# EPIDEMIOLOGY OF

# OVARIAN CANCER IN ILLINOIS

by

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## INTRODUCTION

Advocacy groups clamor for more effective early detection of ovarian cancer in the hope that it will reduce the devastating mortality from this disease. The vast majority of women with ovarian cancer are diagnosed in the late stages, when treatment is not highly effective. No screening method is available for the general population. Ovarian cancer is the fifth most common malignancy in women; it is the most common fatal gynecologic malignancy and the fourth most lethal of all cancer types in females.[1]

## EPIDEMIOLOGY OF OVARIAN CANCER

### Age

Ovarian cancer occurs in women of all ages, even infancy and childhood, however the largest number of new cases are diagnosed in women from 60 to 74 years of age. The risk that an ovarian tumor is malignant also increases with age, with an overall risk of 13 percent in premenopausal women and 45 percent in postmenopausal women.[2]

### Family History

Approximately 5 percent to 10 percent of ovarian cancer cases are part of a familial clustering of the disease. There are two sub-types of familial clustering that place women at higher risk: hereditary ovarian cancer and a family history. Women who are members of one of the hereditary ovarian cancer syndromes have one or more first-degree relatives affected by ovarian cancer or another hereditary cancer, such as breast cancer. Cases with a family history have only one relative with the disease and no evidence of a hereditary pattern. Familial clustering is an important risk factor, second only to age.[3,4]

**Reproductive, Hormonal, Menstrual, and Endocrinologic History**

A decreasing risk for ovarian cancer is associated with an increasing number of pregnancies (regardless of outcome).[5] Increasing duration of breast-feeding, oral contraceptive use, and tubal ligation or hysterectomy with ovarian preservation have also been associated with a decreased risk for the disease.[5,6] Risk is increased among women who have used fertility drugs. However, no consistent results have been found for other reproductive variables, such as age at menopause, menarche, or age at first pregnancy, infertility (separate from the use of fertility drugs), and hormone replacement therapy.[4,5]

**Environmental Carcinogens**

The only chemical agent linked to ovarian malignancies is asbestos. Microscopic particles have been seen more often in ovarian tumor tissue than normal tissue.[7] Asbestos dust can enter the pelvic peritoneal cavity and ovaries from the vagina. A study of female asbestos workers showed that workers were seven times more likely to die from ovarian cancer than the control group.[8] In a study of epithelial ovarian cancer cases, no significant trends were identified for frequency or duration of talcum powder use in the peritoneal region, nor in its use on sanitary napkins or contraceptive diaphragms.[9]

Most human studies have not found an increased incidence associated with irradiation, even at doses sufficient to cause malignancies in other organs.[10]

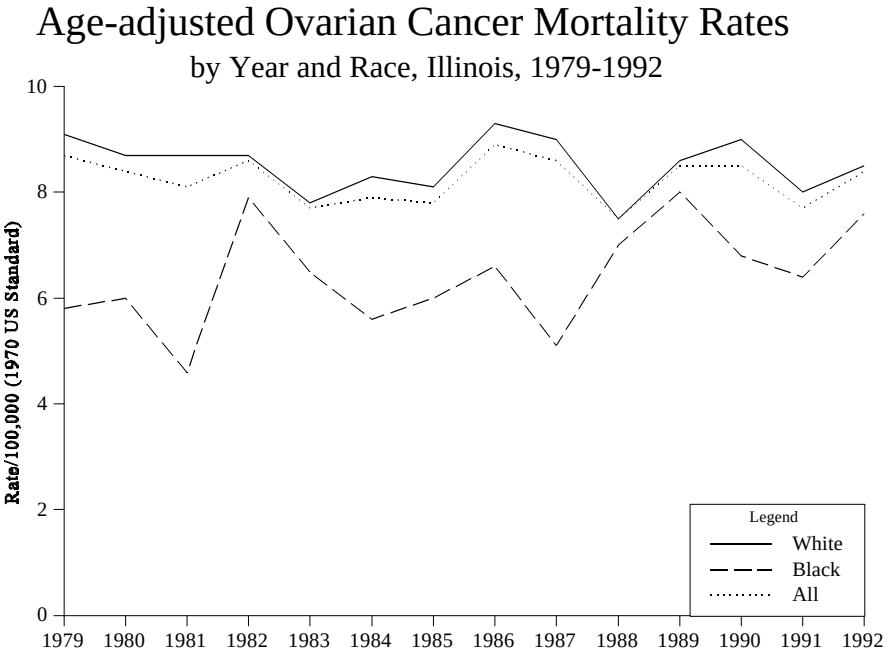
Lifetime consumption of alcohol and tobacco has not been associated with risk. Lifetime coffee consumption, however, has been associated with an elevated risk compared with sporadic coffee consumers. No dose-response association was seen with increasing consumption.[9]

Migration studies have shown a mixed effect of environmental and genetic factors. Ovarian cancer rates are 10 percent to 50 percent higher in Asian women living in the United States, and yet their rates are lower than U.S. white women by about the same magnitude.[11] A study of black women in Illinois did not

Age-adjusted Ovarian Cancer Mortality Rates
(1970 U.S.)

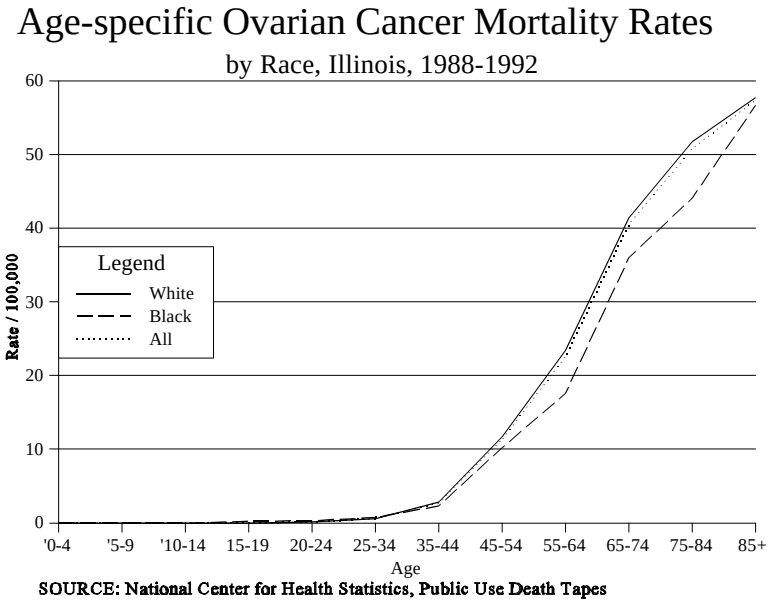
The five-year survival from malignant ovarian tumors decreases with age. Relative survival (i.e., the effect of cancer only on survival) is 37 percent for women of all ages, as shown in the adjacent figure.[14] For women in their 20s, it was 83 percent, while for patients older than 80 years of age, it was 18 percent. This difference is attributable to older women being diagnosed at later stages of the disease, having higher grade tumors at diagnosis, being treated less aggressively, and being enrolled less frequently in clinical trials than younger women.[15,16]

The age-adjusted Illinois mortality rates of ovarian cancer have demonstrated minor annual fluctuations since 1979, but generally have not reflected any changing trends. White women have higher mortality rates than black women, as shown in the figure below.




SOURCE: National Center for Health Statistics, Public Use Tapes

Ovarian cancer mortality increases with age, with the greatest increases beginning at 35 years of age, as shown in the adjacent figure of Illinois data. Differences between black and white women are negligible in women younger than 45 years of age, while in older women, 45 through 84 years of age, white women have a higher mortality than black women.



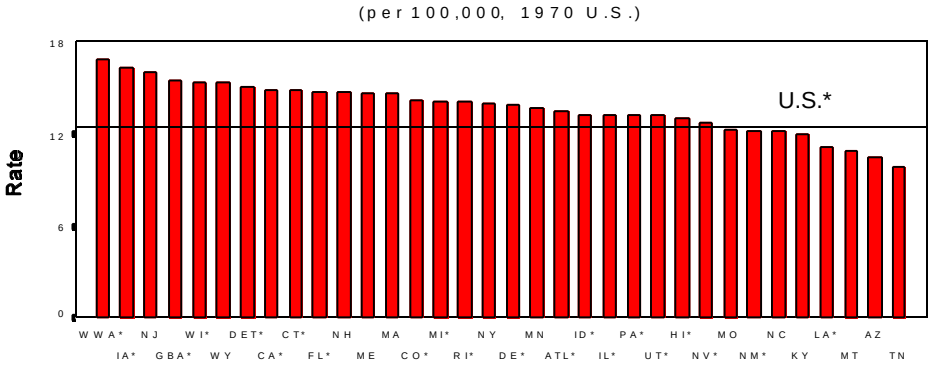

**OVARIAN CANCER INCIDENCE**

From 1988 to 1991, the age-adjusted rate of ovarian cancer for females of all races in the U.S. was 12.5 cases per 100,000 population (using the 1970 U.S. standard population). The range of incidence rates among U.S. states and regions are shown in the following graph,[2] relative to the U.S. combined rate.[13,] The differences in the rates are attributable both to true regional variation and, for some states, incomplete case reporting. Case reporting completeness might be a contributing factor for those registries with a wide disparity between the ranks of mortality and incidence rates. Registries that have attained the North American Association of Central Cancer Registries' (NAACCR) standard of highest quality are indicated by an asterisk (*) in the figures.[13]

[2] Metropolitan registries in the Surveillance Epidemiology and End Results (SEER) program of the National Cancer Institute's cancer surveillance system are abbreviated in the figures as DET - Detroit; ATL - Atlanta; GBA - San Francisco-Oakland- Greater Bay Area; WWA - Western Washington.

**Age-adjusted Ovarian Cancer Incidence Rates**

**by Registry, All Females, 1988-1991**




SOURCE: NAACCR, April 1995

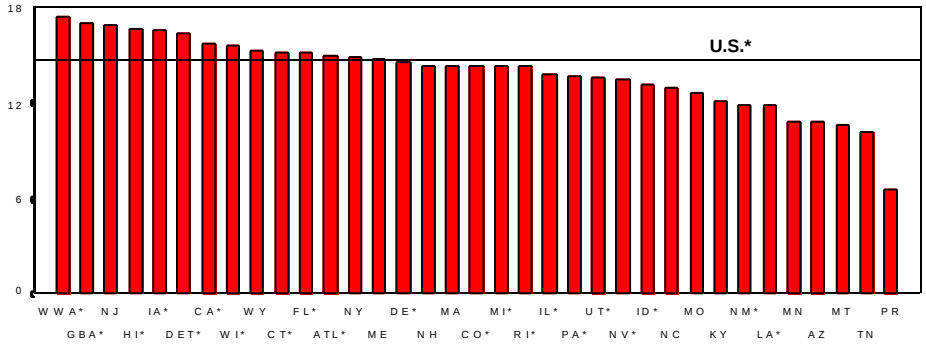
*Highest Quality Registry

White women in the U.S. have the highest incidence of the disease with 14.8 cases per 100,000 population, followed by black women with 10.0 cases per 100,000 population, and women of all other races with 7.7 cases per 100,000.[13] The U.S. regional variation in ovarian cancer incidence among white women is shown in the next figure. The highest rates are in two metropolitan areas, Western Washington and the Greater Bay Area, both in the SEER program. The lowest incidence rates occur in Puerto Rico and Tennessee, among all registries with incidence data, and in Louisiana and New Mexico, among registries that have met the NAACCR standard of highest quality incidence data.

Age-adjusted Ovarian Cancer Incidence Rates

by Registry, White Females, 1988-1991

(per 100,000, 1970 U.S.)




SOURCE: NAACCR, April 1995

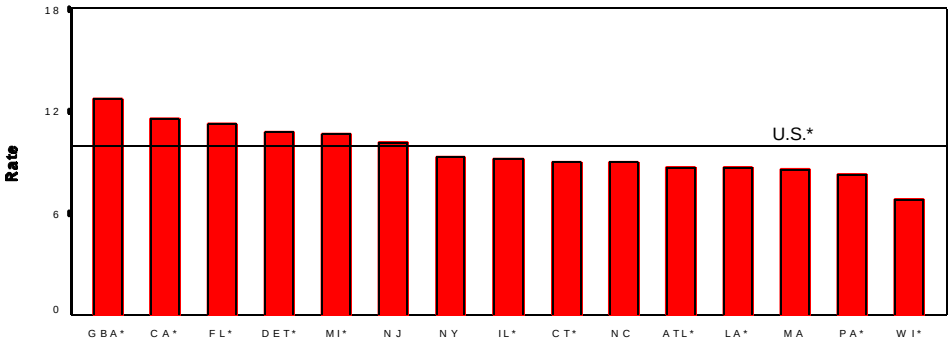
* Highest Quality Registry

For those areas with sufficiently large populations of black persons, the regional variation in incidence among black women is shown in the next figure. The Greater Bay Area and the state of California have the highest incidence rates, while Wisconsin and Pennsylvania have the lowest rates.

Age-adjusted Ovarian Cancer Incidence Rates

by Registry, Black Females, 1988-1991

(per 100,000, 1970 U.S.)



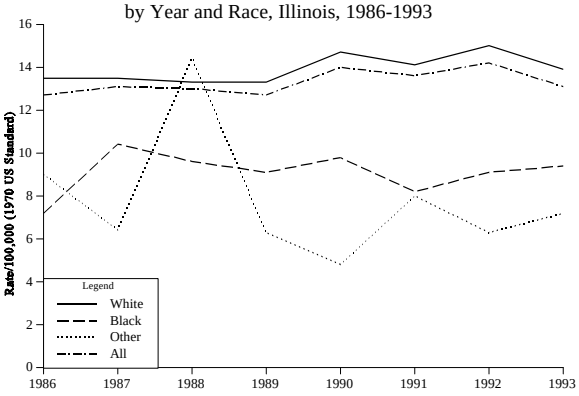

SOURCE: NAACCR, April 1995

* Highest Quality Registry

In Illinois, ovarian cancer ranks third in frequency among the four female gynecologic cancers (i.e., breast, uterus, ovary, and cervix). Ovarian cancer accounts for almost 4 percent of all cancers diagnosed among Illinois women each year. From 1986 to 1993, the age-adjusted rate of ovarian cancer in Illinois was 13.3 cases per 100,000 population (using the 1970 U.S. standard population). White women have the highest incidence of the disease with 13.9 cases per 100,000 population, followed by black women with 9.1 cases per 100,000 population; women of all other races have the lowest rate at 7.7 cases per 100,000 population.

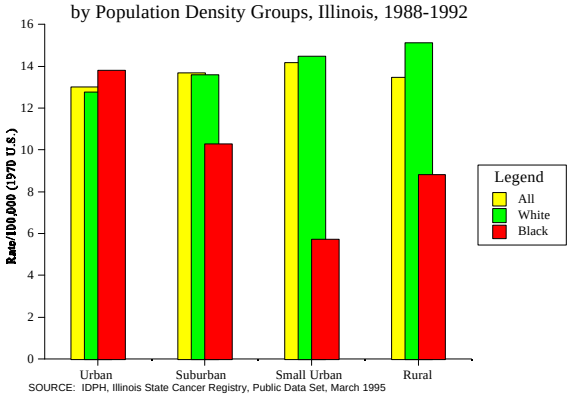
The annual incidence of ovarian cancer in Illinois is shown for the major race groups for the years 1986 through 1993. The incidence in white women increased slightly in 1990 compared with the four previous years and stabilized at this higher rate. This small increase is most likely attributable to an improvement in case reporting that was achieved by the Illinois Department of Public Health's (IDPH) State Cancer Registry in 1990. It also increased the rate among all females, however, due to the large variation in the annual rates of black women and women of all other races, no comparable increases in these race groups were seen.

Age-adjusted Incidence of Ovarian Cancer
by Year and Race, Illinois, 1986-1993



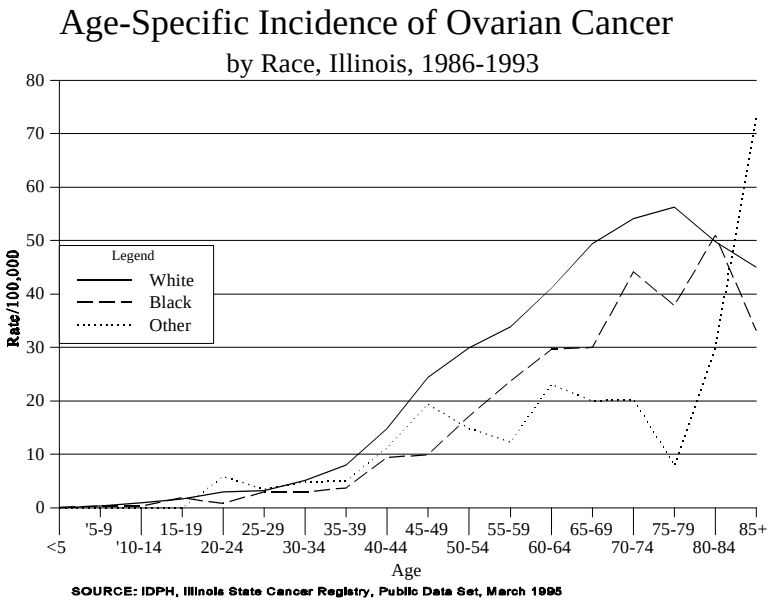

SOURCE: IDPH, Illinois State Cancer Registry, Public Data Set, March 1995

Age-adjusted Ovarian Cancer Incidence Rates
by Population Density Groups, Illinois, 1988-1992




SOURCE: IDPH, Illinois State Cancer Registry, Public Data Set, March 1995

It has been demonstrated that ovarian cancer varies across urban-rural gradients.[17] As shown in the figure, using incidence data from 1988 to 1992, ovarian cancer incidence increases with decreasing population density. The effect of declining urbanization is most pronounced among white women; however, the rates in blacks in the suburban and rural population density groups are affected by small numbers and thus produce less stable and less precise estimates.




Ovarian cancer incidence rates increase with age for all race groups, as shown in the adjacent figure, although the small numbers of women of all other races cause some instability in the age-specific rates. The rates in women younger than 30 years of age do not show large differences between black and white women. However, beginning at 30 years of age, the rate of ovarian cancer increases more rapidly in white than in black women up to the age of 50 years. The age-specific changes in the older age groups are relatively similar in both races.

**Report Sources**

As the delivery of medical care undergoes a major transition from inpatient to ambulatory care, it is important to monitor how these changes affect cancer reporting. Two characteristics of reporting collected by the Illinois State Cancer Registry are the method of diagnosis and the source of the report. Of 4,615 cases of ovarian cancer reported to the cancer registry from 1987 to 1991, 4,465 had the diagnosis confirmed by a positive histology (96.7 percent), 136 were diagnosed clinically, four through

magnetic resonance imaging (MRI), two by positive cytology, and eight cases had an unknown method of diagnosis. All but two of the cases were invasive ovarian cancer; the two exceptions were diagnosed in an *in situ* stage.

Nearly 94 percent of the 1987 to 1991 cases were reported from a hospital (n=4,324), 3 percent from an outpatient setting, and 3 percent had an unknown report source. A very small number of cases (fewer than 0.5 percent) were reported by a lab or autopsy report. Neither the method of diagnosis nor the report source differed by the race of the woman with ovarian cancer.

**Characteristics of Illinois Women Diagnosed with Ovarian Cancer**

The characteristics of Illinois women with ovarian cancer are summarized using the public data set, 1987 to 1991, from the Illinois State Cancer Registry. About 45 percent of the ovarian cancer cases resided in rural Illinois counties, with 21 percent in Chicago, 18 percent in suburban counties, and the remaining 16 percent in small urban counties. This is comparable to the case distribution of all cancer cases reported to the state cancer registry. About 90 percent of the cases were white, 8 percent were black, and 1 percent were among women of all other races. Race was unknown for 1 percent of the cases. Further, 4 percent of the cases were diagnosed among women of Hispanic origin.

The table below summarizes the age distribution of all cases of invasive ovarian cancer and also those cases for which the diagnosis was confirmed through histologic examination. Most of the cases occurred in women 60 years of age and older.

***Invasive Ovarian Cancer by Age and Histologic Confirmation, Illinois, 1987-1991***

| | All Cases | | Confirmed Cases | |
|---|---|---|---|---|
| **Age** | Number | Percent | Number | Percent |
| <30 | 180 | 3.9 | 180 | 4.0 |
| 30-59 | 1,673 | 36.3 | 1,655 | 37.1 |
| 60+ | 2,760 | 59.8 | 2,628 | 58.9 |
| Total | 4,613 | 100.0 | 4,463 | 100.0 |

Source: Illinois State Cancer Registry, Public Data Set, 1987-1991

Use of tobacco or alcohol is reportable for all cancer cases who are diagnosed in Illinois facilities. The following table summarizes usage among the ovarian cancer cases. While the category for missing information is the most frequent, this distribution is common for cancer types not known to be associated with these risk factors. Ovarian cancer would be included among these types.

***Tobacco and Alcohol Use among Cases of Invasive Ovarian Cancer Illinois, 1987-1991***

| | Alcohol | | | Tobacco | | |
|---|---|---|---|---|---|---|
| | No. | % | Adj. % | No. | % | Adj. % |
| Current | 1,128 | 24.9 | 38.7 | 811 | 17.9 | 25.2 |
| Past | 87 | 1.9 | 3.0 | 440 | 9.5 | 13.7 |
| Never | 925 | 20.1 | 31.7 | 1,162 | 25.2 | 36.1 |
| Does Not | 778 | 16.9 | 26.7 | 803 | 17.4 | 25.0 |
| Unknown | 1,695 | 36.7 | -- | 1,397 | 30.3 | -- |
| Total | 4,613 | 100.0 | 100.0 | 4,613 | 100.0 | 100.0 |

Source: Illinois Department of Public Health (IDPH), Illinois State Cancer Registry, Public Data Set, 1987-1991

### *Characteristics by Race*

The incidence of ovarian cancer is highest among white women in the United States with black women having lower rates and women of Asian descent having the lowest rates. In Illinois, as

elsewhere, more than 90 percent of newly diagnosed cases of ovarian cancer occur in white women. Most epidemiologic studies are unable to describe the epidemiology of this disease in black women, due to small numbers of cases.

The one study that has examined not only risk factors in black women, but also compared cases between the races was a paper using data from the Collaborative Ovarian Cancer group. Even in this relatively large collaborative effort, the number of cases among black women was relatively small, only 110 for the 16-year period, 1971 to 1986.[18] The risk factors associated with reproductive factors were similar for black and white women, although the prevalence of the risk factors differed between them. Black women were more likely than white women to report four or more full-term pregnancies, a history of breast-feeding, a history of breast-feeding for six months or longer, and less likely to use oral contraceptives.[18] However, these differences explained little of the variation in incidence, suggesting that other factors or genetic susceptibility explains most of the differential incidence between the two races.`[18] Papers examining the epidemiology of the disease among women of Asian descent have focused on the effects of migration.[11]

Of the 4,463 histologically confirmed cases of invasive ovarian cancer diagnosed in Illinois from 1987 to 1991, 369 occurred in black women and 52 occurred in women of other races, a group comprising primarily Asians and Pacific Islanders; 46 had an unknown race. The remaining 3,996 cases were white. As shown in the table below, there were significant differences by race in the age distribution of ovarian cancer cases, with black women and women of other races both more likely than white women to be diagnosed younger than 30 years of age. Further, women of other races were more likely than blacks to be diagnosed between the 15 and 30 years of age.

***Histologically Confirmed Invasive Ovarian Cancer by Age and Race Illinois, 1987-1991***

| | Whites | | Blacks | | Other Races | |
|---|---|---|---|---|---|---|
| **Age** | Number | Percent | Number | Percent | Number | Percent |
| 15 | 19 | 0.5 | 4 | 1.1 | 0 | 0.0 |
| 15-29 | 124 | 3.1 | 24 | 6.5 | 6 | 11.5 |
| 30-59 | 1,459 | 36.5 | 147 | 39.8 | 33 | 63.5 |
| 60+ | 2,394 | 59.9 | 194 | 52.6 | 13 | 24.9 |
| Total | 3,996 | 100.0 | 369 | 100.0 | 52 | 100.0 |

Source: IDPH, Illinois State Cancer Registry, Public Data Set, 1987-1991
$X^2$ tests, 3 d.f.: p< .0001, Whites *cf.* Blacks; p< .0001, Whites *cf.* Other; p<.005, Blacks *cf.* Other

Nearly 55 percent of all cases of ovarian cancer are diagnosed in the distant stage. No differences among the three race groups are noted in the stage distribution of the newly diagnosed ovarian cancer cases. Unlike other gynecologic cancers for which there are common and widespread access to screening modalities, no such tool exists for early detection of ovarian cancer. Thus the issues of differential access to early detection modalities among different race groups is not a factor in ovarian cancer, and it may explain the reasons for the lack of race differentials, as shown below.

***Histologically Confirmed Invasive Ovarian Cancer by Stage and Race Illinois, 1987-1991***

| | Whites | | Blacks | | Other Races | |
|---|---|---|---|---|---|---|
| **Stage** | Number | Percent | Number | Percent | Number | Percent |
| Local | 1,027 | 25.7 | 91 | 24.7 | 21 | 40.4 |
| Regional | 636 | 15.9 | 52 | 14.1 | 6 | 11.5 |
| Distant | 2,174 | 54.4 | 218 | 59.1 | 24 | 46.2 |
| Unknown | 159 | 4.0 | 8 | 2.2 | 1 | 1.9 |
| Total | 3,996 | 100.0 | 369 | 100.0 | 52 | 100.0 |

Source: IDPH, Illinois State Cancer Registry, Public Data Set, 1987-1991
$X^2$ test, p=.09, 6 d.f.

The place of residence of the ovarian cancer cases varied by race, although it is similar to the race distribution of Illinoisans across the state.

***Histologically Confirmed Invasive Ovarian Cancer by Illinois Region and Race Illinois, 1987-1991***

| | **Whites** | | **Blacks** | | **Other Races** | |
|---|---|---|---|---|---|---|
| Place | Number | Percent | Number | Percent | Number | Percent |
| Chicago | 798 | 20.0 | 260 | 70.5 | 25 | 48.1 |
| Suburban Cook Co. | 876 | 21.9 | 35 | 9.5 | 12 | 23.1 |
| Illinois, excl. Cook Co. | 2,322 | 58.1 | 74 | 20.1 | 15 | 28.8 |
| Total | 3,996 | 100.0 | 369 | 100.0 | 52 | 100.0 |

Source: IDPH, Illinois State Cancer Registry, Public Data Set, 1987-1991
$X^2$ test, p=.0001, 6 d.f.

The reporting of tobacco and alcohol use differed among the three race groups; however, it is not clear what etiologic significance can be attached to this finding. For both factors, black women were more likely to have information in the central registry, as shown in the table below. However, when the unknown category is omitted, statistically significant differences by race are still evident.

***Histologically Confirmed Invasive Ovarian Cancer by Tobacco and Alcohol Use and Race, Illinois, 1987-1991***

| | Whites | | Blacks | | Other Races | |
|---|---|---|---|---|---|---|
| **Use** | Number | Percent | Number | Percent | Number | Percent |
| **Alcohol**[a] | | | | | | |
| Current | 1,035 | 25.9 | 71 | 19.2 | 8 | 15.4 |
| Past | 69 | 1.7 | 16 | 4.3 | 0 | 0 |
| Never | 768 | 19.2 | 111 | 30.1 | 21 | 40.4 |
| Does not | 681 | 17.0 | 49 | 13.3 | 8 | 15.4 |
| Unknown | 1,443 | 36.1 | 122 | 33.1 | 15 | 28.8 |
| Total | 3,996 | 100.0 | 369 | 100.0 | 52 | 100.0 |
| **Tobacco**[b] | | | | | | |
| Current | 700 | 17.5 | 91 | 24.7 | 5 | 9.6 |
| Past | 387 | 9.7 | 41 | 11.1 | 3 | 5.8 |
| Never | 1,007 | 25.2 | 102 | 27.6 | 20 | 38.5 |
| Does not | 713 | 17.8 | 47 | 12.7 | 8 | 15.4 |
| Unknown | 1,189 | 29.8 | 88 | 23.8 | 16 | 30.8 |
| Total | 3,996 | 100.0 | 369 | 100.0 | 52 | 100.0 |

Source: IDPH, Illinois State Cancer Registry, Public Data Set, 1987-1991
[a]$X^2$ test, p=.0001, 6 d.f.
[b]$X^2$ test, p=.005, 6 d.f.

### *Characteristics by Cell Type*

The ovary is a complex structure, with elements from different germ cell layers. Tumors can develop in any of these elements. The major morphologic types of the invasive ovarian cancers are epithelial (93 percent), gonadal (2 percent), germ cell (2 percent), mixed Müllerian (2 percent), and all other cell types (1 percent). The next table shows the distribution of ovarian tumors by specific morphologic type.

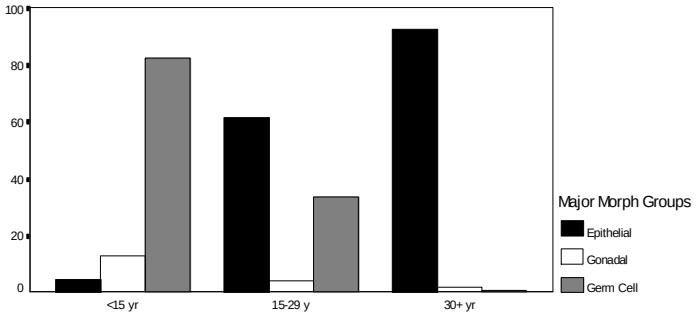
***Frequency and Percent Distribution of Morphologic Types, Histologically Confirmed Cases Ovarian Cancer, Illinois, 1987-1991***

| Morphologic Type† | Number | Percent |
|---|---|---|
| Ovary, invasive | 4,463 | 100.0 |
| Carcinoma | | |
| Epidermoid carcinoma | 26 | 0.6 |
| Adenocarcinoma | | |
| Adenocarcinoma NOS (8140) | 728 | 16.3 |
| Papillary adenocarcinoma (8050, 8260) | 512 | 11.5 |
| Clear cell adenocarcinoma (8310, 9110) | 129 | 2.9 |
| Endometroid carcinoma (8380-81, 8570) | 389 | 8.7 |
| Cystadenocarcinoma (8440, 8450) | 177 | 4.0 |
| Serous cystadenocarcinoma (8441) | 345 | 7.7 |
| Papillary serous cystadenocarcinoma (8460-61) | 1,030 | 23.1 |
| Mucinous cystadenocarcinoma (8470-71) | 344 | 7.7 |
| Mucinous adenocarcinoma (8480-81) | 148 | 3.3 |
| Other | 86 | 1.9 |
| Other specific carcinomas | | |
| Stromal cell tumor (8620-31, 8650) | 77 | 1.7 |
| Other (8012) | 57 | 1.3 |
| Unspecified (carcinoma NOS) | 163 | 3.7 |
| Sarcoma (8800) | 23 | 0.5 |
| Other specified types | | |
| Mixed Müllerian (8950-51, 8980) | 85 | 1.9 |
| Brenner tumor, malignant (9000) | 8 | 0.2 |
| Germ cell tumors | | |
| Dysgerminoma (9060) | 38 | 0.9 |
| Teratoma, malignant (9080-85. 9102) | 48 | 1.1 |
| Other (9064) | 21 | 0.5 |
| Other (9100) | 7 | 0.2 |
| Unspecified | 22 | 0.5 |
| Ovary, *in situ* | 2 | 100.0 |

† Based on ICD-O, histology codes in parentheses.
SOURCE: IDPH, Illinois State Cancer Registry, Public Data Set, March 1995

***Age Differences.*** The histopathology of ovarian malignancies differs by age, as shown in the adjacent figure. Among women younger than 15 years of age, germ cell tumors are the most common. These tumors are virtually non-existent among cases older than 30 years of age. Gonadal tumors, although less frequent in occurrence, follow the same age pattern as the germ cell tumors. Epithelial tumors, on the other hand, which are the most common ovarian tumor cell type, are the most frequent tumor among women 15 to 29 years of age and also among women 30 years of age and older. These differences are statistically significant at $p < .0001$ using a chi-square test with 8 degrees of freedom.

Major Morph Groups of Invasive Ovarian Cancer Cases by Age, Illinois, 1987-1991




SOURCE: IDPH, Illinois State Cancer Registry, Public Data Set, 3/95

***Race Differences.*** The frequency distribution of tumor cell types also differs by race as shown in the table below. Black women are also the least likely of the three race groups to be diagnosed with an epithelial tumor. Black women are more likely than white women to have a gonadal or germ cell tumor.

***Invasive Ovarian Cancer by Cell Type and Race, Illinois, 1987-1991***

| | Whites | | Blacks | | Other Races | |
|---|---|---|---|---|---|---|
| **Cell Type** | Number | Percent | Number | Percent | Number | Percent |
| Epithelial | 3,725 | 93.2 | 315 | 85.4 | 47 | 90.4 |
| Gonadal | 63 | 1.6 | 21 | 5.7 | 2 | 3.8 |
| Germ Cell | 88 | 2.2 | 16 | 4.3 | 2 | 3.8 |
| Mixed Müllerian | 73 | 1.8 | 12 | 3.3 | 0 | 0 |
| All Other | 47 | 1.2 | 5 | 1.4 | 1 | 1.9 |
| Total | 3,996 | 100.0 | 369 | 100.0 | 52 | 100.0 |

Source: IDPH, Illinois State Cancer Registry, Public Data Set, 1987-1991
$X^2$ test, p=.0001, 8 d.f.

***Stage Differences.*** The stage of disease at diagnosis differs by cell type (see table below). Gonadal tumors and germ cell tumors are most often diagnosed in the local stage, while epithelial tumors, mixed Müllerian and all other tumors are most often diagnosed in the distant stage.

***Invasive Ovarian Cancer by Cell Type and Stage, Illinois, 1987-1991***

| | Local | | Regional | | Distant | | Unknown | |
|---|---|---|---|---|---|---|---|---|
| **Cell Type** | Number | Row % | Number | Row % | Number | Row % | Number | Row % |
| Epithelial | 1,022 | 24.7 | 653 | 15.8 | 2,296 | 55.6 | 162 | 3.9 |
| Gonadal | 48 | 55.8 | 12 | 14.0 | 24 | 27.9 | 2 | 2.3 |
| Germ Cell | 63 | 59.4 | 17 | 16.0 | 20 | 18.9 | 6 | 5.7 |
| Mixed Müllerian | 6 | 7.1 | 17 | 20.0 | 59 | 69.4 | 3 | 3.5 |
| All Other | 12 | 22.6 | 4 | 7.5 | 35 | 66.0 | 2 | 3.8 |
| Total | 1,151 | 25.8 | 703 | 20.0 | 2,434 | 54.5 | 175 | 3.9 |

Source: IDPH, Illinois State Cancer Registry, Public Data Set, 1987-1991
$X^2$ test, p=.0001, 12 d.f.

**Distribution of p**

- Women with no family members with ovarian cancer have a 1 in 70 lifetime risk of developing the disease. A very small subset of women with multiple first-degree relatives have a very high risk. The three known hereditary syndromes that may place a women at exceedingly high risk are familial site-specific ovarian cancer syndrome, breast-ovarian cancer syndrome, and Lynch syndrome II.
- All women should have a careful family history taken by their primary care physicians. Women who have one of the three syndromes noted above should have at least an annual physical examination, a bi-manual recto-vaginal examination, CA 125 determinations, and trans-vaginal ultrasound (TVS). When childbearing is complete, or at least by 35 years of age, prophylactic bilateral oophorectomy is recommended.
- No evidence is currently available that the current screening modalities of CA 125 and TVS can be effectively used in widespread population screening programs. However, these techniques should be used in clinical trials to determine their efficacy and impact on ovarian cancer mortality.
- Studies need to be done to evaluate the risks and benefits of laparoscopic surgery, compared with more traditional approaches, for management of ovarian masses.
- Women with ovarian masses who have been identified pre-operatively as having a significant risk for ovarian cancer should be given the option to have their surgery performed by a gynecologic oncologist.
- Aggressive attempts at cytoreductive surgery as the primary management of ovarian cancer will improve the patient's opportunity for long-term survival.
- Women with stage IA grade 1 and most stage IB grade 1 ovarian cancer do not require post-operative adjuvant therapy. Many other stage I patients do require adjuvant therapy, thus subsets of stage I must be fully defined.

- Women with stages II, III, and IV epithelial ovarian cancer (other than tumors with low malignant potential [LMP]), should receive post-operative chemotherapy.
- For women who have completed primary therapy for ovarian cancer, no evidence exists for an ideal follow-up. Studies are needed to identify additional therapies that can prolong survival, improve quality of life, and increase the possibility of cure.
- Physicians must be encouraged to discuss clinical trial participation with women, and women should be encouraged to participate.
- All women should have access to accurate and complete information regarding ovarian cancer, without barriers to access to qualified specialists, optimal therapy, and protocols currently in clinical trials.

## TECHNICAL NOTES

### Data Sources

The Illinois State Cancer Registry (ISCR) is the only source for population-based information on cancer incidence for the state of Illinois, with continuous collection of statewide incidence data since 1985. Reporting is mandated for all non-federal Illinois hospitals. In addition, although reports are received currently from six of eight federal facilities, arrangements with only two of them pre-date all the years of this report.

Due to a number of reasons, including geography and perceived quality of care, the geography of the state, some residents travel outside Illinois for their cancer care. In order to optimize incidence ascertainment for all Illinois residents, data are exchanged with the central cancer registries in all five bordering states and four other states or locations where Illinoisans travel for cancer care (Florida, Michigan, California, and the Mayo Clinic, Rochester, Minnesota). The data were obtained from ISCR public data sets covering the years from 1986 through 1993. Data for 1992 and 1993 are considered probationary due to the unavoidable lag in data exchanges with several other states.

Illinois mortality information was obtained from the public use death tapes of the National Center for Health Statistics, accessible through the Wonder/PC bulletin board at the U.S. Centers for Disease Control and Prevention. For comparison purposes, the ovarian cancer mortality rates for 1987 to 1991 in the United States and states other than Illinois were obtained from the publication, *SEER Cancer Statistics Review, 1973-1991*.[20] Ovarian cancer incidence data for the United States and for other states were obtained from the publication *Cancer Incidence in North America, 1988-1991* and the NAACCR electronic data set for 1988 to 1991.[13]

Graphs were produced using SPSS for Windows version 6.1 and WordPerfect Presentations.

**Disease Rates**

The Health Information Retrieval System (HIRS) software was used to calculate the Illinois incidence rates. Estimates of the Illinois populations for 1988 through 1991 were obtained from the SEER program of the National Cancer Institute. Estimates of all race groups for 1986 and 1987 were obtained from the U.S. Bureau of the Census' intercensal estimates by age, race, and sex for Illinois.[3] Estimates of the white population for 1992 were obtained from the Illinois Bureau of the Budget. The 1991 estimates of the black and other race populations were used to calculate rates for 1992 and 1993, since estimates were not available for these groups. Similarly, estimates for the 1992 white population were used for 1993, since estimates were not available at the time of the analysis.

[3] Differences between the NCI estimates and Bureau of the Census intercensal estimates are small (most less than 20 persons) in the age groups of greatest cancer occurrence.

**REFERENCES**


1. Park RC. Age—Is it a risk factor in ovarian cancer? *Cancer* 1994; 73:245-6.
2. Merino MJ and Jaffe G. Age contrast in ovarian pathology. *Cancer* 1993; 71:537-44.
3. Karlan BY and Krakow D. Genetic aspects of ovarian cancer. *Current Opinion in Obstetrics and Gynecology* 1994; 6:105-10.
4. Carlson KJ, Skates SJ, Singer DE. Screening for ovarian cancer. *Ann Intern Med* 1994; 121:124-132.
5. Whittemore AS, Harris R, Itnyre J, Halpern J, Collaborative Ovarian Cancer Group. Characteristics relating to ovarian cancer risk: collaborative analysis of 12 U.S. case-control studies. II. Invasive epithelial ovarian cancers in white women. Collaborative Ovarian Cancer Group *Am J Epidemiol* 1992; 136:1184-1203.
6. Hankinson SE, Colditz GA, Hunter DJ, Spencer TL, Rosner B, Stampfer MJ. A quantitative assessment of oral contraceptive use and risk of ovarian cancer. *Obstet Gynecol* 1992; 80:708-14.
7. Venter PF. Ovarial epithelial cancer and chemical carcinogenesis. *Gynecol Oncol* 1981; 12:281
8. Wignall BK, Fox AJ. Mortality of female gas mask assemblers. *Brit J Ind Med* 1982; 39:34-38.
9. Whittemore AS, Wu ML, Paffenbarger RS, Sarles DL, Kampert JB, Grosser S, Jung DL, Ballon S, Hendrickson M. Personal and environmental characteristics related to epithelial ovarian cancer. II. Exposures to talcum power, tobacco, alcohol, and coffee. *Am J Epidemiol* 1992; 136:1228-40.
10. Miller RW . Radiation induced cancer. *J Nat Cancer Inst* 1972; 49:1221.
11. Herrinton LJ, Stanford JL, Schwartz SM, Weiss NS. Ovarian cancer incidence among Asian migrants to the United States and their descendants. *J Nat Cancer Inst* 1994; 86:1336-39.
12. Howe HL, Alo CJ, Lumpkin JR, Qualls RY, Lehnherr M. Cancer incidence and age at northern migration of African Americans in Illinois, 1986-1991, under review for publication.

13. Howe HL (ed). Cancer Incidence in North America, 1988-1991. Sacramento, CA: North American Association of Central Cancer Registries, April 1995.

14. Ovarian Cancer and Older Women: is treatment less aggressive? *J Nat Cancer Inst* 1992; 84:6-7.

15. Hightower RD, Nguyen HN, Averette HE, Hoskins W, Harrison T, Steren A. National survey of ovarian carcinoma IV: patterns of care and related survival for older patients. *Cancer* 1994; 73:377-83.

16. Anteby SO, Yosef SM, Schenker JG. Ovarian cancer geographical, host and environmental factors. *Arch Gynecol* 1983; 234:137-148.

17. Howe HL, Keller JE, Lehnherr M. Relation between population density and cancer incidence, Illinois, 1986-1990. *Am J Epidemiol* 1993; 138:29-36.

18. John EM, Whittemore AS, Harris R, Itnyre J, Collaborative Ovarian Cancer Group. Characteristics relating to ovarian cancer risk: collaborative analysis of seven U.S. case-control studies. Epithelial ovarian cancer in black women. *J Nat Cancer Inst* 1993; 85(2):142-47.

19. Ovarian Cancer: Screening, Treatment, and Followup. NIH Consensus Statement 1994 April 5-7; 12(3):1-30.

20. Ries LAG, Miller BA, Hankey BF, Kosary CL, Harras A, Edwards BK (eds). SEER Cancer Statistics Review, 1973-1991; Tables and Graphs, National Cancer Institute. NIH Pub. No. 94-2789. Bethesda, MD, 1994.

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