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Cancer prevalence in France: Time trend, situation in 2002 and extrapolation to 2012

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ARTICLE INFO

Article history:
Received 7 September 2007
Received in revised form
1 October 2007
Accepted 24 October 2007
Available online 26 November 2007

Keywords:
Prevalence
Cancer burden
Incidence
Time trend

ABSTRACT

Background: Cancer prevalence is a basic indicator of the cancer burden in a population and essential to estimate the resources needed for care of cancer patients. This paper provides a prevalence estimate for 2002 and 2012 in France and an assessment of the trend in prevalence over the period 1993–2002.

Method: Incidence and survival data from French cancer registries were used to estimate specific 5-year partial prevalence rates that were then applied to the whole French population.

Results: In 2002, the 5-year partial prevalence was over 427,000 in men and 409,000 in women. The most frequent cancer site among men was prostate (35% of the cases) and breast in women (45% of the cases). In 2002, in France, more than 3.5% of men over 74 years old are alive with a prostatic cancer diagnosed within 5 years. The increase in the number of cases between 1993 and 2002 was about 40% and was mainly due to prostate and breast cancers. The demographic variations alone induce an increase of the number of prevalent cases of 75,000 among men and 54,500 among women if both incidence and survival are considered as stable during the period 2002–2012.

Conclusion: This study uses a large amount of information from cancer registries which makes it possible to assess the cancer burden. Five-year prevalence is very sensitive to

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doi:10.1016/j.ejca.2007.10.022

changes in incidence and demographic changes. Prevalence has to be estimated regularly in order to ensure accurate medical care meets demand.

1. Introduction

In France there is no national cancer registry. However, a fair proportion of the population - about 15% - is covered by the cancer registries of some French '*départements*' and provides various indicators in the field of oncology. These registries, organised into a network (FRANCIM), have estimated the national incidence of cancer at different times.[1,2] An analysis of the survival of cases diagnosed between 1989 and 1997, with follow-up at 1st January 2002, was published in 2007 in collaboration with the Bio-statistics Department of the Hospices Civils in Lyon.[3] But the best indicator of the needs, in terms of patient care and monitoring, is prevalence, that is, the number of patients with cancer at a given date. There are several, more or less restrictive definitions of prevalence. *Total prevalence* is defined as the number of patients having had a cancer diagnosis, and still living at a given date. This is a very broad definition because it quantifies a heterogeneous group of people. Some of them need medical care, as part of initial treatment or for relapse, while others can be considered cured and no longer have cancer. *Partial prevalence* makes it possible to arrive at a more precise figure for the number of patients needing medical care. It limits the previous group to those whose diagnosis was not made before a given time. *Actual prevalence* is the estimation of those who currently have a need for medical care; that is, those in treatment, initial or for relapse.

Whichever definition is used, there are very few publications concerning French data. These publications also relate to early data: prevalence in 1992,[4–6] prevalence of colorectal tumours in 1994[7] and 1995.[8] The most recent estimation, done as part of national estimations of incidence and survival for the European project EUROCARE, relates to the year 2000.[9] One of the reasons for the lack of prevalence information is the difficulty in finding the vital status of French patients.

In this article we look at estimation of *partial prevalence* in France in 2002 and 2012. Partial prevalence estimation was done using incidence and survival data in the registries. The same data was used to look at changing trends in 5-year partial prevalence between 1993 and 2002.

2. Materials and methods

The incidence data used in this study was that from 13 *départements* (Calvados, Côte d'Or, Doubs, Hérault, Isère, Loire-Atlantique, Marne-Ardennes, Bas-Rhin, Haut-Rhin, Saône and Loire, Somme and Tarn) using 23 cancer sites coded according to ICD-O-3. The number of incident cases between 1989 and 2002 was 335,272. An active search for vital status at 01/01/2002 for patients diagnosed between 1989 and 1997 was carried out.[3]

The first step in the estimation of 5-year partial prevalence in 1993 and 2002 in France, is to estimate, based on the data from the registries, the survival of the patients diagnosed between 1989 and 1993 and 1993 and 1997, taking account of age and sex. These specific survival rates were then applied to patients for whom the diagnosis was made between 1989 and 1993 in order to estimate prevalence in 1993 and between 1998 and 2002 in order to estimate prevalence in 2002. The application of survival rates of cases diagnosed in 1993–1997 to cases diagnosed between 1998 and 2002 was due to the lack of follow up for patients diagnosed between 1998 and 2002. These age and sex specific prevalence rates were finally applied to the whole French population of the years 1993 and 2002. Prevalence rates have been standardised to the European-age standardisation.

In order to account for the variation in the number of prevalent cases between 1993 and 2002, we used the breakdown suggested by Bashir et al.[10] This breakdown distinguishes the relative contributions of demographic change and aging, on the one hand, from 'net' change, and on the other, for different epidemiological indicators. Last, we have estimated the number of prevalent cases in France in 2012 using prevalence rates of the year 2002.

3. Results

The number of cases of people diagnosed with cancer between 1998 and 2002 and still alive at the end of 2002 is shown in Table 1. In France in 2002, more than 836,000 people diagnosed with cancer over the previous 5 years of the study (1998–2002) were still alive at the end of 2002.

Among these 836,000 patients, 51% were male and 49% female. The corresponding European age-standardised prevalence rates (easpr) were 1270.6 and 1094.1. In men 36% of the cases were prostate cancers (easpr: 431). Adding in colorectal cancers (14%, easpr: 172.2) gave almost 50% of the 5-year prevalent cases. In women 45% of the cases were breast cancer (easpr: 515.4). Breast and colorectal (12%, easpr: 107.8) cancers represented 57% of the 5-year prevalent cases. In men over 65, the proportion of prostate cancers among the prevalent cases exceeded 46%. In women between 45 and 64, breast cancer accounted for more than one in two cases (54%).

The proportions per 100,000 in the general population, of the previously quoted numbers, are shown in Table 2. For all ages combined, the 5-year prevalence is 1476 per 100,000 for men and 1333 per 100,000 for women. In men aged 75 and over, 7.6% are prevalent cases that were diagnosed in the previous 5 years. This proportion is about 3.6% for prostate cancer alone. In women of 75 or over, the proportion of the general population having had a cancer in the previous 5 years is 3.4%. It is worth noting that, among women between 45 and 64, cancer prevalence is 1.8% (45–54) and 2.8% (55–64). Breast cancer accounts for half of these two groups with respective proportions of 1% (45–54) and 1.5% (55–64).

Table 1 – 5-year partial prevalence in France in 1993 (all ages) and 2002 (by age group)

	5-year estimation - 2002								1993	
Cancer site	0–14	15–44	45–54	55–64	65–74	75+	All ages	EASP[a]	All ages	EASP[a]
Men										
Lip, oral cavity, pharynx	30	1600	8010	8220	6290	3480	27630	89.8	28700	106.0
Oesophagus	0	120	1050	1750	1900	980	5800	18.3	5760	20.9
Stomach	0	270	860	1470	2370	2710	7680	22.6	7500	25.5
Colon-rectum	10	1560	5230	10800	19970	21720	59290	172.2	47320	160.0
Liver	20	100	460	1060	2080	1260	4980	14.9	3290	11.3
Pancreas	0	140	290	430	840	670	2370	7.1	1700	6.0
Larynx	0	280	2250	2670	3300	1930	10430	32.8	11950	43.5
Lung	0	870	5510	8390	10710	6350	31830	99.0	26950	96.1
Mesothelioma	0	20	80	110	250	120	580	1.8	390	1.4
Malignant melanoma	40	2610	2090	2440	2670	1940	11790	37.4	6860	24.3
Breast	0	70	170	310	380	450	1380	4.1	1200	4.1
Prostate	0	110	2640	22960	65440	62230	153380	431.0	77830	249.5
Bladder	10	210	1610	4000	7830	9470	23130	66.1	21880	74.6
Kidney	230	830	2480	3700	4880	4130	16250	49.7	12690	44.7
Brain and other CNS	360	1500	840	610	480	360	4150	13.8	3530	12.6
Thyroid	50	1710	1190	1140	540	310	4940	16.4	2050	7.4
Non-Hodgkin lymphoma	250	1690	1790	2550	3280	2740	12300	38.1	9860	34.8
Hodgkin's disease	140	1820	490	270	240	150	3110	10.5	2780	9.7
Multiple myeloma	0	130	510	1170	1790	2040	5640	16.4	3830	13.3
Leukaemias	920	1260	1480	1900	2800	2440	10800	34.0	8850	31.2
Others[b]	1020	8290	4000	4030	6050	6910	30300	94.5	23090	80.5
TOTAL[b]	3080	25190	43030	79980	144090	132390	427760	1270.6	308010	1057.6
Women										
Lip, oral cavity, pharynx	30	620	1630	1620	1330	1720	6950	18.9	4390	12.7
Oesophagus	0	20	120	240	220	340	940	2.3	820	2.3
Stomach	0	250	370	580	1290	2380	4870	10.3	5030	11.7
Colon-rectum	0	1350	4360	7610	12930	23440	49690	107.8	40750	101.5
Liver	10	180	140	220	310	370	1230	3.2	540	1.6
Pancreas	0	140	250	420	760	970	2540	5.9	1520	3.9
Larynx	0	80	250	400	290	130	1150	3.4	950	2.8
Lung	0	670	1710	1800	2110	1810	8100	22.0	4290	12.8
Mesothelioma	0	10	10	70	70	60	220	0.6	100	0.3
Malignant melanoma	30	4460	3120	3070	2610	3160	16450	46.6	10990	34.4
Breast	0	17210	43560	45000	42440	35570	183780	515.4	118380	369.2
Cervix uteri	0	4690	3020	1580	1710	1600	12600	37.2	13460	43.0
Corpus uteri	0	390	2060	5890	7320	6170	21830	56.0	17540	50.8
Ovary	50	1050	2630	3240	3280	2340	12590	35.4	10510	33.9
Bladder	0	140	240	440	1160	2450	4430	8.8	4420	9.9
Kidney	210	500	940	1700	2660	2770	8780	21.9	7530	21.9
Brain and other CNS	290	1490	1080	940	730	620	5150	15.9	3750	12.7
Thyroid	70	5860	4940	3830	2380	1030	18110	57.2	8420	28.5
Non-Hodgkin lymphoma	110	1080	1580	2160	3030	3440	11400	29.0	8970	24.9
Hodgkin's disease	60	1840	350	270	140	130	2790	9.2	2170	7.1
Multiple myeloma	0	120	390	780	1580	2410	5280	11.5	3750	9.6
Leukaemias	800	970	810	1330	2110	2650	8670	22.7	6490	18.9
Others[b]	630	2340	2580	3310	4580	8200	21640	52.8	15880	44.2
TOTAL[b]	2290	45460	76140	86500	95040	103760	409190	1094.1	290650	858.6

a European age standardised prevalence rates (per 100,000).
b Non-melanoma skin cancers are excluded from this estimate.

The changes in numbers of prevalent cases (5-year partial prevalence) and European age-standardised prevalence rates estimated for France between 1993 and 2002 are shown in Table 1. The components of the change in cancer prevalence estimated from the registries are presented in Table 3. The estimated total number of prevalent cases in France increased from 308,000 (easpr: 1057.6) to 427,760 (easpr: 1270.6) for men and from 290,650 (easpr: 858.6) to 409,190 (easpr: 1094.1) in women, an overall increase in the number of cases of 40% and an increase of 20% in terms of European age-standardised prevalence rates over a 10-year period. In men, the change in the number of prevalent prostate cancer cases accounted for 64% of the total increase for all cancer sites combined. In women, breast cancer accounted for 57% of the overall increase. The overall increase in numbers hides pronounced differences between cancer sites. A reduction

Table 2 – 5-year partial prevalence (France 2002) per 100,000

Cancer site	5-year prevalence (per 100,000) - 2002						
	0–14	15–44	45–54	55–64	65–74	74+	Total
Men							
Lip, oral cavity, pharynx	1	13	193	278	269	200	95
Oesophagus	0	1	25	59	81	56	20
Stomach	0	2	21	50	101	156	26
Colon-rectum	0	13	126	366	854	1250	205
Liver	0	1	11	36	89	72	17
Pancreas	0	1	7	15	36	38	8
Larynx	0	2	54	90	141	111	36
Lung	0	7	133	284	458	366	110
Mesothelioma	0	0	2	4	11	7	2
Malignant melanoma	1	21	50	83	114	112	41
Breast	0	1	4	10	16	26	5
Prostate	0	1	64	777	2799	3582	529
Bladder	0	2	39	136	335	545	80
Kidney	4	7	60	125	209	238	56
Brain and other CNS	7	12	20	21	20	20	14
Thyroid	1	14	29	39	23	18	17
Non-Hodgkin lymphoma	4	14	43	86	140	158	42
Hodgkin's disease	3	15	12	9	10	8	11
Multiple myeloma	0	1	12	40	76	117	19
Leukaemias	17	10	36	64	120	141	37
Others[a]	18	67	96	136	259	398	104
TOTAL[a]	56	205	1036	2708	6162	7620	1476
Women							
Lip, oral cavity, pharynx	1	5	38	53	47	56	23
Oesophagus	0	0	3	8	8	11	3
Stomach	0	2	9	19	46	78	16
Colon-rectum	0	11	103	250	458	766	162
Liver	0	2	3	7	11	12	4
Pancreas	0	1	6	14	27	32	8
Larynx	0	1	6	13	10	4	4
Lung	0	5	40	59	75	59	26
Mesothelioma	0	0	0	2	2	2	1
Malignant melanoma	1	36	73	101	93	103	54
Breast	0	140	1025	1477	1503	1163	599
Cervix uteri	0	38	71	52	61	52	41
Corpus uteri	0	3	48	193	259	202	71
Ovary	1	9	62	106	116	76	41
Bladder	0	1	6	14	41	80	14
Kidney	4	4	22	56	94	91	29
Brain and other CNS	6	12	25	31	26	20	17
Thyroid	1	48	116	126	84	34	59
Non-Hodgkin lymphoma	2	9	37	71	107	112	37
Hodgkin's disease	1	15	8	9	5	4	9
Multiple myeloma	0	1	9	26	56	79	17
Leukaemias	15	8	19	44	75	87	28
Others[a]	12	19	61	109	162	268	71
TOTAL[a]	44	371	1791	2839	3365	3392	1333

a Non-melanoma skin cancers are excluded from this estimate.

was observed in the number of prevalent cases of laryngeal and lip, oral cavity, pharynx cancers in men, and stomach, bladder and cervical cancer in women. The difference in estimated number of cases is a result of demographic change, an aging population and a net change, linked to variations in the probability of being diagnosed or in survival. For the cancer sites studied, demographic change contributes to an increase of between 4.7% (stomach in women) and 13.5% (mesothelioma in women) according to cancer site and sex. Population aging contributes to an increase of between 0.1% (Hodgkin's disease in men) and 17.2% (prostate) depending on the cancer site, if cases of Hodgkin's disease in women are excluded, for which the effect of population aging reduces the number of prevalent cases by −1.3%. Net variation explains most of the changes in cancer prevalence. This effect varies from −25.3% (larynx in men) to +125.5% (thyroid in men). If account is taken only of net changes, there is a reduced prevalence in men, of stomach, oesophageal, bladder cancers as well as the

Table 3 – Breakdown of prevalence change in prevalence in 'departments' covered by a registry

	Breakdown of the overall change			
	Net change (%)	Aging-related (%)	Population increase (%)	Overall change (%)
Men				
Lip, oral cavity, pharynx	−16.1	9.2	5.6	−1.3
Oesophagus	−13.1	10.7	4.8	2.4
Stomach	−16.4	14.4	4.9	2.9
Colon-rectum	7.8	13.4	6.0	27.2
Liver	34.6	9.9	7.2	51.7
Pancreas	23.8	10.7	6.7	41.2
Larynx	−25.3	9.6	5.1	−10.6
Lungs	1.8	11.7	6.8	20.4
Mesothelioma	26.1	13.1	8.4	47.5
Malignant melanoma	58.5	8.5	10.0	77.0
Breast	−2.4	13.5	7.1	18.2
Prostate	76.2	17.2	11.6	105.1
Bladder	−11.2	13.5	6.1	8.4
Kidney	12.6	11.1	7.4	31.2
Brain and other CNS	9.2	3.3	6.8	19.2
Thyroid	125.5	7.4	11.7	144.7
Non-Hodgkin lymphoma	10.8	9.3	6.8	26.9
Hodgkin's disease	7.8	0.1	6.1	13.9
Multiple myeloma	28.6	14.1	8.0	50.7
Leukaemias	7.8	10.5	6.7	25.0
Others[a]	18.0	7.6	7.6	33.2
Women				
Lip, oral cavity, pharynx	44.2	7.8	9.4	61.3
Oesophagus	1.7	7.0	5.6	14.4
Stomach	−18.3	9.9	4.7	−3.6
Colon-rectum	7.4	9.9	6.1	23.4
Liver	106.8	7.3	11.1	125.1
Pancreas	51.2	8.3	8.2	67.7
Larynx	10.8	7.4	7.3	25.5
Lungs	71.6	7.8	11.1	90.5
Mesothelioma	118.9	0.2	13.5	132.6
Malignant melanoma	38.1	6.1	8.9	53.1
Breast	41.0	8.9	9.7	59.7
Cervix uteri	−15.8	5.7	5.5	−4.5
Corpus uteri	12.4	7.5	7.4	27.2
Ovary	6.7	8.2	7.1	21.9
Bladder	−14.1	10.4	5.9	2.2
Kidney	4.1	8.0	6.9	19.0
Brain and other CNS	26.6	3.3	8.0	37.9
Thyroid	102.4	5.4	10.9	118.7
Non-Hodgkin lymphoma	13.9	8.5	7.1	29.5
Hodgkin's disease	25.4	−1.3	7.2	31.3
Multiple myeloma	26.5	9.2	7.9	43.6
Leukaemias	21.9	6.2	7.5	35.6
Others[a]	22.4	6.7	8.0	37.1

a Non-melanoma skin cancers are excluded from this estimate.

laryngeal and lip, oral cavity, pharynx cancers already mentioned. In women there is a net reduction in cancers of the stomach, cervix and bladder. The European age-standardised prevalence rates of these cancer sites decreased between 1993 and 2002.

The most pronounced change in the relative proportions of cancer site between 1993 and 2002, is for prostate cancer which has risen from 25.2% to 35.9% of all cases, an increase of over 75,000 cases. In women, cases of breast cancer have gone from 40.6% to 45.8% of all cases, an increase of over 65,000 cases. The other largest increases in numbers of cases are colorectal cancers in men with an estimated 11,655 extra cases and in thyroid cancer with an increase of around 13,000 cases.

The projected numbers of cases by sex, age group and cancer site in 2012 under the hypothsesis of stability of incidence and survival are reported in Table 4. The estimated total number of prevalent cases in France will increase by 75,000 among males and 54,600 among females with a total number of cases of 502,740 (males) 463,780 (females). Prostate and colorectal

Table 4 – 5-year partial prevalence (France 2012) by age group

Cancer site	0–14	15–44	45–54	55–64	65–74	75+	All ages
Men							
Lip, oral cavity, pharynx	30	1610	8050	10980	6960	4330	31960
Oesophagus	0	120	1050	2330	2090	1200	6790
Stomach	0	270	860	1990	2570	3520	9210
Colon-rectum	10	1560	5240	14850	21540	27510	70710
Liver	20	100	460	1470	2260	1490	5800
Pancreas	0	140	290	580	910	820	2740
Larynx	0	280	2260	3570	3660	2380	12150
Lung	0	890	5520	11400	11710	7510	37030
Mesothelioma	0	20	80	150	270	150	670
Malignant melanoma	40	2560	2110	3260	2910	2460	13340
Breast	0	70	180	410	420	580	1660
Prostate	0	110	2620	32660	70600	77330	183320
Bladder	10	210	1610	5480	8450	12160	27920
Kidney	240	840	2490	5060	5300	5060	18990
Brain and other CNS	380	1480	850	820	530	440	4500
Thyroid	50	1670	1190	1510	600	380	5400
Non-Hodgkin lymphoma	260	1670	1800	3450	3560	3390	14130
Hodgkin's disease	150	1790	490	360	270	170	3230
Multiple myeloma	0	130	510	1560	1940	2550	6690
Leukaemias	970	1240	1490	2580	3060	3100	12440
Others[a]	1050	8150	4040	5460	6570	8790	34060
TOTAL[a]	3210	24910	43190	109930	156180	165320	502740
Women							
Lip, oral cavity, pharynx	30	610	1670	2220	1360	2130	8020
Oesophagus	0	20	120	340	220	410	1110
Stomach	0	240	380	810	1280	2930	5640
Colon-rectum	0	1320	4460	10580	12820	28490	57670
Liver	10	180	150	310	310	400	1360
Pancreas	0	140	260	590	750	1140	2880
Larynx	0	80	260	550	300	170	1360
Lung	0	660	1750	2460	2150	2020	9040
Mesothelioma	0	10	10	90	70	70	250
Malignant melanoma	30	4320	3200	4170	2590	3820	18130
Breast	0	16820	44620	61970	43610	41900	208920
Cervix uteri	0	4520	3110	2170	1760	1860	13420
Corpus uteri	0	380	2100	8240	7500	7120	25340
Ovary	50	1030	2700	4460	3340	2700	14280
Bladder	0	140	250	600	1150	3000	5140
Kidney	210	480	960	2360	2640	3210	9860
Brain and other CNS	300	1450	1110	1280	770	720	5630
Thyroid	80	5680	5070	5160	2440	1120	19550
Non-Hodgkin lymphoma	110	1050	1620	2990	3020	4010	12800
Hodgkin's disease	60	1790	360	360	140	140	2850
Multiple myeloma	0	120	390	1100	1560	2910	6080
Leukaemias	840	950	830	1820	2110	3150	9700
Others[a]	650	2270	2650	4560	4600	10020	24750
TOTAL[a]	2370	44260	78030	119190	96490	123440	463780

a Non-melanoma skin cancers are excluded from this estimate.

cancers contribute to 55% of this increase among males. Colorectal and breast cancers contributed to 61% of the increase among females.

4. Discussion

This study provides precise information on 5-year cancer prevalence for France in 2002, by cancer site. Overall, the number of people affected is over 836,000, which gives an indication of the burden of cancer on health services. The results also show that this burden can vary widely over a relatively short period of time. Measurement of such an increase is essential for health service planning. In the relative survival curves recently published in France,[11] it can be seen that no cancers, except thyroid and testicular, reached a plateau in the first 5 years following diagnosis. So 'cure' can only be considered as achieved in under 5 years for a small proportion of cancers. Five-year partial prevalence can thus be regarded as largely made up of those people still needing medical care or monitoring. For some cancer sites, with medium or long term

Table 5 – Cross-validation – 5-year prevalence – six registries

	Calvados		Doubs		Isère		Bas-Rhin		Somme		Tarn	
	Est[a]	Obs[b]	Est[a]	Obs[b]	Est[a]	Obs[b]	Est[a]	Obs[b]	Est[a]	Obs[b]	Est[a]	Obs[b]
Men												
Lip, oral cavity, pharynx	396	382	227	216	433	428	622	648	377	356	118	136
Stomach	92	98	54	68	136	152	156	147	71	64	40	27
Colon-rectum	521	512	417	416	934	987	1055	1050	476	455	419	429
Larynx	155	133	121	119	189	200	168	182	149	131	55	67
Lungs	324	258	263	270	481	557	553	559	307	293	180	193
Malignant melanoma	100	96	74	78	160	152	234	247	55	52	60	61
Prostate	1165	1164	740	749	1758	1773	1670	1677	767	714	871	898
Bladder	268	258	176	168	383	384	456	492	193	165	175	195
Kidney	147	166	98	89	215	208	339	363	131	122	80	76
Non-Hodgkin lymphoma	112	109	95	104	235	222	219	229	94	87	72	71
Leukaemias	75	78	106	107	189	188	209	202	98	100	74	75
Women												
Colon-rectum	477	507	359	352	850	874	806	810	375	340	340	354
Malignant melanoma	145	150	139	137	223	217	338	352	78	75	80	81
Breast	1661	1621	1133	1123	2763	2813	2616	2623	1415	1366	906	924
Cervix uteri	144	145	108	103	195	209	225	221	136	131	55	55
Corpus uterus	184	187	152	157	291	292	421	410	198	192	143	148
Ovary	135	125	103	114	195	206	238	238	122	130	82	74
Kidney	100	97	56	57	115	113	203	216	73	80	61	59
Thyroid	185	187	103	100	215	223	139	134	69	67	124	124
Non-Hodgkin lymphoma	101	103	90	97	188	198	188	164	74	70	56	60
Leukaemias	62	72	71	69	166	163	149	157	76	67	50	45

a Prevalence estimated using survival rates from other registries.
b Prevalence observed in the département after correction for those lost to follow-up.

survival, it may be interesting to estimate 10 year or 20 year prevalence rates. These estimations suppose long-term follow-up of patients that is not avalaible in France.

The estimations produced are based on a number of hypotheses. Unlike what is done for estimations of national incidence, for which the observed rate in the registries is weighted by mortality, the hypothesis in this work is that specific prevalence rates according to age and sex for the different cancer sites are identical, both for all registries and in France as a whole. This is a restrictive hypothesis. An alternative is to apply survival rates estimated from registry figures to estimations of national incidence. Currently, these are only available as projections up to the year 2000, using data that stops in 1997. A second hypothesis relates to the similarity between observed survival in *départements* covered by a cancer registry on the one hand and the estimated national survival on the other. We have cross-validated the 1997 prevalence figures in six general registries (Calvados, Doubs, Isère, Bas-Rhin, Somme and Tarn) for the most frequent cancers in order to quantify the difference between observed prevalence in each registry and that derived from survival rates in all the other registries. The results, in Table 4, show good agreement between estimations and observations. The only major differences for men are for stomach cancer in Doubs and Tarn, laryngeal cancer in Calvados, lung cancer in Calvados and Isère and bladder cancer in the Somme. So the hypothesis using registry survival rates is deemed acceptable when the aim is to measure the order of magnitude of prevalence. The third hypothesis applies survival rates of cases diagnosed in 1993–1997 to cases diagnosed between 1998 and 2002. Based on the survival analysis in France,[11] the hypothesis is acceptable for 15 cancer sites where there has been no change between 1989 and 1997. However, a significant improvement in survival is seen both for common cancer sites (prostate, breast, colon-rectum) and rarer cancer sites (kidney, Non-Hodgkin lymphoma, thyroid). Hence our estimations for these sites are reduced overall, even though 1993–1997 and 1998–2002 are relatively close in time.

We break down changes in prevalence according to demographic change, the age pyramid and incidence (influx) and survival (outflux). However the 5-year prevalence is the result of the outcome of the incident cases diagnosed in a 5-year period. The method of Bashir et al. only takes into account the changes in the number of prevalent cases at the end of the period. In this context, the aim is only to rank the cancer sites according to the components of the variation and not to give a precise figure of the individual effect of each of the three components. In addition, use of survival figures for a period (1993–1997) earlier than that being studied (1998–2002) reduces, but does not cancel out, the impact of changes in survival on changes in prevalence. Therefore, the net change in prevalence between 1993 and 2002 is mostly due to fluctuations in incidence. Thus the increased incidence of breast, prostate and thyroid cancers explains the large increase in prevalence. Conversely, the reduction in incidence shown for stomach cancer explains the net trend in prevalence for this site. Changes in prevalence are not attributable only to incidence: Non-Hodgkin lymphoma is in a group of sites for which, although incidence has increased the most, the net change in prevalence is very small. This is explained

by the fact that the survival of these patients is not good.[11] Thus the impact of changes in incidence on prevalence is not negligible in terms of the number of prevalent cases. However, a quantitative view of changes in prevalence must be accompanied by a qualitative approach. It is probable that screening programmes and an improvement in diagnostic techniques have led to earlier diagnoses and thus to prevalent cases being in better health.

Breast and prostate cancers account for a high proportion of prevalent cases. Two recent studies[12,13] describe a reduction in the incidence of breast cancer in the United States, for which one of the reasons put forward by the authors was a reduction in hormone replacement therapy. If the same thing is seen in France, it is likely that the prevalence of breast cancer will drop or, more probably, stabilise, because of concomitant reduced mortality. With respect to prostate cancer, a similar reduction in incidence is described in the United States and Canada.[14] The use of the PSA (Prostate Specific Antigen) test helps explain the changing trend observed by these authors. It is therefore essential to look at risk factors for cancers that are increasing in incidence, but also to consider the consequences of health policies in diagnosis terms: for prostate cancer, our study shows that a large proportion of men over 75 have prostate cancer diagnosed between 1998 and 2002.

Within the framework of the European project EUROPREVAL, Verdecchia et al.[6] provided estimations of 5-year partial prevalence for the whole of France in 1992 for ten tumour sites. Compared to our estimations for 1993, there is concordance for stomach, breast and colorectal cancers, Hodgkin's disease and leukaemias. In the EUROPREVAL study the prevalence is under-estimated compared to our results for melanoma (men and women), cervical, uterine and lung cancer in women, and for prostate cancer. Verdecchia et al. provided higher lung cancer prevalence in men. The EUROPREVAL study results for France used data from three French *départements* for digestive and gynaecological tumours, and two *départements* for other tumours. Therefore, the results obtained in our study are more representative of the national situation.

5. Conclusion

Our results demonstrate the great sensitivity of prevalence to fluctuations in cancer incidence and demographic changes. Our projection in 2012 showed that demographic variations alone may induce a high increase in the number of prevalent cases. It therefore seems necessary to make these estimations on a regular basis. Updating survival and making national incidence estimations make it possible to provide more accurate results. Finally, although estimating 5-year partial prevalence is important in assessing the demands for medical care and follow-up, it will be necessary in the future to provide estimations of *actual prevalence*. These require information both about the initial stage of the disease and about other adverse events over time (recurrences, relapses) that only the registries can provide on a population basis (Table 5).

Conflict of interest statement

None declared.

Acknowledgements

This work was supported by a grant from INCa (Institut National du Cancer, Paris, France).

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