment phase. Some biobanks have samples from women only, e.g. The Nordic Maternity Cohorts, the Nurses' Health Study, and The Norwegian Women and Cancer study (NOWAC). Janus has an even distribution of samples from women and men. Many of the biobanks in Table S1 have material from selected groups of the population, e.g. a specific county or age group. Janus has material that is representative to the total Norwegian population, making it particularly well suited for population-based studies.

Table S1: Overview of selected biorepositories worldwide, sorted by year of establishment. Approximate number of participants are given

Biobank	Number of participants	Material	Storage temperature	Country	Established
Swedish Institute of Infectious Disease Control (SIIDC)	358000	Serum	−20 °C	Sweden	1957
Kaiser permanente multiphasic health checkup cohort	150000	Serum	−23 °C / −40 °C	USA	1964
Finnish Mobile Clinic Health Examination Survey	51000	Serum		Finland	1966
Reykjavik Study	30000	Serum	−20 °C	Iceland	1967
FINRISK	23000	Serum, DNA	−70 °C	Finland	1972
JANUS Serum Bank	317000	Serum	−25 °C	Norway	1973
Tromsø study	40000	Serum, plasma, urine, EDTA blood, DNA, hair	−20 °C / −70 °C	Norway	1974
Malmö Preventive Medicine	33000	Plasma, serum	−20 °C	Sweden	1974
Northern Sweden Maternity Cohort	86000	Serum		Sweden	1975
Nurses' health study	238000	Serum, urine		USA	1976
Icelandic Maternity Cohort	48000	Serum		Iceland	1980
Helsinki Heart Study	19000	Serum		Finland	1980
Finnish Maternity Cohort	750000	Serum	−25 °C	Finland	1983
The Nord-Trøndelag health study (HUNT)	100000	Whole blood, DNA, serum, plasma, urine, RNA tubes, cells, buffy coat and Na-heparin tubes	−20 °C / −196 °C	Norway	1984
Alpha-Tocopherol-Beta-Carotene (ATBC) cancer prevention study	30000	Serum		Finland	1984
Västerbotten Intervention Programme (VIP)	95000	Serum		Sweden	1985
Malmö Microbiology	560000	Serum	−25 °C	Sweden	1986
Japan Public Health Center-Based Study	141000	Blood		Japan	1990
NOWAC (The Norwegian Women and Cancer study)	50000	Plasma, DNA, RNA		Norway	1991
Malmö Diet and Cancer	29000	Erythrocytes, granulocytes, mononuclear leucocytes, plasma, serum	−80 °C / −140 °C	Sweden	1991
EPIC (The European Prospective Investigation into Cancer and Nutrition)	522000	Plasma, serum, buffy coat, erythrocytes	−196 °C	10 European countries	1992
CONOR (Cohort of Norway)	200000	Serum, whole blood	−80 °C	Norway	1994
Danish National Birth Cohort	100000	Blood	−20 °C / −196 °C	Denmark	1996
deCode	113000	Blood		Iceland	1996
Million Women Study	1300000	Blood		United Kingdom	1997
Mexico City Prospective Study	160000	Blood	−196 °C	Mexico	1998
The Norwegian Mother and Child Cohort Study (MoBa)	270000	Whole blood, urine , breast milk DNA, RNA	−80 °C / −20 °C	Norway	1999
UK Biobank	120000	Red cells, white cells, plasma, urine	−80 °C / −196 °C	United Kingdom	2000
The Victorian Cancer Biobank	6 000	Tissue, serum, plasma, buffy coat, DNA		Australia	2006

2 Organisation

Ownership

The Janus Serum Bank was owned and sponsored by the Norwegian Cancer Society (NCS) from its establishment in 1973 until 2004. NCS is a national, non-profit voluntary organisation with no state funding, which allocates most of its funds to cancer research. The long-term financial investment from NCS has been of vital importance to Janus Serum Bank. In 2004, the Janus biobank was transferred to the CRN.

The Janus Steering Board

Janus has its own steering board, which is responsible for the scientific management of the biobank. Their assignment is to ensure that the use of the bank is in accordance with the license from the Data Inspectorate and the bank's aims, laws and regulations. Furthermore, the board ensures that the applicants that use the bank have the necessary permissions from the Regional Committees for Medical and Health Research Ethics.

The Janus steering board has 7 members from different special fields at institutions and universities across Norway. It consists of at least one member from the Norwegian Cancer Society as well as one member from the CRN. The chairman is elected among and by the members. The composition of the board is approved by the CRN and the term of office is 5 years. The board approves or rejects applications by general majority. Meetings are arranged when necessary but not less than once a year.

The secretariat

The secretariat is located at the CRN, which appoints its members. It is responsible for the daily management of the bank, which includes management of the data material as well as the serum samples. It coordinates all research projects and is in continuous and close dialogue with the principal investigators, IT personnel and laboratories.

Regulations and licence

In the early 1990s, it was determined that the Janus Serum Bank became subject to the Personal Data Filing System Act. In 1993, the CRN received a license to establish a personal data filing register of the Janus donors. The license was in the CRN's name, since all the data were stored there. The license was renewed in 2009 and is valid through 2018.

During the bank's first years, the donors gave their consent for their samples to be used for "cancer research". The broad consent is not valid according to today's laws. Samples collected in 1997 and onwards are collected based on a voluntary and informed consent (Act relating to biobanks, § 12). However, the Data Inspectorate has approved the use of data and biological samples collected in the period 1973–2004. The donors are free to unconditionally withdraw their consent at any time, and their samples and data will then be deleted (Act relating to biobanks, § 14).

Use of biological materials and the data attached to them is subject to strict ethical and legal restrictions. An ethical framework for previously-collected biobank samples and data has been discussed in several previous articles (9-12). Interestingly, thorough ethical analyses of the advantages and disadvantages of different informed consent practises, regarding how they respect autonomy and integrity, have resulted in recommendations for broad consent practices that are rather similar to the original informed consent used in the Janus biobank (9).

How to apply for serum samples from the Janus Serum Bank

On the Janus Internet site:

http://www.kreftregisteret.no/janus

a standardised application form is available. The formhas to be filled in and submitted together with a scientific project protocol. The protocol should include the background and aims of the study, description of the methods, arguments for the serum volume, power calculations, outline of the project finances, and a list of planned publications. At least one collaborator/co-author from the CRN and/or the Janus Serum Bank has to be appointed. Applications are evaluated by the Janus Steering Board within 1-2 months. All research projects have to be approved by the Regional Committees for Medical and Health Research Ethics prior to sample delivery. Applicants outside Norway require a Norwegian collaborator to coordinate the application process.

3 Characteristics of the Janus cohort

Cohort members

The Janus cohort members consist of three subgroups of donors: I) persons undergoing routine health examination in different counties in Norway, II) Red Cross blood donors from Oslo and surrounding areas, and III) previous Janus donors referred to the NRH for cancer treatment, where samples are collected before treatment starts. In the following text, most tables and figures distinguish between these three subgroups. The members of subgroup I) filled out a questionnaire on risk factors for cardiovascular disease, e.g. smoking habits, alcohol use and body-mass index. The questionnaire data are administered by the Norwegian Institute of Public Health. No such information was collected for subgroup II and III.

The Janus register has the following information about the donors: name, day, month, year of birth, PID, gender and county of residency at the time of blood draw. The total number of donors in the Janus Serum Bank with existing samples is 316 951 (Table S2). Less than 1% (3080) of the donors have not been identified due to invalid PIDs. For a small proportion of the donors (1786) the samples are missing mostly due to serum consumption in different research projects and minor accidental spills. The average age at enrollment for all donors is 41 years. The Red Cross blood donor group (average age 34) is younger than the health examination group (average age 42). The reason is that the donors in the Oslo investigation in 1982–87 and in the health examination from 1985–1999 were in their 40s. Donors from the health examinations constitute approximately 91 % of the cohort and Red Cross blood donors about 9% (Table S3). Post-diagnostic samples are available for 3316 Janus donors (subgroup III). A total of 7473 donors have contributed both as health examination donors and Red Cross blood donors. Table S3 shows the number of donors in the Janus cohort by sex and sample origin. The number of male donors is slightly higher than that of female donors, 52% and 48% respectively, because the Oslo investigation in 1982–87 included men only. In addition, the proportion of men among blood donors is higher than that of women in the general population.

Table S2:
Number of donors included in the Janus Serum Bank

Persons	Number
Janus cohort	321817
Invalid PID	3080
Missing samples	1786
Total included	316951

Table S3:
Number of men and women in the Janus cohort

Sample origin	Men	Women	Total
Health examinations	150779	138310	289089
Red Cross blood donors	17438	14581	32019
NRH	1494	1822	3316
Donors in several categories	4321	3152	7473
All donors	165390	151561	316951

By 31 December 2008, 85% of donors were still alive, 14% were dead and 1% had emigrated (Table S4). The vital status distribution is similar for the health examination and Red Cross subcohorts. Among donors with post-diagnostic samples the death rate is 46.5%.

Description of the sampling procedures

The Janus database has the following information about the samples: day, month, year of collection, position at the repository and county at blood collection. Remaining sample volume is being registered for every sample that is thawed in connection with a project.

The volume of serum samples collected from health examination donors ranged from 1 to 10 ml, and from one to a maximum of four consecutive samples were collected. In the period 1973–1991, the Red Cross blood donors gave a sample of 50 ml to the Janus Serum Bank. In the period 1997–2005, the volume was reduced to 20 ml. The serum was aliquoted into 5-ml polypropylene vials and frozen. Samples from young blood donors (25–30 years of age) were collected at 3–5 year intervals, whereas in the case of the older donors (>40 years) samples were collected more frequently. Thus, from certain individuals, the serum bank may contain up to 17 consecutive blood samples collected since 1973, whereas in other cases only one to three samples are available (13). Consecutive serial samples from the same donors are of particular interest for validation of whether the biomarkers under study are sufficiently stable over time, to allow meaningful analysis.

As shown in Table S5 the largest proportion of the Janus donors has donated serum only once (239 279 donors). More than 42 500 individuals have donated

Table S4: Vital status of the Janus donors

Sample origin	Alive		Dead		Emigrated	
	No	%	No	%	No	%
All donors	269182	85.0	44446	14.0	3323	1.0
Health examinations	245299	85.0	41224	14.0	2566	1.0
Red Cross blood donors	27504	86.0	3703	11.5	812	2.5
NRH	1764	53.0	1537	46.5	15	0.5

twice and more than 24 000 three times. A smaller proportion have donated 4 times (4674) and 6043 individuals have donated 5 times or more.

The Janus biobank is nationwide with samples collected from 17 of the 19 counties in Norway, representing both urban and rural areas (Figure S5).

Table S6 gives the number of donors and number of samples collected in the health examinations only. The only two counties that are not represented are Buskerud and Hordaland. Donors from Oppland constitute the largest part of the Janus cohort with 26.7 %, followed by Finnmark (10.9 %), Sogn og Fjordane (10.6 %) and

Table S5: Number of donors with multiple samples in the Janus Serum Bank

Number of samples	All donors	Health examinations	Red Cross blood donors	NRH
1	239279	233520	13024	3175
2	42574	34204	6788	87
3	24381	20181	3962	26
4	4674	1183	2799	20
5+	6043	1	5446	8

Figure S5: Geographical distribution of sample collection in the Janus Serum Bank

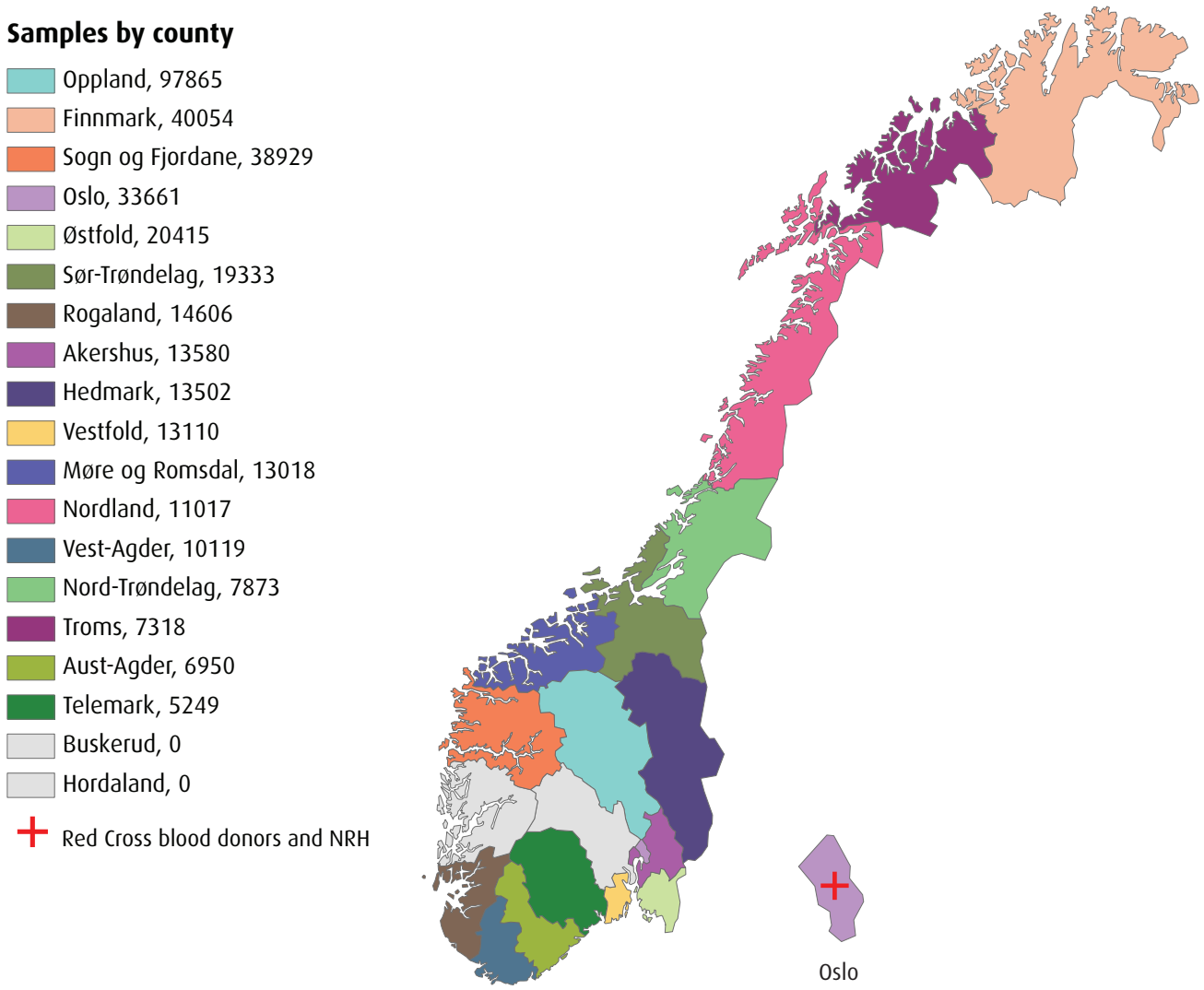


Table S6: Number of samples and donors in the health examinations, by county and gender

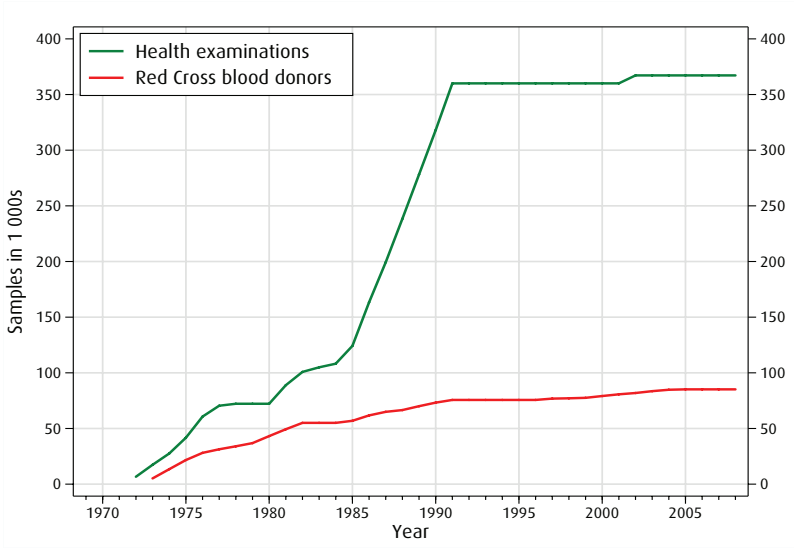
		Men			Women			Total		
No	County	Samples	Percent	Donors	Samples	Percent	Donors	Samples	Percent	Donors
01	Østfold	10068	5.3	9259	10347	5.8	9908	20415	5.6	19167
02	Akershus	6455	3.4	6455	7125	4.0	7125	13580	3.7	13580
03	Oslo	25310	13.3	25077	8351	4.7	8346	33661	9.2	33423
04	Hedmark	6646	3.5	6646	6856	3.9	6856	13502	3.7	13502
05	Oppland	48064	25.3	25395	49801	28.1	26108	97865	26.7	51503
07	Vestfold	6197	3.3	6197	6913	3.9	6913	13110	3.6	13110
08	Telemark	2512	1.3	2512	2737	1.5	2737	5249	1.4	5249
09	Aust-Agder	3445	1.8	3158	3505	2.0	3328	6950	1.9	6486
10	Vest-Agder	4938	2.6	4529	5181	2.9	4881	10119	2.8	9410
11	Rogaland	7051	3.7	6887	7555	4.3	7379	14606	4.0	14266
14	Sogn og Fjordane	19739	10.4	14291	19190	10.8	13726	38929	10.6	28017
15	Møre og Romsdal	6245	3.3	6245	6773	3.8	6773	13018	3.5	13018
16	Sør-Trøndelag	9598	5.1	8688	9735	5.5	9139	19333	5.3	17827
17	Nord-Trøndelag	3920	2.1	3920	3953	2.2	3953	7873	2.1	7873
18	Nordland	5489	2.9	5489	5528	3.1	5528	11017	3.0	11017
19	Troms	3525	1.9	3524	3793	2.1	3793	7318	2.0	7317
20	Finnmark	20128	10.6	12587	19926	11.2	11910	40054	10.9	24497
21	Svalbard	386	0.2	386	223	0.1	223	609	0.2	609
01-21	Total	**189716**	**100.0**	**151245**	**177492**	**100.0**	**138626**	**367208**	**100.0**	**289871***

* 782 persons are included in more than one county

Oslo (9.2 %). A total of 609 samples are from Svalbard inhabitants (a region of Norway located in the Arctic Ocean). The gender specific distribution of samples is fairly similar, except for Oslo, because the collection in 1982–1987 was restricted to men. Table S6 further demonstrates that for the counties Oppland, Sogn og Fjordane and Finnmark, there is a large difference in the number of samples and number of donors, indicating the consecutive collections in these counties.

The serum samples for subgroup I and II were collected in the period 1972–2004. The largest proportion was collected in 1984–1991, especially among health examination donors. In that period the number of samples increased from 110 000 to more than 350 000. Accumulated numbers of samples for both groups are given in Figure S6. Subgroup I and II constitute 367 208 and 85 168 samples respectively. The only serum samples that are still collected by the Janus biobank are samples from the NRH (subgroup III).

Figure S6 Accumulated number of samples collected in different time periods



4 Follow-up of the Janus cohort

Once a year the Janus cohort is linked to the CRN by PIDs, to identify new cancer cases. The CRN has since 1953, systematically collected notifications of cancer for the Norwegian population. A description of the data sources and registration routines at the Registry is given in the first part of this report. The Registry is considered to capture close to 100% of new cancer cases yearly, and this and other quality aspects have recently been evaluated (14-16). The linkages of cancer registry data with the biobank database, create a study base of samples and data, with long-term follow-up and a large number of cancer cases among the donors. The PID, established in the 1960s, allows linkage of data from different sources and to follow a person from early life until a cancer diagnosis, death or other loss to follow-up (emigration or retraction of consent).

The cohort members in Janus are followed up for the event of cancer in the period 1953 to the end of 2008, or until date of death or emigration. As shown in Figure S6 the largest proportion of donors entered the cohort in the late-1980s. The Lexis diagram in Table S7 shows the distribution of person-years at risk of cancer outcome in the different age groups and calendar periods for the Janus cohort members. The total number of person years in Janus is 7 094 753. The age-period-cohort model is a descriptive tool for analysing observations from a Lexis diagram, typically from cancer registries or other disease registries. The model describes rates as a product of age, period and cohort effects (17).

The number of cases has increased year by year since 1978, the largest increase in the period 1998–2008. The baseline samples in Janus were from presumably healthy individuals. However, as shown in Figure S7 some cases were diagnosed before they entered the Janus cohort in 1972. This group comprises approximately 600 cases that were diagnosed with cancer during the period 1953–1971, thus their samples might be affected by diagnostic and treatment parameters.

Cancer incidence

By 31 December 2008 the number of incident cancer cases in Janus was 48 076, 44 578 among health examination donors and 4030 among Red Cross blood donors. Some donors have participated in both subgroups and are therefore counted as cancer cases in both. Of all cases, 3396 have donated post-diagnostic samples at the NRH. Tables S8 and S9 provide an overview of the number of cancer cases in Janus by site and

Table S7: Person years of the Janus cohort members by age group and calendar period (Lexis diagram)

Age	1972-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	2000-2004	2005-2008	Total
85+				5	109	367	795	3015	**4291**
80-84				36	590	1109	9528	40015	**51278**
74-79			29	558	1503	12171	67679	67226	**149166**
70-74		34	596	1565	14209	79451	96520	64690	**257065**
65-69	29	644	1687	7311	87012	107477	88259	80580	**372999**
60-64	248	1774	6803	58884	114715	93712	117666	294640	**688442**
55-59	472	6969	61148	117888	97741	119925	429323	443096	**1276562**
50-54	4346	61933	118704	98160	122843	437175	501731	60317	**1405209**
45-49	15998	101310	94861	119112	443615	507415	68706	26128	**1377145**
40-44	11837	73322	86651	258867	461975	65795	28725	14049	**1001221**
35-39	2898	54578	40007	48952	45770	25267	13594	5709	**236775**
30-34	2833	29240	36182	35408	25086	12064	5629	3112	**149554**
25-29	3887	28560	24338	16349	11693	3254	1363	768	**90212**
20-24	2596	15622	6148	4701	2926	399	261	97	**32750**
15-19	236	722	130	623	353	16	3	1	**2084**
Total	**45380**	**374708**	**477284**	**768419**	**1430140**	**1465597**	**1429782**	**1103443**	**7094753**

Calendar period

sample origin for men and women respectively.

Cancer in male donors

The total number of cancer cases in male donors is 26 216 (Table S8). A total of 24 429 cases are identified among subgroup I, and 2215 in subgroup II. Cancer of the prostate, lung and colon constitute almost half of the cancer burden. Post-diagnostic samples have been donated by 1606 cases at the NRH. These samples are mainly represented by patients with colorectal cancer, lung cancer, melanoma of the skin, prostate cancer and Non-Hodgkin's lymphoma. Figure S8 identifies the cancer sites that contribute substantially to the disease burden in all male Janus donors.

The most common cancer sites in both subgroups combined are prostate cancer, with some 6521 cases, followed by lung, colon, bladder and melanoma of the skin, with 2974, 2039, 1861 and 1550 cases, respectively. Figure S8 illustrates that there is a relatively high number of rarer cancer sites in Janus, some 632 cases of pancreatic cancer, 393 multiple myeloma cases, 121 liver, 114 mesotheliomas and 57 nasal cancer cases.

Cancer in female donors

The total number of cancer cases in female donors is 21 860 (Table S9). A total of 20 149 cases are identified in subgroup I, and 1815 in subgroup II. Cancers of the breast, lung and female genital organs represent more than half of the female cancer burden. Post-diagnostic samples have been donated by 1790 cases at the NRH. The most common cancer sites in post-diagnostic donors are colorectal cancer, lung, breast and ovarian cancer.

Figure S8 identifies those cancer sites that contribute substantially to the disease burden in female Janus donors. The most common cancer site in both subgroups combined is breast cancer with 6407 cases, followed by cancers of genital organs, colon, lung and melanoma of the skin, with 3967, 1555, 1495 and 1335, cases respectively. Rare cancer sites like pancreatic cancer, multiple myelomas, liver, mesotheliomas and nasal cancer cases constitute 412, 210, 43, 16 and 25 cases respectively.

Figure S7: Number of cancer cases by year of diagnosis

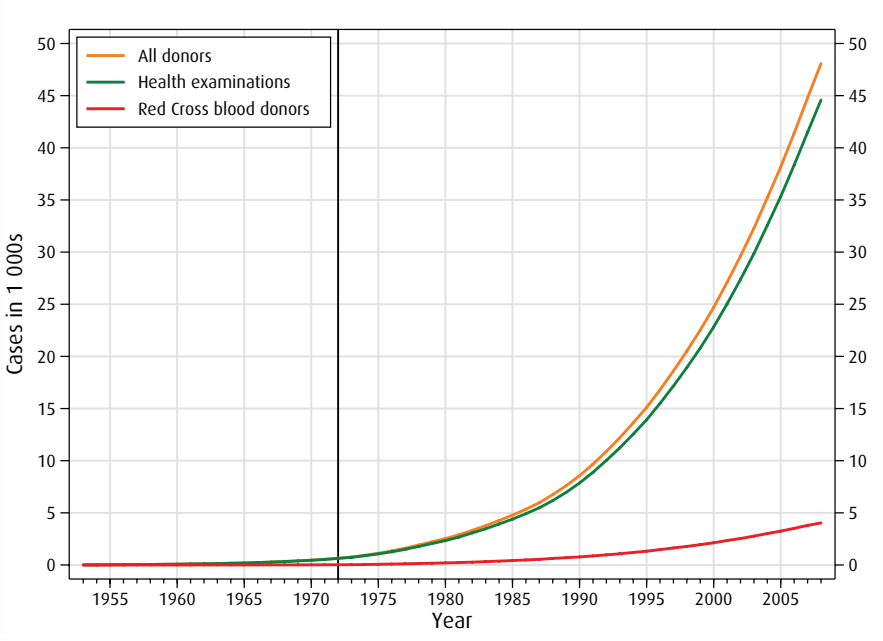


Figure S8: Proportion of common and rare cancer cases among male and female donors

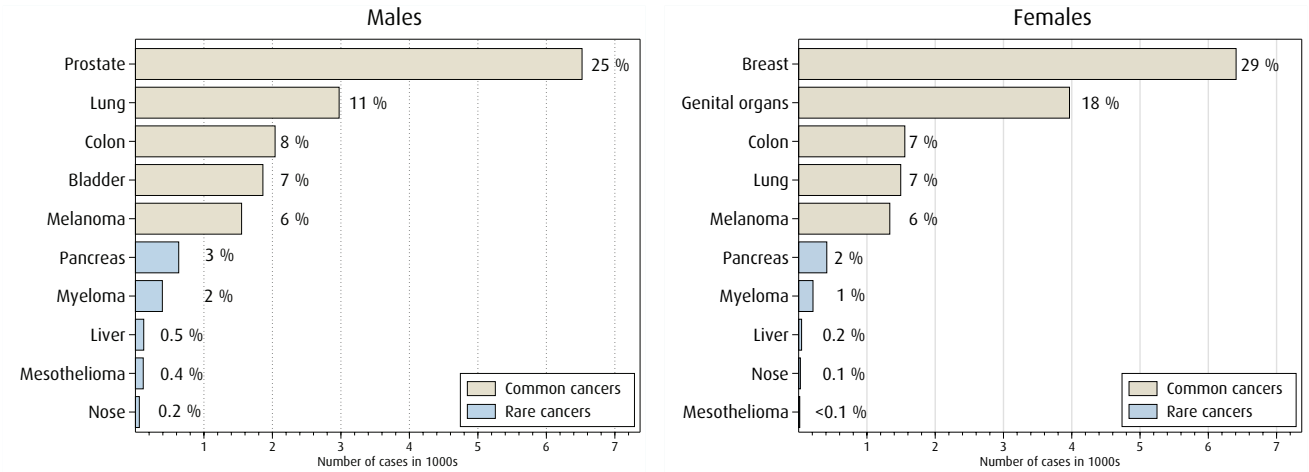


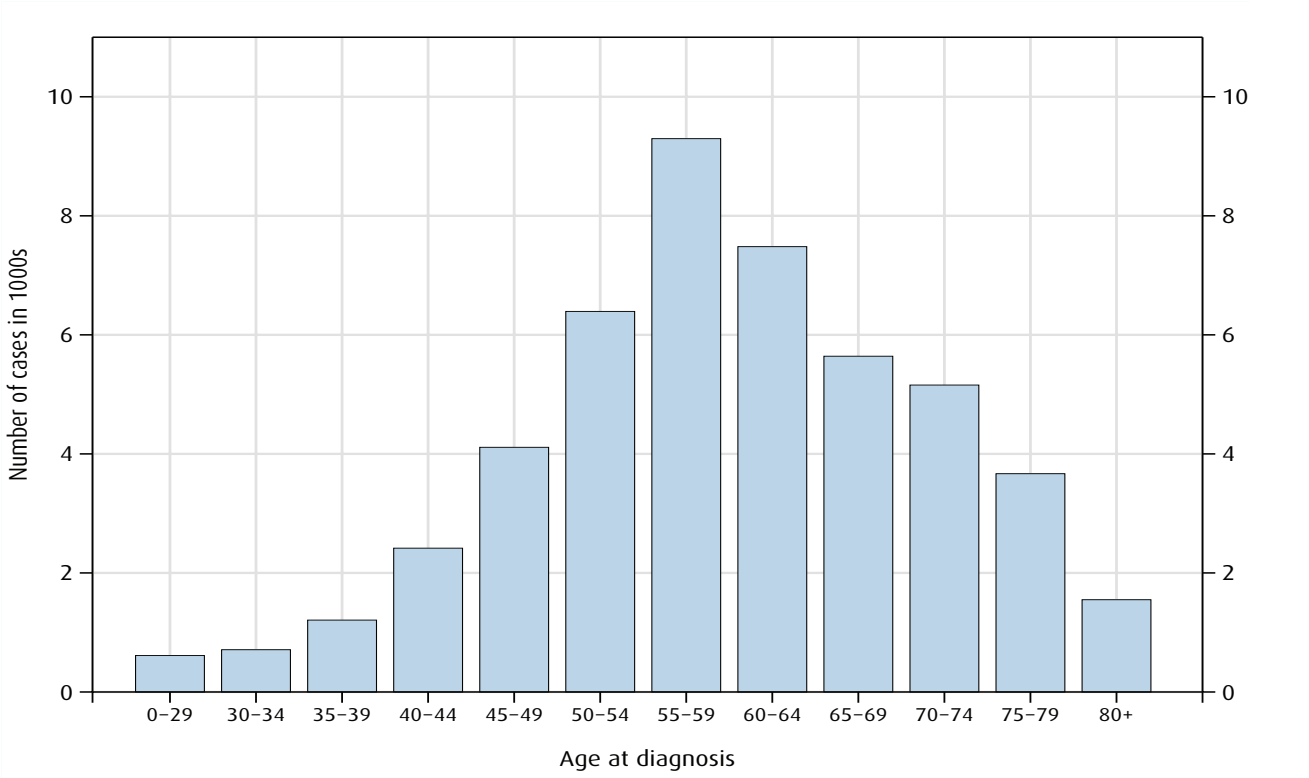
Table S8: Number of incident cancer cases in male donors. Follow up 1953–2008. Cases with post-diagnostic samples at the Norwegian Radium Hospital (NRH) are listed in the last column

ICDO	Site	All donors	Health examinations	Red Cross blood donors	NRH
C00-96	**All sites**	**26216**	**24429**	**2215**	**1606**
C00-14	**Mouth, pharynx**	**687**	**645**	**53**	**59**
C00	Lip	159	153	9	9
C01-02	Tongue	144	131	16	15
C03-06	Mouth, other	130	123	7	12
C07-08	Salivary glands	56	55	1	1
C09-14	Pharynx	198	183	20	22
C15-26	**Digestive organs**	**5625**	**5267**	**440**	**236**
C15	Oesophagus	273	250	27	39
C16	Stomach	846	810	42	30
C17	Small intestine	106	94	14	2
C18	Colon	2039	1901	165	56
C19-21	Rectum, rectosigmoid, anus	1427	1327	122	96
C22	Liver	121	113	8	1
C23-24	Gallbladder, bile ducts	114	108	9	2
C25	Pancreas	632	602	48	5
C26	Other digestive organs	67	62	5	5
C30-34, C38	**Respiratory organs**	**3306**	**3130**	**217**	**223**
C30-31	Nose, sinuses	57	52	6	10
C32	Larynx, epiglottis	250	241	12	15
C33-34	Lung, trachea	2974	2814	197	196
C38	Mediastinum, pleura (non-mesothelioma)	25	23	2	2
C40-41	**Bone**	**39**	**38**	**2**	**9**
C43	**Melanoma of the skin**	**1550**	**1413**	**175**	**93**
C44	**Skin, non-melanoma**	**891**	**797**	**110**	**38**
C45	**Mesothelioma**	**114**	**108**	**10**	**9**
C46	**Kaposi's sarcoma**	**9**	**7**	**3**	**0**
C47	**Autonomic nervous system**	**16**	**15**	**1**	**0**
C48-49	**Soft tissues**	**129**	**120**	**8**	**26**
C50	**Breast**	**29**	**27**	**3**	**3**
C60-63	**Male genital organs**	**7085**	**6584**	**627**	**533**
C61	Prostate	6521	6059	586	477
C62	Testis	467	433	38	38
C60, C63	Other male genital	97	92	3	18
C64-68	**Urinary organs**	**2735**	**2565**	**215**	**119**
C64	Kidney excl. renal pelvis	784	739	58	34
C65	Renal pelvis	90	84	8	3
C66-68	Bladder, ureter, urethra	1861	1742	149	82
C69	**Eye**	**90**	**81**	**10**	**1**
C70-72, D42-43	**Central nervous system**	**898**	**826**	**95**	**57**
C73	**Thyroid gland**	**200**	**185**	**15**	**21**
C37, C74-75	**Other endocrine glands**	**204**	**189**	**18**	**6**
C39, C76, C80	**Other or unspecified**	**438**	**417**	**27**	**12**
C81-96	**Lymphoid and haematopoietic tissue**	**2171**	**2015**	**186**	**161**
C81	Hodgkin lymphoma	138	127	11	15
C82-85, C96	Non-Hodgkin lymphoma	1033	954	94	110
C88	Malignant immunoproliferative diseases	52	51	1	1
C90	Multiple myeloma	393	372	30	18
C91-95	Leukaemia	555	511	50	17

Table S9: Number of incident cancer cases in female donors. Follow up 1953–2008. Cases with post-diagnostic samples at the Norwegian Radium Hospital (NRH) are listed in the last column

ICDO	Site	All donors	Health examinations	Red Cross blood donors	NRH
C00-96	All sites	**21860**	**20149**	**1815**	**1790**
C00-14	Mouth, pharynx	**260**	**237**	**25**	**22**
C00	Lip	61	59	2	2
C01-02	Tongue	54	48	6	6
C03-06	Mouth, other	39	36	3	3
C07-08	Salivary glands	49	44	7	6
C09-14	Pharynx	57	50	7	5
C15-26	**Digestive organs**	**3528**	**3260**	**279**	**188**
C15	Oesophagus	67	61	7	3
C16	Stomach	350	330	20	9
C17	Small intestine	66	61	5	3
C18	Colon	1555	1442	121	65
C19-21	Rectum, rectosigmoid, anus	874	803	69	100
C22	Liver	43	42	1	0
C23-24	Gallbladder, bile ducts	113	104	9	0
C25	Pancreas	412	373	43	6
C26	Other digestive organs	48	44	4	2
C30-34, C38	**Respiratory organs**	**1572**	**1459**	**120**	**128**
C30-31	Nose, sinuses	25	23	2	2
C32	Larynx, epiglottis	42	40	2	5
C33-34	Lung, trachea	1495	1387	115	121
C38	Mediastinum, pleura (non-mesothelioma)	10	9	1	0
C40-41	**Bone**	**41**	**38**	**3**	**6**
C43	**Melanoma of the skin**	**1335**	**1224**	**120**	**46**
C44	**Skin, non-melanoma**	**429**	**389**	**42**	**16**
C45	**Mesothelioma**	**16**	**14**	**2**	**2**
C46	**Kaposi's sarcoma**	**3**	**3**		**0**
C47	**Autonomic nervous system**	**10**	**8**	**2**	**0**
C48-49	**Soft tissues**	**146**	**132**	**15**	**27**
C50	**Breast**	**6407**	**5847**	**621**	**429**
C51-58	**Female genital organs**	**3967**	**3685**	**275**	**679**
C53	Cervix uteri	1004	931	75	116
C54	Corpus uteri	1504	1411	96	220
C55	Uterus, other	13	12	1	0
C56	Ovary	1217	1126	81	285
C51-52, C57	Other female genital	216	194	20	58
C58	Placenta	13	11	2	0
C64-68	**Urinary organs**	**873**	**802**	**72**	**49**
C64	Kidney excl. renal pelvis	371	346	25	20
C65	Renal pelvis	41	36	5	2
C66-68	Bladder, ureter, urethra	461	420	42	27
C69	**Eye**	**66**	**64**	**3**	**3**
C70-72, D42-43	**Central nervous system**	**897**	**845**	**59**	**41**
C73	**Thyroid gland**	**492**	**471**	**24**	**34**
C37, C74-75	**Other endocrine glands**	**171**	**154**	**17**	**3**
C39, C76, C80	**Other or unspecified**	**336**	**298**	**40**	**29**
C81-96	**Lymphoid and haematopoietic tissue**	**1311**	**1219**	**96**	**88**
C81	Hodgkin lymphoma	107	98	8	5
C82-85, C96	Non-Hodgkin lymphoma	668	628	42	72
C88	Malignant immunoproliferative diseases	18	15	3	0
C90	Multiple myeloma	210	193	17	9
C91-95	Leukaemia	308	285	26	2

Figure S9: Age at diagnosis for all cancer cases in Janus



The most common cancer sites in both sexes are in accordance with the profile of cancer seen in the general Norwegian population.

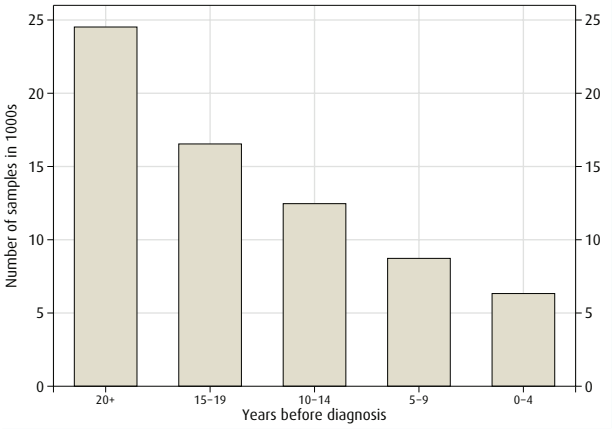
Age distribution and lag time

The largest proportion of cancer cases in Janus are diagnosed in the age group 55–59 years (Figure S9). In the general Norwegian population the age-specific incidence rates per 100 000 person-years are highest in the oldest age groups (80–84, 85+) for all cancer sites combined (see the first part of this report). One-third of all new cancer cases occur among elderly men and women (aged 75 or over). Figure S6 illustrates that the largest proportion of samples in Janus were donated in the late-1980s and early-1990s. Thus, this proportion of the cohort is generally not yet old enough to develop cancer, and this fact suggests that the number of new cancer cases in Janus will continue to increase in the future.

Pre-diagnostic samples are valuable in identifying biomarkers for early detection of cancer and to investigate possible associations between lifetime exposures and risk of cancer. The time between the initiation of disease and cancer diagnosis is the time window where novel markers of early diagnosis can be used (18). The time between sample collection and cancer diagnosis (lag time) for all cancer cases in Janus is given in Figure S10. The largest proportion of the samples has a lag time of either 20 years or more (35%) or 15–19 years (25%). Approximately 10% of the samples that were collected had a lag time of 0–4 years. The rest of the samples material distributes in the lag time categories 10–14 years and 5–9 years.

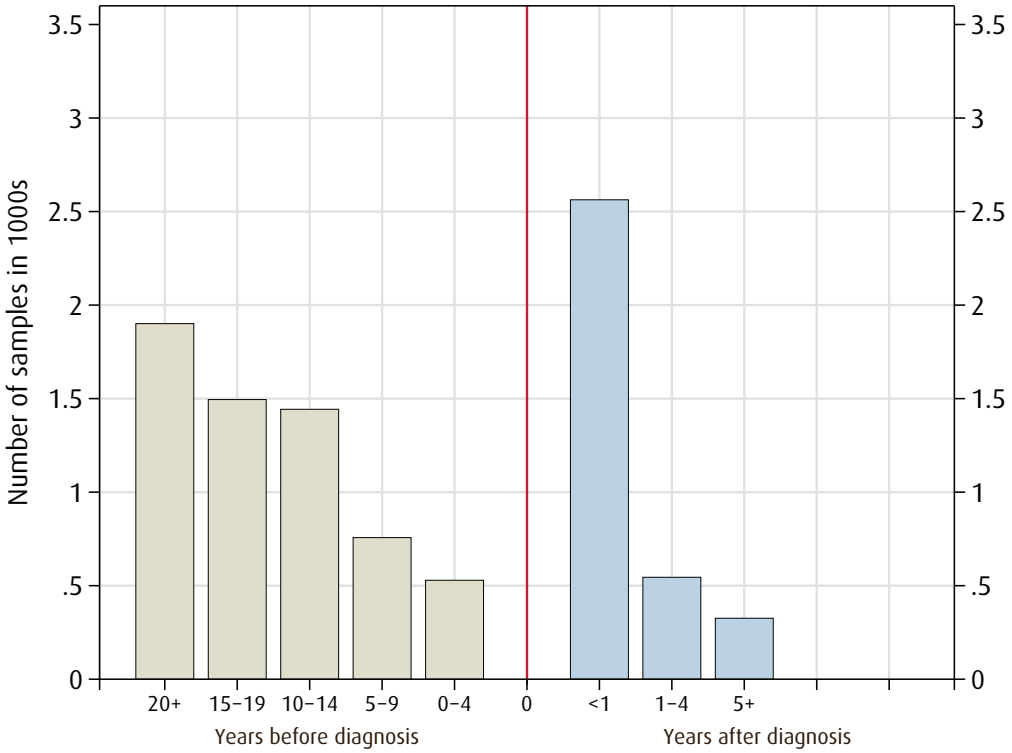
For subgroup III, serum samples collected both before and after cancer diagnosis are available. For those patients ever treated at the NRH, the percentage distribution in lagtime for pre-diagnostic samples is almost similar to that for all patients combined (Figure S11). For post-diagnostic samples, the predominant proportion is collected within one year after diagnosis. As the figure indicates, there are also some samples

Figure S10: Time between sample collection and cancer diagnosis (lag time) in all cancer cases in Janus.



that have been collected 1–4 years or even more than 5 years after diagnosis. Those samples probably originate from the minor number of Janus donors that were recruited to the cohort even though they were diagnosed with cancer before 1972. Alternatively, they might have been treated in other hospitals in Norway before they were referred to the NRH. A third possibility is that they might have been diagnosed with a second cancer. Descriptive analyses of selected sites (cancers of the prostate, breast, colon, lung and melanoma of the skin) showed that the cases with samples collected both before and after diagnosis are limited but adequate for use in research projects (numbers not shown).

Figure S11: Number of samples collected pre- and post-diagnostic, in Janus donors ever treated at the NRH



5 Quality assurance

Quality assurance (QA) in a biobank is the process of verifying or determining whether all procedures meet or exceed defined quality goals. The process considers standard operation procedures for the biobank sample, from donor to research laboratory, covering sampling, transport, storage, tubes and caps, aliquoting samples and shipment. Monitoring and documentation at every step may reduce pre-analytical errors. Two key principles characterise QA: I. Suitable for intended purpose, and II. Correct handling first time.

I. Suitable for intended purpose

The potential value of a biobank depends on the quality of the samples, i.e. to what extent they may reflect the biological, or biochemical situation in the individual at the time of sampling. Storage conditions can vary with respect to temperature, environmental humidity, light exposure, and type of vials and caps. Most errors in laboratory results are due to pre-analytical factors (sampling routines), and have been estimated to constitute about two-thirds of all errors (19). The sample quality is essential for obtaining reliable measurements of archival samples, and lack of component stability may invalidate research results. Several serum components have been investigated in stability studies in the Janus Serum Bank.

Samples from health examinations

The first health examination was carried out in Oslo 1972–1973 among men. In the period of 1974–1988 the health examination surveys were performed in three counties: Finnmark, Sogn og Fjordane and Oppland. During this first enrollment (1974–1978), iodoacetate was added to all samples to stabilise the blood glucose.

In the period 1985–1999 the health examinations among people in their 40s were performed across the country. The examinations were all subjected to cardiovascular disease and risk factors. Blood sampling was done whenever the subject attended i.e. in a non-fasting or random state. Most women attended early in the morning ; most men attended in the afternoon. In 2002, an examination of health and life conditions in Troms county was completed. The Janus biobank received samples from most of the counties and from several periods in each county. Until 1986, the samples were collected in plain tubes without additives, while the samples from the later years were collected in gel vials. After coagulation at room temperature and centrifugation, the serum was transferred to a new vial (glass or polypropylene tube) before shipment, or sent in a gel tube to Ullevål University Hospital in Oslo for serum analyses. The Janus Serum Bank received the residue volume after the analyses. The samples were shipped in batches of 200–300 in specially constructed cooling containers, which maintained a temperature between +1 °C and +10 °C, and reached the laboratory 45–60 hours after collection (2). Depending on transport distance to Oslo, the freezing of these samples could be delayed for days.

Samples from Red Cross blood donors

The sampling routine of blood donors has been fairly unchanged over time. Samples were collected at daytime between 8 am and 6 pm. The donors were non-fasting; blood was drawn with the donor in a supine position. The tubes had no additives or separating gel; samples were coagulated at room temperature and stored at 4 °C overnight before transport to Janus Serum Bank. The clot time could vary from 14 to 28 hours. After centrifugation the serum was transferred to new vials before freezing. The serum was stored in 5 ml polypropylene tubes. Samples collected in 1973–1975 (about 7000 vials) were lyophilised and have to be rehydrated before use.

Samples from the Norwegian Radium Hospital

Janus donors being hospitalised at NRH are asked to give a sample to Janus before treatment. The samples are collected in tubes without additives. After coagulation at room temperature and centrifugation, the serum is transferred to polypropylene tubes and frozen.

For all three subcohorts, the samples have been stored in paper boxes with lids in a commercial freezer department. Exposure to light has occurred during collecting, retrieval, thawing and aliqouting of samples.

Stability studies

Epidemiological studies may be significantly enhanced by using biochemical analyses of stored blood samples collected from the population being studied. The aim of a clinical laboratory test is to measure the concentration or activity of a component in a body fluid or tissue to give information relevant to a patient's clinical state. This procedure implies that the composition of the samples for analysis should not change during the pre-analytical phase. Stability studies have been performed to describe the quality

and usefulness of the archival serum samples in the Janus Serum Bank.

1. Study of biochemical components in serum, to describe the impact of preanalytical sample handling, short- and long-term storage at –25 °C.

Sodium levels showed a significant difference of +3.9 % in long-term stored serum samples demonstrating only a small degree of sublimation during storage. After short-term storage, the difference in level of potassium (+19.9%) and bilirubin (–32.4%) showed the impact of delayed clot time and light exposure. Calcium, iron, creatinine and uric acid showed non-significant or numerically small differences in the levels for short- and long-term storage (20).

2. Study of long-term stability of protein biomarkers.

Levels of albumin, asparagin amino transferase (AST), cystatin C, Immunoglobulins (IgE and IgG), sex hormone binding globulin (SHBG) and transferrin showed non-significant, or numerically small group differences. Large differences after short-term storage were seen for ferritin (–18.5%), alanin amino transferase (ALT) (–41.1%), and creatinin kinase (CK) (–41.1%), while insulin C-peptide showed large differences after long-term storage (–98.7%). The study demonstrated that immunoglobulins which are often analysed in the Janus biobank, are quite robust to long-term storage, while the three-dimensional structure may be critical for enzymes' properties and function and therefore seemed to be more fragile (21).

3 Estimation of folate recovery in long-term stored serum samples.

The accuracy of measurement of folate in archival serum samples has been difficult to assess due to degradation during storage and methods offering low recovery. Folate was measured by three methods, microbiological assay, liquid chromatography tandem mass spectrometry (LC-MS/MS) assay and as p-amino benzoyl glutamate (pABG) equivalents giving recoveries of 41.3, 55.7 and 78.9 %, respectively. For assessment of the initial level, folate determined as pABG equivalents gave the most reliable result (22).

A study on hormones focusing on stability and methodology is ongoing in the Janus Serum Bank.

Quality and applicability of DNA

The Janus Serum Bank is not established for genetic analysis purposes; however, the serum samples do contain trace amounts of DNA. These trace amounts are probably due to an incomplete separation of serum from the blood clot.

The quality and amount of the DNA in the Janus Serum Bank have so far not been investigated. Ivarsson et al. (23) have validated genotypes in archival maternal serum samples. The study compared concordance of genotypes between DNA extracted from 200µl whole blood and serum. The results showed a median DNA yield of 15 mg/L (1–34 mg/L) from fresh whole blood and 90 µg/L (0–4800 µg/L) from archival serum samples. Compared to fresh samples from the same women, the archival samples had a DNA yield of 0–14 % decreasing with storage time in the biobank. Sjöholm et al (24) showed that the DNA yield in the archival serum samples could be a useful source of DNA for genetic epidemiologic studies and for reliable studies on genotyping results, provided that at least 0.2 ng of serum-derived DNA is used in the TaqMan genotyping assays (as allelic loss can occur if smaller amounts are analysed). These results should also be valid for the serum material in the Janus biobank.

The Janus serum collection has been used in two genotyping studies: Bjørge et. al (25) examined BRCA1 mutations in ovarian cancer and borderline tumors in Norway, using a nested case-control study design and Ulvik et. al (26) investigated single nucleotide polymorphism (SNP), genotyping in unprocessed whole blood and serum via real-time PCR.

In both studies, 5–7 µl archival serum was used for detection of SNPs by real-time polymerase chain reaction with a success rate of 83.2–97.9%.

The DNA amplifications were performed on a large set of serum samples, n=2 955 (BRCA1 gene), and n=2 500 (MTHF-reductase gene). Both studies demonstrated that amplification of DNA from serum samples is possible.

II. Correct handling first time

Correct handling the first time requires a high degree of accuracy in all parts of the process. The Janus Serum Bank has established an organisation with explicit procedures for quality assurance, including a quality manual listing the instructions that regulate all parts of the biobank body. The quality system is designed to meet the requirements in the ISO/IEC 17025 standard. All equipment is regularly maintained for optimal performance.

Quality assurance of the samples in research projects

The requested samples are transported from the repository to the Janus laboratory in cooling elements and are immediately placed in freezers. All freezers at the Registry have acoustic alarms and are, in addition, connected to a security company in the event of power failure or breakdown. The temperatures are checked and registered daily.

A maximum of 10 samples are thawed and carefully homogenised simultaneously to minimise the time the samples are exposed to light, and remain in the liquid phase. The restriction on the number also minimises the risk of any mix-up of the samples. The identity of the samples is checked at least two times during aliquoting. Only one sample at a time is uncorked to prevent any contamination. The samples are in the liquid phase for approximately half an hour and are immediately placed on dry ice after the requested volume of serum has been extracted. Filtered tips are used for withdrawal of the serum.

Organising the laboratory work

In order to organise the laboratory work the Janus Serum Bank is in the process of implementing the Laboratory Information Management System (LIMS) for management of all laboratory processes. LIMS is computer software that is used in the laboratory for the management of samples, users, instruments and other lab functions like workflow and invoice registration. The system will make it possible to keep track of information on the samples, i.e. connection between aliquots and the mother tube, and restrictions on the samples like donor reservations. LIMS will also be utilised for generating picking and shipment lists, for assigning barcodes as well as registration of residual volumes and laboratory results. Security and confidentiality of data are ensured by the use of data systems developed with a very high level of security, including back-up procedures and audit functions that protect against unauthorised access to sensitive data.

Document handling

The Janus biobank has recently started implementing an electronic quality manual system to store concessions, rules and regulations, informed consents, information documents and registration of publications. The programme keeps track of project data like applications, approvals and contracts. The quality manual, changes of standard operating procedures (historical documents), registration of deviation and the internal control document are also stored in this document handling system.

6 How to use the Janus biobank – methodological considerations

All sections in this chapter are based on a peer-reviewed article on the quality assurance of studies linking data from cancer registries and biobanks with an emphasis on the experiences of the Nordic biobanks, such as Janus (18).

Design and methods in research projects

The choice of study design in the relation to the use of Janus depends on the proposed outcome of interest. The most widely used study design is however the nested case-control design. A case-control study is an epidemiological study in which, rather than measuring the experience of an entire population to obtain rates, controls are sampled from the same source population as the cases, and relative rates are estimated. The control group provides an estimate of the exposure distribution in the source population and is a substitute for the denominators of rates or risks (27). The nested case-control study starts with identifying the subjects who have developed the disease of interest during follow-up. For each case, the controls are randomly sampled from those eligible to be controls. The practice of selecting ”best fitting controls” (the controls that best fit the matching criteria) and/or convenience sampling (selecting the controls that are stored adjacent to the case and/or listed next to the cases on sample inventories) (28) is not recommended. When using such a sample of controls, it is not possible to make generalisations about the total cohort as the samples are not drawn at random from the eligible samples in the cohort. The nested case-control design is superior for the study of biomarkers where the measurements may be influenced by analytic batch, long-term storage and/or freeze-thaw cycles.

Another approach is the case-cohort sampling design that allows controls to be selected from a random sample of the whole cohort at the start of the follow-up. The subcohort is representative of the full cohort rather than non-cases. Every person in the source population has the same chance of being included in the subcohort as a control, regardless of how much person-time that person has contributed. All subcohort members at risk at the time of the cases diagnosis serve as controls.

Identification of cases and controls

The Janus donors diagnosed with the disease of interest a sufficiently long time after specimen donation are typically included as cases. The cases are identified by linking the PID in Janus to the CRN. This linkage is performed in every new study since the cancer registry is a dynamic database and the number of new cases among the donors will increase over time.

In some Janus studies on environmental and dietary exposures it might be relevant to select samples from one specific point in time, when the exposures were high and samples from all other time periods are not, due to a lack of significant serum components. However, the most typical approach is to include all cancer cases of a specific site during the follow-up period and select either the first available pre-diagnostic sample of the cases, or the sample closest in time to the diagnosis. Another approach is to select serial samples from each case, where the aim of the study is to investigate prediagnostic changes in biomarkers.

Controls should be selected via random sampling among all those eligible, not just those that appear suitable for matching. A person selected as a control, who remains in the study population at risk after selection, should remain eligible for further selection as a control. Moreover, a person selected as a control whom later develops the disease, and then is selected as a case, should be included in the study both as a control and as a case. Sampling with replacement, which allows a control specimen to occur more than once as a control, is in harmony with incidence density sampling for matched case-control studies (27). In biobank studies, it is common to identify 1–2 substitutes for each control that fulfils the same matching criteria as all controls. Those substitutes will be used if the control specimen cannot be located or the serum volume is too low.

The controls have to be at risk for the outcome, in other words, alive and under follow-up at the time of the case’s diagnosis. Therefore vital status is an important variable. Follow-up should include cancer occurrence, death or emigration.

Matching

Matching refers to the selection of control series with respect to the distribution of potentially confounding factors, and is usually performed as a means of in-

creasing efficiency. Common matching variables in Janus are sex, age, date of diagnosis, date of blood collection, county and batch type. Other relevant matching variables may be storage time and thawing status. Matching on only a limited number of variables has been recommended in a recent paper reviewing Nordic biobank studies (8). Actual sampling dates at the level year-month-day (yyyymmdd), instead of approximate ones, are favorable. For instance seasonal matching may be important in micronutrient studies where detailed information on date is essential in evaluating differences in vitamin levels during the year (29;30).

If the aim of the study is to elaborate upon the disease risk related to exposure in the general population, specimen donors selected by health behavior, risk factors and/or sickness, should be avoided. As population representativeness in practice commonly differs from that intended, estimating standardised incidence ratios for a number of different cancer sites, as a proxy for estimating population representativeness, is highly recommended (8). The Red Cross blood donors in Janus are examples of healthy donors not representative of the general population (31). We therefore recommend matching population-based cases to population-based controls, and blood donor cases to blood donor controls. Since blood donors are supposed to be recruited from the healthiest fraction of the population, their use as controls for population-based cases is likely to result in an overestimation of risk.

Data linkages and logistics

The first step in research projects is to link the Janus cohort members to the CRN to identify cases and controls. This linkage gives information on the cancer diagnosis, sample collection date and the location of the sample at the storage facility. After the retrieval of all samples, a complete list of study codes and the coded biological samples are sent to the research laboratories. When analyses are completed, the code list and the laboratory results are returned to Janus. The Janus secretariat attaches all the information required for the study (e.g. the case-control status) and sends the file to the principal investigator or to a statistical analysis centre directly. It is important to ensure that the released data file does not contain accessory information on subjects at a level of detail such that identification of individual subjects would be possible.

In all biobank research projects an essential aspect of quality is that the laboratory analysis is carried out blinded to avoid potential biases. In the Janus Serum Bank, a code-keeping system has been in routine use for many decades. The code of the case-control status is revealed only after completion of all the laboratory analyses. This is an important measure to prevent any data manipulation. The code-keeping system also ensures a high degree of confidentiality; furthermore, patients' names and PIDs are never disclosed (18).

In a few of the research projects involving Janus, several data sources have been used from different institutions. The definition of a unique study code is then essential and is normally generated by the Janus Secretary. Commonly-linked data on confounding variables are occupation, diet and smoking habits. The PID makes possible the retrieval of data from the Norwegian Institute of Public Health. Those data were collected from the health examination questionnaires from the Oslo investigation, 1972–1973 (25%), and the three-counties file (Oppland, Sogn og Fjordane and Finnmark), 1974–1988 (75%). Examples of data items are smoking habits, height, weight, year and age at height/weight measure, and levels of cholesterol and triglyceride. Another source of information is demographics and census data from Statistics Norway, e.g. number of children, birth year of children, occupation, industry, municipality, community (dense/scattered), population (number of citizens in the municipality), county at birth, education, income, number and date of relocation. In such cases, it is recommended that the list of PIDs is sent to those institutions that have the required data and that they themselves do the linkage to obtain the necessary additional information. If the unique study code is sent from Janus together with the personal identifiers, the external institutions can then release the coded data (without identifiers) directly to the PI. During the linkages, it is important that each person in the study population be assigned a unique code. A flowchart of the study logistics and data sources normally applied in Janus studies is illustrated in Figure S12.

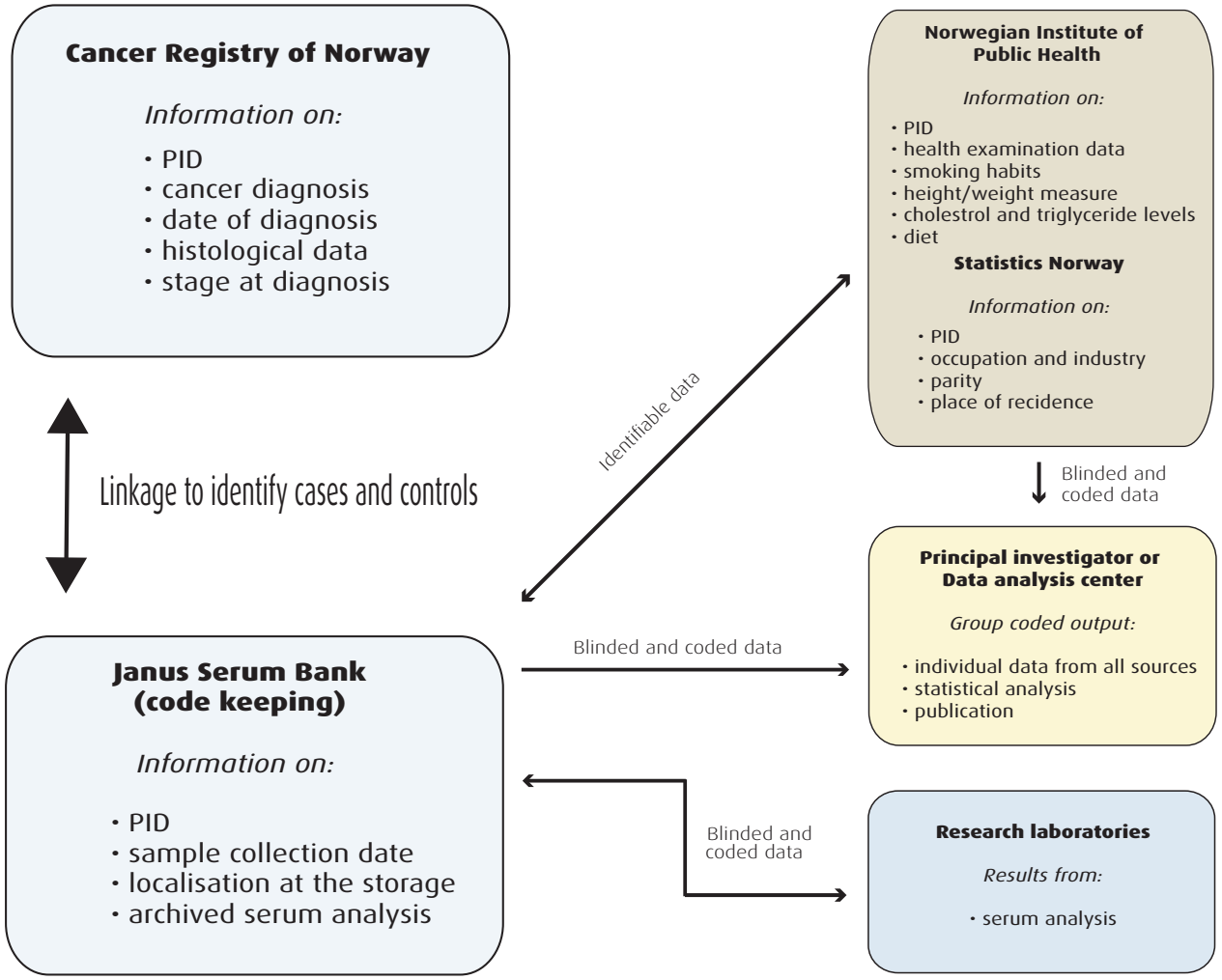
Data management

The writing of an explicit "*Data Management Report*" should become common practice and an important element of the study protocol. This practice is essential for ensuring accuracy in describing the procedures undertaken, particularly when writing scientific papers. The report should contain information on; the identification, loss to follow-up and final numbers of cases and controls; matching criteria; dates of serum sample thawing; missing data and any data errors found. The file record specification should be enclosed as an appendix.

Long-term archiving of the entire study file containing information from all participating biobanks should be organised. The institute responsible for the

long-term storage should be stated on the logistics scheme. The long-term archive file should be based on the unique study code and should not contain any personal identifiers. The code(s) that may be used to link the unique study code to the personal identifiers should be archived at each biobank that originated the samples. It is common that there may be requests for actual crude data for clarifications, new research hypotheses that require further laboratory analyses adjusting for the previously analysed exposures, or requests from collaborators involved in pooling studies that require information from a study published many years earlier. It should be possible to respond to such requests in an efficient manner. Because of the lengthy time spans involved and the requirement for unified data storage formats, it is recommended that the custody of the long-term archive be the responsibility of the host institution. It is therefore sufficient from an ethical and practical point of view that codes enabling linking to personal identifiers remain in the biobank.

Figure S12: Flowchart of common study logistics and data sources in Janus research projects



7 Research projects and important findings

Figure S13: Key scientific findings from studies involving the Janus biobank

Association between different types of Human papillomavirus (HPV) and cervical cancer, other anogenital and oropharyngeal cancers

Association between infection with the bacteria Helicobacter pylori and gastric cancer

Association between elevated levels of Prostate-specific antigen (PSA) and development of prostate cancer

Association between elevated serum CA 125 levels and ovarian cancer

The Janus biobank has since the 1980s been utilised in a numerous research projects within the field of cancer epidemiology. The most common hypothesis have involved the investigation of associations between cancer and infections, environmental exposures and lifestyle-related factors. Another important aim has been to investigate biomarkers for the early detection of cancer. Studies on other disease outcomes than cancer have been limited (32). Figure S13 highlights some important results from aetiological studies in Janus that have had implications on the treatment regimes of cancer patients. The studies reported associations between the human papilloma virus (HPV) and cervical cancer (33), Helicobacter pylori (H. pylori) infection and gastric cancer (34), as well as elevated levels of Prostate Specific Antigen (35) and cancer antigen 125 (CA-125) and the development of prostate and ovarian cancer (36) respectively.

A common technique used to analyse metabolic or immunological changes in serum samples from Janus has been Capillary Electrophoresis (CE). CE designed for serum protein analysis was used for early detection of the monoclonal component in myelomatosis (37). The ELISA technique has been used in several immunological studies. Both chromatography and electrophoresis were utilised to study pre-diagnostic sera from Janus and to classify certain bacteria (38).

The first scientific paper from Janus was published in 1982. The number of publications has grown over the years, as is shown in Figure S14. In addition, there have been a number of reports, pilot studies and abstracts. Approximately 30% of the projects have been initiated by Norwegian researchers and 70% have been initiated by research groups outside Norway. By 2009 there are more than 15 ongoing projects involving the Janus biobank. An overview of the publications, according to research area, is given in Table S10.

Infections and cancer

A large proportion of the research projects in Janus have focused on investigating the association between infections and cancer, in particular HPV. The strong association between HPV-18 infection and risk of cervical adenocarcinoma was confirmed in a seroepidemiological study (33). Another study found a significant increase in the risk of head and neck cancer among HPV-16 seropositive cases (41). A significant increased risk of developing esophageal cancer was observed in HPV 16-seropositive subjects (42) as well as among women diagnosed with non-cervical anogential cancer, particularly vulvae and vaginal cancers (89). A positive association was found between cancer of the anal and perianal skin and infection with HPV

Figure S14: Accumulated number of publications using the Janus Serum Bank

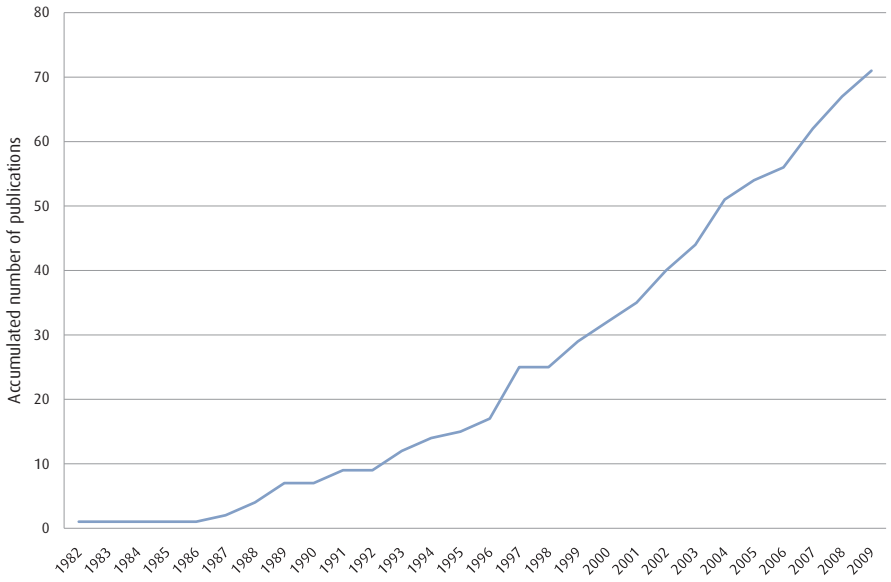


Table S10: Overview of the publications in the Janus biobank, separated by research field

Research field	Biomarker / Biobank	Type of cancer	References
Infections and cancer	HPV	Cervix	(33;39;40)
		Head and Neck	(41)
		Esophagus	(42)
		Prostate	(43)
		Anal and perianal skin	(44)
	HPV DNA	Cervix	(45)
	H. pylori	Gastric	(34;46-48)
	Epstein Barr virus	Non-Hodgkin lymphoma	(49)
		Nasopharyngeal	(50)
	EBV and CMV viruses	Testicular	(51)
	JC polyomavirus	Colorectal	(52)
	SV40 antibodies	Mesotelioma	(53)
	Human herpesvirus 8	Multiple myeloma	(54)
	C. trachomatis	Cervix	(55-57)
	Chlamydia antibodies	Prostate	(58)
	HPV and C. trachomatis	Cervix	(59)
	HPV and C. trachomatis and smoking	Cervix	(60)
Early detection of cancer	PSA	Prostate	(35)
	CA-125	Ovary	(36)
	Androgens	Prostate	(61)
	Epstein Barr virus	Hodgkin lymphoma	(62)
	Thyroglobulin	Thyroid	(63)
	Immune Anti-tumor respons	Lung	(64)
	Mesothelin	Malignant mesothelioma	(65)
	Insulin-like growth factor I and binding protein 3	Breast cancer	(66)
	Sex hormones	Prostate	(67)
	Testosterone	Prostate	(68)
	Vitamin D	Prostate	(69)
Environmental exposures and cancer	Organochlorines	Breast	(70)
		Non-Hogkin lymphoma	(71)
		Testis	(72)
	Selenium	Thyroid	(73)
	DHEA	Thyroid	(74)
Lifestyle related risk factors and cancer	Smoking/Cotinine	Lung	(75)
	Smoking/Cotinine	Cervix	(76)
	Fatty acids	Prostate	(77)
		Thyroid	(78)
		Breast	(79)
	Obesity/lipids	Colon	(80)
	Diet/leptin	Prostate	(81)
	Diet/phytoestrogen	Prostate	(82)
Cancer prognosis	Vitamin D	Prostate	(83)
	Mesothelin	Malignant mesothelioma	(65)
Genetic studies	SNP-analyses	Colorectal	(26)
	BRCA1-mutations	Ovarian	(25)
QA- stability studies	Serum proteins	-	(21)
	Sodium, calcium, iron, creatinine, uric acid, potassium, bilirubin	-	(20)
	Albumin and free fatty acids	-	(84)
Descriptive studies	Janus	-	(4;38;85;86)
	Nordic biobanks	-	(8)
	Nordic biobanks/registries	-	(18)
Methodological stuides	Chromatography and capillary electrophoresis	-	(37;87)
	BRCA1-mutations	-	(88)

-16 and 18 (44). No association was seen between the serologic markers of HPV-16, 18, and 33 infections and the risk of prostate cancer (43).

H. pylori infection and risk of gastric cancer have been investigated in several studies. It was found that gastric (but not non-gastric) non-Hodgkin lymphoma, was strongly associated with previous H. pylori infection (46). A nested case-control study in the Janus cohort concluded that the results strengthen the evidence that H. pylori infection is a risk factor in non-cardia gastric cancer. A negative association with H. pylori infection was found for cardia cancer (47). A recent paper reported two aetiologies of cardia cancer, one associated with H. pylori atrophic gastritis, resembling non-cardia cancer, and the other associated with non-atrophic gastric mucosa, resembling esophageal adenocarcinoma. Serological markers of gastric atrophy may provide the key to determining the gastric versus the esophageal origin of cardia cancer (48).

One landmark study reported a positive association between Chlamydia trachomatis (C. trachomatis) and risk of invasive squamous-cell carcinoma (SCC) of the uterine cervix (55). These results were confirmed in other studies using sera from three Nordic biobanks (56;57). The joint effect of HPV and C. trachomatis and smoking on risk of cervical cancer was investigated in the same Nordic biobanks. Results showed that HPV-16, C. trachomatis and smoking are likely to be risk factors for SCC and jointly, there is strong antagonistic effect (59;60).

Serum from Janus has also been used to investigate the association between the Epstein-Barr virus (EBV) and Hodgkin lymphoma. Results showed that the development of the disease may in some patients be preceded by enhanced activation of EBV. The study could not provide direct answers as to whether EBV has a direct role in the pathogenesis of the disease, or is simply a marker for a more fundamental factor affecting the immune control of latent infection (62). This finding were supported by similar findings for non-Hodgkin lymphoma (49).

Preclinical tumor markers and early detection of cancer

A study on early diagnosis of ovarian cancer on measuring CA-125 levels, provided a new insight into the preclinical biology of ovarian neoplasia (36). Serum CA-125 levels were determined retrospectively for specimens collected from 105 women who subsequently developed ovarian neoplasia, and from 323 matched controls. The distribution of CA-125 levels was significantly different between the case and control populations. Serum thyroglobulin was found to be a preclinical tumor marker in subgroups of thyroid cancer patients in Janus. Results indicated that serum thyroglobulin tends to be elevated years prior to the clinical appearance of thyroid carcinoma, whereas serum-TSH is not (63). Janus was participating in collaborative analysis of 18 prospective studies investigating the association between sex hormones and prostate cancer. No association was found (67).

Environmental exposures and cancer

The sample collection in Janus is particularly suitable for investigating environmental exposures and cancer, since a large number of the samples were obtained at a time when a number of carsinogenic substances were still in use. The three studies that are published on this topic are based on serum samples from the 1970s when organochlorine exposures were high. A positive association between Non-Hodgkin lymphoma and polychlorinated biphenyl (PCB) was shown in one study (71), and between testicular cancer and exposure to dichlorodiphenyldichloroethylene (DDE) and chlordane compounds in another (72). However, no association was shown between breast cancer and organochlorine levels (70). There is also an ongoing project on organochlorines and risk of cancer of nine different sites.

Lifestyle-related risk factors and cancer

Lifestyle-related risk factors like smoking and diet have been investigated in Janus projects with different cancer outcomes. Serum cotinine level as a predictor of lung cancer risk has been investigated in 1741 Janus participants. Mean serum cotinine levels were higher in cases than in controls, and were found to be a predictor of risk of lung cancer among smokers (75). Smoking as an independent risk factor for cervical cancer in women infected with oncogenic HPV was confirmed in a Nordic collaborative study (76). A further study hypothesized that leptin increases the risk of colon cancer, and furthermore that leptin may provide a link between obesity and the disease (80).

QA stability studies

A vital component of the work within the Janus biobank is quality assurance and studies performed to investigate the stability of a number of serum components (electrolytes, minerals, water-soluble molecules, enzymes, immunoglobulines, transport proteins, glycoproteins, peptides and hormones) after long-term storage. The studies showed some sublimation (4%) in the samples after 25 years of storage, and demonstrated that commonly-analysed immunoglobulins are

quite robust to long-term storage, while some enzymes appeared to be more fragile (20;21).

The effect of long-term storage on the concentration of albumin and free fatty acids (FFA) in serum was measured. FFA and albumin could increase in response to several years of storage at –25°C. It was suggested that the storage-time-dependent increase in FFA was due to FFA liberation from lipoprotein triglycerides, whereas the apparent increase in albumin concentration possibly could be attributed to an unfolding of the protein (84).

Genetic studies

Few genetic studies have been performed in Janus. However, two studies that used polymerase chain reaction (PCR) methods were successfull in detecting the polymorphisms of interest. One study found a significantly reduced risk of colorectal cancer in subjects with the MTHFR 677 TT and MTR 2756 GG genotypes (26). Prevalence of BRCA1 mutations in ovarian and borderline tumors was investigated in a case-control study. Four founder mutations were analysed and results showed that mutation carriers have a very high risk of developing ovarian cancer (25).

Methodological studies

Analysis of DNA variations in biological samples most frequently involve PCR performed on extracted genomic DNA. Amplification of DNA from plasma and serum samples has been rare applied. DNA amplification on a large set of serum samples (n=2955) from the Janus collection has also been studied. Of the 11 820 PCRs performed, the overall success rate was 91.3%, which is comparable to the success rate of PCRs performed on genomic DNA (88). The advantage of the method is its ability to utilise archival material stored in serum biobanks for a long period.

8 Strengths and limitations

At the time Janus Serum Bank was launched, few amongst the scientific milieu had strong inclinations as to the profound importance of such materials in future cancer research. The establishment of the Janus Serum Bank was made possible by a huge voluntary and communal effort in Norway. However, the funding was restricted and therefore gave room for only simple logistical solutions, relative to the options available to well-funded and modern biobanks, with respect to temperature monitoring, sample access etc. The Janus biobank is a child of its age carrying both strengths and weaknesses compared to a modern biobank.

The Janus biobank holds a unique position because of its close and longstanding relations to the CRN. Janus has a high number of sera with a follow-up time of up to 35 years, and can thus provide research projects with the required number of cases, even for rarer cancer forms. Sequential samples offer a unique possibility to follow the development of the disease in prediagnostic changes over the years. The biobank contains serum samples from as far back as the early-1970s, a time when dietary and smoking habits in the general population were quite different, and certain environmental pollutants - later established as carcinogenic - were not yet banned from use. These samples have proven to be important in cancer projects investigating the impact of environmental exposures. The presence of some DNA in the Janus samples may offer the possibility for single nucleotide polymorphism (SNP) analysis. Although the quality and amount of the DNA material in Janus Serum Bank have not been investigated, two projects have successfully performed SNP analysis. Two of the obvious benefits of the Janus Serum Bank are that it provides linkage to the national high-quality cancer registry, and that it provides linkage to the deaths registry in order to match vital status, and to the national public health institute for questionnaire data.

Today the Janus Serum Bank performs high-quality operational procedures according to a quality manual that implements the retrieval of the correct sample, transport to the laboratory, thawing, aliquoting, tubes and caps, and shipment.

Documentation is an important part of the quality work, and use of every sample in the bank in an earier project is recorded. The storage has been upgraded and now has a good quality logistic system.

The Janus Serum Bank has a strict code-keeping policy. The code will not be broken before the analyses have been completed and the results have been sent to the Janus Secretary. This policy ensures blind analyses and honest research.

One limitation of the Janus biobank is the undocumented preanalytical sample handling. Samples donated by both blood donors and persons participating in health examinations were collected in a sub-optimal way. Blood donor samples had a prolonged clot time before separation and freezing of serum. For the health examination samples, delayed freezing of the serum samples due to long transport distance may have reduced the quality of the samples. However, studies show no significant changes in the levels of a number of common biological components in rat serum, refrigerated for seven days (90), and in human serum, refrigerated for four days (91). The storage temperature of –25 °C is sub-optimal according to present requirements. Stability studies have shown that the pre-analytical sample handling and the storage temperature have an impact on some serum constituents (20, 21). In the early years of collecting (1973–1978), iodoacetate was added to the samples to stabilise the blood glucose. Iodoacetate may disturb the measurements in some assays (GC-MS of homocystein and double-antibody radioimmunoassay of IgF), and these samples have therefore been excluded in certain projects.

In contrast to modern biobanks, Janus does not contain many small aliquots from each sample, but from the blood donors there are 4–5 larger aliquots. The repeated refreezing of the mother tube after aliqouting may decrease stability of some serum components and thus reduce the quality of the sample. However, the majority of the samples in the Janus serum bank have not yet been used in research projects, and therefore have never been thawed.

The number of cancer cases continues to increase in the bank, as does the lag time (the time between date of collection and date of diagnosis) for the cases. A long lag time may be of critical concern in studies looking for biomarkers for early diagnosis of cancer.

Despite the limitations, the bank has proved to have a large research potential. The bank is internationally unique with respect to its research potential given its size, long-term storage of serum samples and its large number of subsequent cancer cases.

9 National and international collaborations

An underlying philosophy of the The Janus Steering Board is that the collection of serum samples should be utilised as much as possible for relevant cancer research projects. Researchers are therefore encouraged to submit proposals for collaborative studies.

Already in 1980 the Janus biobank collaborated with 10 laboratories in Europe and the United States, and more than 1000 serum constituents were analysed in a search for early pre-clinical biochemical changes in sera.

The Janus Serum Bank and the CRN have collaborated with institutions both in Norway and abroad. The pioneering study of H. pylori and gastric cancer was published in collaboration with Ullevål University Hospital in Oslo, and a project on vitamin D associated with cancer has been published in collaboration with Aker Hospital in Oslo. The gene mutation study among ovarian cancer patient in Janus was initiated at the NRH and a project on gene polymorphisms and colon cancer was initiated by the homocysteine group at the University of Bergen.

Through the Nordic Biological Specimen Banks working group on Cancer Causes & Control (NBSBCCC), and the Cancer Control Using Population-based Registries and Biobanks (CCPRB), a large European Union-funded Network of Excellence, the Janus Serum Bank has collaborated with several European institutions. Major research fields has been HPV and different cancer forms and studies on the science of biobanks. Samples have been analysed at the German Cancer Research Center in Heidelberg and at laboratories in Malmö, Sweden and Oxford, England. Most of the statistical work in CCPRB has been performed by the Cancer Registry of Finland. Important projects on lung cancer associated with smoking have been performed in collaboration with International Agency for Research on Cancer (IARC), France.

In the U.S., Stanford University, Harvard School of Public Health, Yale University and Johns Hopkins University have been collaborating institutions. A longstanding cooperation with the National Cancer Institute (NCI) in United States has been focusing on associations between environmental exposure (organochlorines) and different cancer outcomes.

10 Summary remarks and future perspectives

Biobanks have become an important resource in cancer epidemiology and have led to an increased interest in aetiological, clinical and gene-environment-interaction studies. The long follow-up time, the nationwide sample collection and the large number of cancer cases make Janus biobank an exceptional resource for modern cancer research. Linking information from biological samples in Janus to the population-based CRN, optimises the biobank's value in cancer research. Janus is an important resource for cancer research and future goals are to optimise the utilisation of the samples, and to improve the accessibility for all national and international research groups focused on cancer as endpoint.

Major scientific goals of the Janus Serum Bank are:

- To motivate studies on rarer cancer forms. The number of cancers such as liver and pancreatic cancer, and multiple myeloma is high in Janus. This feature provides opportunities to set up large epidemiological studies focusing on cancer diseases with poor prognoses, and where the knowledge of aetiology is limited.
- To continue vital quality assurance work to obtain high quality scientific data.
- Initiate new studies examining environmental exposures, in relation to lifestyle-related cancers, and to investigate the effect of changing exposure over time.
- To utilise the subcohort with both pre- and post-diagnostic serum samples in studies on cancer treatment and prognosis.
- To focus on site-specific cancer studies that utilise the thawed samples optimally.
- To implement and improve infrastructural data systems for tracking information on the biological samples, including serum volumes and the generation of retrieval and shipment lists in research projects.
- To exploit the possibilities of Registry linkages to obtain additional relevant information on the donors in Janus for cancer research.
- To utilise modern technology to enable the use of the Janus biobank in gene-environment-interaction studies.
- To examine further the utilisation of the samples for research on non-cancer endpoints.

11 Evaluation of Janus as a resource in cancer research -international perspectives

Joakim Dillner

International biobank collaboration is useful both for making biobank-based studies more informative as well as for furthering the progress in the scientific field of the biobanking itself. Basically, the international biobank-based study aims to ameliorate some of the major problems encountered in modern molecular epidemiology, most notably i) unreliable study designs ii) insufficient statistical power iii) confounding, "part of the truth" study designs and non-generalisability iv) multiple hypothesis testing v) insufficient quality control, feasibility assessment and prioritisation of efforts from the perspective of several different disciplines. As the build-up and use of biobanks is expanding rapidly with many new uses and increasing demands on the infrastructure, there is a need for the scientific personnel of the biobanks to interact in scientific networks aimed to promote exchange of experiences and further the science of biobanking. Several major international biobank collaborations exist and very ambitious initiatives have been made in recent years. The Janus biobank has unquestionably pioneered the science of biobanking, particularly regarding purpose-oriented quality of biobanking and is likely to continue to be an important contributor to international research on biobanking and its uses in cancer research.

When reliable information from registries and questionnaires, in particular concerning cancer incidence and mortality, family history, health and life-style factors, can be linked to biological samples from large numbers of individuals, an enormous study base for innovative cancer research is created. The significant cost and limited throughput for obtaining data from biospecimens used to favour epidemiological studies based only on registry analyses. However. the technological advances in the analysis of biospecimens have greatly improved our ability to investigate the genetic and environmental determinants of cancer and response to treatment of cancer. Today, the bottleneck for the progress is not the analysis cost or capacity, but rather the availability of large and well characterised sample collections that have been followed-up for significant amounts of time.

Biobank-based sciences of today are however faced with a number of unresolved problems, regarding fundamental issues like integrity, ownership/custodianship and quality. The mode of operation of the Janus biobank is in many respects a "role model" for high quality biobanking efforts, where solutions to many of the current problems were, with incredible foresight, established decades ago.

In terms of ownership/custodianship, much of the current debate has focused either on "Big Brother"-issues related to governmental biobanking initiatives or on issues of making profit from personal samples/data related to commercial biobanking. The Janus biobank is a role model of a citizen biobank established from a popular grass roots movement and from the start had a clear ownership organisation (the Norwegian Cancer Society) with widespread popular trust.

In terms of protection of integrity, the Janus biobank has again acted as a role model as the personal identifiers of donors are never released to the scientists requesting withdrawal of samples. With the absence of any instance of violation of integrity after >35 years of operation in large-scale biobanking research, it can be considered as shown that biobanks can be established and used for cancer research without violation of personal integrity, provided that equally strict modes of operation as used by the Janus biobank are implemented.

In terms of quality, the principles used by the Janus Steering Board are gradually being recognised as a preferable mode of operation of biobanks. In brief, the use of the Janus biobank is decided by the multidisciplinary committee, that evaluates proposals for withdrawals of data and samples with respect to the common pitfalls that impair quality and usefulness of samples (biased study designs, insufficient power, confounding ("part of the truth" study designs that investigate only a single risk factor), multiple hypothesis testing, insufficient quality control, feasibility assessment and prioritisation of efforts from the perspective of several different disciplines). The Janus Steering Board has stringent policies for evaluation of these aspects of proposal. Prioritisation is made with the ex-

plicit aim to ensure that future research possibilities are not impaired, which includes e.g. stringent assessment to ensure minimal consumption of samples and active requests for applicants wishing to do similar studies to collaborate. The hypotheses to be tested must be filed with the Janus Steering Board in advance of approval, guarding against uncontrolled multiple hypothesis testing and duplication of efforts.

An important quality assurance is the policy that the samples must always be analysed, with the analysing laboratory being blinded to the identity of samples. The code with data on case-control status and accessory data is only released after a copy of the laboratory measurements have been filed with the Janus biobank (please observe that the code for personal identities is never released, only the clinical information needed for the statistical analyses). This policy is essential for several reasons. The strict blinding policy is an effective measure for prevention of fraud, thereby ensuring credibility and resulting impact of studies that emanate from the Janus biobank. Keeping the code until data is returned is also an effective policy to ensure control of what the biobank is being used for, which is the essence of quality. Quality is defined as being appropriate for the intended purpose and any quality improvement programme must start with assessing whether the uses and the results from the uses are in accordance with the purpose of the biobank. The present special issue should further contribute to promoting excellence in the science of biobanking, as widespread recognition of the availability of the resource will assist in ensuring that the Janus biobank is optimally used for its designated purpose – contributing to the progress in cancer research.

Several collaborative studies and international biobanking networks are currently actively attempting to develop uniform methods and quality standards for biobanking - so-called Good Biobanking Practice. All such efforts recognise the importance of establishing quality criteria concerning the nature of the sample, conditions of sample storage, the adequacy of available information et cetera, and the stringent Janus biobank policies that enable assessing quality of use in relation to purpose are gradually gaining acceptance as an essential part of Good Biobanking Practice.

That these policies are successful is evident, as the scientific output from the Janus biobank is not only voluminous but contains a substantial proportion of high impact papers that have made a decisive difference for our opportunities for cancer control.

An important aspect of the operation of the Janus biobank, is an active pursuit of research on biobanking. In the past few years, there has been a growing awareness that biobanking is not merely a service but that the complexity and innovation involved clearly merit designating biobanking as a science in itself. The doctoral thesis of Randi Gislefoss on long-term stability of serum components in biobanked specimens is a prominent example of the importance given to an evidence-based approach to biobanking.

The integration of the Janus biobank with the Cancer Registry of Norway is an internationally unique arrangement that also should be recognised as a role model. Many biobank cohorts are based on small and selected groups of volunteers. However, it is an essential feature of epidemiological cancer research that it should be population-based. The vision for the biobanks of the future should be as a biological part of the Cancer Registry, where the samples are either comprehensive population cohorts and/or systematically enrolled, comprehensive series of cancer patients. There should not be a disconnection between the registries with data and the registries with samples (i.e. biobanks) regarding how inclusive they are or the framework within which they work. To my knowledge, the Cancer Registry of Norway is the first Cancer Registry in the world to operate a large-scale biobank in-house. With the continuing scientific success of the Janus biobank, I am convinced that this concept will be followed by many other registries all over the world.

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