Survival of cancer patients in France: A population-based study from The Association of the French Cancer Registries (FRANCIM)

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ABSTRACT

We present the main results of the first population-based cancers survival study gathering all French registry data. Survival data on 205,562 cancer cases diagnosed between 01/01/1989 and 31/12/1997 were analysed. Relative survival was estimated using an excess rate model. The evolution of the excess mortality rate over the follow-up period was graphed. The analysis emphasised the effect of age at diagnosis and its variation with time after diagnosis. For breast and prostate cancers, the age-standardised five-year relative survivals were 84% and 77%, respectively. The corresponding results in men and women were 56% *versus* 58% for colorectal cancer and 12% *versus* 16% for lung cancer. For some cancer sites, the excess mortality rate decreased to low values by five years after diagnosis. For most cancer sites, age at diagnosis was a negative prognostic factor but this effect was often limited to the first year after diagnosis.

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1. Introduction

In France, population-based cancer registration is carried out on a Departmental level, a *Département* or Department being the territorial and administrative division of the country. This registration provides information on cancer incidence regarding approximately 13% of the French population. In 2000, the Association of the French Cancer Registries (FRANCIM) and the Biostatistics Unit of Lyon University Hospital joined 20 different registries to create a common database that counts nearly 520,000 patients diagnosed between 1975 and 2002. This centralised approach has facilitated the emergence of several collaborative projects.

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One of the epidemiological goals of FRANCIM is to provide estimates of incidence, survival and prevalence of cancer in France. The first objective was achieved in 2003 with the publication of national incidence estimates.[1] A second objective, reported here, was to obtain survival estimates to assess globally the performance of the health care system. Population-based survival data for cancer have been already published for France and for several European countries (for example, see references [2–8]) separately or within the collaborative European project EUROCARE.[9–11] EUROCARE provides regularly net survival estimates; *i.e.* survival of cancer patients after elimination of all other causes of death than cancer. The project uses a database on more than 6.5 million cancer patients and a complete methodology for analysis of survival data including data collection, standardisation, quality control and statistical analysis. As mentioned above, population-based survival data have been published for several French Departments and these have been partially included in EUROCARE. However, no clear picture of the survival data for France using all French available data of the FRANCIM network has been given yet.

The aim of the present study was to produce estimates of crude and relative survivals at 1, 3 and 5 years with their corresponding age-standardised relative survivals, for 47 cancer sites, by sex, different age classes and different periods of diagnosis. It focused also on the analysis of the proper effects of gender, age at diagnosis, and year of diagnosis on survival. The study emphasised the effect of age at diagnosis and its variation with time after diagnosis. The evolution of the excess mortality rate over the follow-up period could be graphed. This analysis used a single and consistent approach based on an excess rate model[12] and optimised the advantages of the modelling strategy in each of these objectives.[13]

2. Material

All neoplasms registered between 01/01/1989 and 31/12/1997 by the French registries were included in the present survival analysis (Table 1). The quality and the completeness of the participant registries are assessed every four years via an audit by the *Institut de Veille Sanitaire* (InVS) and the *Institut National de la Santé et de la Recherche Médicale* (INSERM). Some quality controls were made at registry level and others at the common database level. For this purpose, the tools provided by the International Agency for Research on Cancer were used. All cancers diagnosed in patients over 15 were included in the analysis. Forty-seven cancer sites were defined according to the codes of the International Classification of Diseases-Oncology 2 (ICD-O 2); they mainly corresponded to the ICD-9-defined EUROCARE sites (Table 2).

An active search for the vital status of all 205,562 cases at 01/01/2002 was carried out using a standardised administrative procedure. The information was collected 'at first line' via birthplace public services or via an electronic request to the *Répertoire National d'Identification des Personnes Physiques* (RNIPP). Both procedures required the knowledge of the birthplace. As this could not be obtained for some cases, other sources of information for vital status were used (medical records or public services of the place of residence). Nevertheless, priority was given to the first line standardised

Table 1 – Description of the data provided by the French Registries

Department	Number of cases	Lost to follow-up[a] (%)	Median follow-up in alive patients (months)
Calvados[b]	21,632	2.1	87.2
Côte d'Or[c]	5822	1.6	84.9
Doubs	15,900	1.0	89.9
Hérault	10,381	6.4	61.7
Isère	34,131	5.8	82.3
Manche	8115	0.5	69.3
Bas-Rhin	36,908	2.0	87.3
Haut-Rhin	25,613	6.8	81.9
Somme	18,240	4.7	86.6
Tarn	13,828	3.0	86.7
Loire Atlantique[d]	8,219	7.8	78.0
Saône et Loire[e]	6,301	4.3	81.9
Ardennes[f]	151	8.0	97.9
Marne[f]	321	5.6	94.5
Total	205,562	4.0	81.0

The diagnosis period was [1989–1997] for all Departments but for Hérault [1995–1997] and Manche [1994–1997].
a Alive and lost before the end of December 2001.
b Two registries for digestive tract cancers and all cancers.
c Two registries for haematological and digestive tract cancers.
d One registry for breast and colorectal cancers.
e One registry for digestive tract cancers.
f One registry for thyroid cancers.

strategy. The general principle was to minimise the number of lost to follow-up patients (alive at some date before 01/01/2002) without compromising the quality of the information or introducing bias. At last, the proportion of lost to follow-up patients was 4% (Table 1).

3. Method

Relative survival was estimated using an excess rate model.[12] For each subject, the observed mortality rate λ at time t is considered to have two components: one due to cancer – hereafter referred to as λ_c, the excess mortality rate – and another due to other causes – referred to as λ_{exp}, the expected mortality rate. The latter component can be viewed as the mortality rate if the subject had no cancer. It was obtained from published vital statistics provided by the *Institut National de la Statistique et des Etudes Economiques (INSEE)*. The time t is the duration of follow-up defined as the time elapsed from the date of diagnosis to the date of death or to the date of last observation. The excess mortality rate λ_c was modelled as a smoothed parametric function of time chosen among several candidate functions according to the Akaike Information Criterion (AIC).[14] Data until 10 years follow-up were used in order to take into account all available information. Relative survival probabilities at different times were calculated by exponentiation of the corresponding cumulative rates. This model-based approach enabled to deal with sparse data met in some subgroups and to describe the evolution of the excess mortality rate λ_c along