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Ovarian cancer in France: Trends in incidence, mortality and survival, 1980–2012

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HIGHLIGHTS

- The decrease in mortality of ovarian cancer has accentuated since 2005.
- Ovarian cancer is responsible for 5% of all cancer-related deaths in women.
- 10-year net survival of adnexa cancer is 11% higher than that of ovarian cancer.

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ABSTRACT

Objective. The aim of this epidemiological study was to describe the incidence, mortality and survival of ovarian cancer (OC) in France, according to age, period of diagnosis, and histological type.

Methods. Incidence and mortality were estimated from 1980 to 2012 based on data in French cancer registries and from the Centre for Epidemiology of Causes of Death (CépiDc-Inserm) up to 2009. Net survival was estimated from registry data using the Pohar-Perme method, on cases diagnosed between 1989 and 2010, with date of last follow-up set at 30 June 2013.

Results. In 2012, 4615 cases of OC were diagnosed in France, and 3140 women died from OC. World population age-standardized incidence and mortality rates declined by respectively 0.6% and 1.2% per year between 1980 and 2012. Net survival at 5 years increased slightly, from 40% for the period 1989–1993 to 45% for the period 2005–2010. Net survival varied considerably according to histological type. Germ cell tumors had better net survival at 10 years (81%) compared to epithelial tumors (32%), sex cord-stromal tumors (40%) and tumors without biopsy (8%).

Conclusions. Our study shows a decline in incidence and mortality rates from ovarian cancer in France between 1980 and 2012, but net survival remains poor overall, and improved only slightly over the whole study period.

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1. Introduction

In 2012, an estimated 238,700 cases of ovarian cancer (OC) were diagnosed around the world, and 151,900 women died from OC. With a standardized incidence rate (age standardized to world population rates, ASWR) of $6.1/10^5$, OC is the seventh most common cancer in women, representing 3.6% of all cancers in females. The standardized mortality rate is $3.8/10^5$, placing OC as the 8th most frequent cause of death from cancer in women, and representing 4.3% of all female cancer deaths. OC occurs primarily in women below the age of 65 (68.3%), with 53.9% of all OC deaths occurring before the age of 65 [1]. As with many other types of cancer, there exists wide geographic variation in incidence and mortality rates for OC; the highest rates being observed in central and eastern Europe (incidence: $11.4/10^5$; mortality: $6.0/10^5$), and the lowest rates in west Africa (incidence: $3.6/10^5$; mortality: $3.0/10^5$). In western Europe, including France, incidence rates are around $7.5/10^5$, and mortality around $4.7/10^5$ [1]. Trends in incidence and mortality rates from OC over time vary considerably between countries. Most of the time, these two rates remain proportional, and follow more or less the same trends [2].

Irrespective of the country, OC is associated with poor prognosis. In Europe, net survival at 5 years in women diagnosed between 2000 and 2007 is around 37.6% [3]. Net survival is highest in Scandinavian countries and in Central Europe (>40%), and lowest in Eastern Europe and Ireland/United Kingdom (below 30%) [3].

Ovarian tumors regroup several different histological types, each of which is associated with specific epidemiological characteristics (e.g. in terms of etiology, incidence, survival, risk factors, or age at diagnosis) [4]. OC can be classified into three main types, namely epithelial cancers, which form the large majority of OC (90% of all ovarian tumors); sex cord- stromal tumors (3 to 6% of cases), and germ cell tumors (0.5 to 5%).

The objectives of this study were: (i) to describe trends in incidence and mortality from OC in France between 1980 and 2012; (ii) to describe incidence by major histological type in 2012; (iii) to describe observed net survival from 1989 to 2010 by age, period of diagnosis and histological type.

2. Materials and methods

For all cases recorded in French cancer registries, cancers were coded as defined in the topography and morphology sections of the International Classification of Diseases for Oncology, third edition (ICD-O-3). Cancers of the adnexa (fallopian tube, broad ligament, round ligament, parametrium, uterine adnexa with codes ICD-O-3: C57.0–C57.4) were considered with ovarian cancer (code CIM-O-3: C56.9) in the overall analysis, but were also studied separately in the analysis by histology. All invasive cancers of the ovaries and adnexa were included in the study, except lymphoma and borderline ovarian tumors.

2.1. Trends in incidence and mortality, France, 1980–2012

Incident cases of invasive OC occurring from 1975 to 2009 were extracted from the common database of the French cancer registries. The analysis includes data from 12 registries, namely the cancer registries of the following French Departments: Calvados, Doubs, Hérault, Isère, Loire-Atlantique, Manche, Haut-Rhin, Bas-Rhin, Somme, Tarn, Vendée and Côte d'Or. Mortality data for OC from 1975 to 2009 were provided by the Centre for Epidemiology of Causes of Death (CépiDc-Inserm). Person-years were estimated from population data provided by the National Institute of Statistics and Economic Studies (INSEE), by Department, sex and age annually.

Details of the methods for analysis have previously been published [5]. Briefly, in the absence of a national registry, national incidence is obtained by multiplying the ratio of incidence to mortality for the registry area by mortality for all of France. Each of the three components (incidence, mortality in the registry area, and national mortality for France) is first modeled using an age-period-cohort model. This type of model makes it possible to make short-term projections to estimate incidence and mortality for 2012. Similarly, using projections, age-period-cohort models make it possible to estimate the cumulative risk of developing OC or of dying from OC before the age of 75 years, according to the year of birth. For example, the 1950 birth cohort was only followed up for age-class for a duration ranging from 30 to 59 years, and members of this cohort will only reach the age of 75 in the year 2025. Therefore, for the most recent cohorts, the cumulative risks are based on long-term projections, and are thus associated with a higher level of uncertainty.

2.2. Incidence by histological type, registry area in 2012

The methodology described above cannot be used to describe incidence by histological type, since this information is not specified in mortality data. Conversely, incidence within the registry area can be analyzed by histological type using an age-period-cohort model. This allows estimation of incidence for 2012 using short-term projections. Incidence data were thus analyzed, with an extra year (1975–2010). Four histological types were studied, namely: (1) all epithelial tumors, (2) germ cell tumors, (2) sex cord-stromal tumors and (4) tumors without specified histology.

2.3. Net and observed survival, registry area, 1989–2010

Survival data were obtained from the common database of the cancer registries network. Information regarding vital status was obtained by all participating registries using a standardized procedure. When the patient's place of birth is known, the vital status was obtained from the births & deaths registry of the patient's place of birth; or using the national registry for the identification of physical persons (RNIPP, Repertoire National d'Identification des Personnes Physiques). Where necessary, vital status was obtained from medical files, or by contacting the local authorities in the patient's place of residence. This standardized procedure makes it possible to minimize the number of patients lost to follow-up, and to obtain accurate and complete information, thereby minimizing potential bias. The analysis included all patients aged at least 15 years and diagnosed between 1989 and 2010, with a follow-up date set at 30 June 2013 (14 registries included, 7 included for the analysis by period of diagnosis). Observed survival was estimated using the Kaplan-Meier method and net survival using the Pohar-Perme method [6]. Net survival was estimated according to age, period of diagnosis, and/or histological type. Net survival is the survival that would be observed if the cancer under study was the only cause of death. Expected all-cause mortality for the general population, required to calculate net survival, was available by age, sex, year and Department. The expected mortality rates of patients over 30 were smoothed by sex and Department. Age standardized net survival estimates were calculated using the ICSS standard [7].

3. Results

3.1. Trends in incidence 1980–2012

With an estimated 4615 new cases in France in 2012 (95% CI, 4095–5136), OC represented 2.9% of all cancers in women, and was the 8th most common type of cancer in women. The world population age-standardized incidence rate was $7.6/10^5$ (Table 1).

The number of OC cases among the French population increased by 32.2% between 1980 and 2012 (Table 1). The attributable proportions that explain this increase can be subdivided as follows: +21.3% due to an increase in population; +18.5% due to population aging; and −7.6% for the risk itself. Indeed, the standardized incidence rate decreased by an average of 0.6% per year between 1980 and 2012 (9.1 cases per