Childbirth as Protective of the Health of Women in Contrast to Induced Abortion. I. Breast, Ovarian, and Endometrial Cancer

There is a long-standing, poorly examined belief that "abortion is safer than childbirth." However, this has never been substantiated by research. One relatively unexamined issue is the important role that childbirth and lactation play in the over-all health of a woman. The failure of the body to experience these events appears to cause malfunctions which frequently results in health problems later in life, including possible increased risks from various types of cancer. This bibliography summarizes key findings from articles in medical and social journals which provide evidence of the protective effects of childbirth compared to induced abortion. It is the first of a series of articles on the subject and specifically discusses breast, ovarian, and endometrial cancer.

Breast Cancer

The American Cancer Society estimates there will be 178,700 new invasive cases of breast cancer in U.S. women in 1998 and an estimated 43,500 women will die from breast cancer in 1998. One out of eight U.S. women will have breast cancer in their lifetime.

Abortion as a Factor in Delayed Childbirth

Between 45% and 50% of U.S. women undergo induced abortion of their first pregnancy each year. However, it is well established that an early full-term childbirth has a protective effect against breast cancer in women. But if women undergo abortion there is a risk that no full-term births will occur, and they may abort what would have been their only full-term birth. Two studies of special populations have found that between 19%-36% of post-abortion women (mean age 32 years) had aborted their only pregnancy an average of eleven years earlier.

In a hospital based case-control study of Connecticut women aged, 45-74, with newly diagnosed breast cancer in 1977-79, it was found that higher than average risks were found among women who had never given birth to a child, women with an early age at menarche, women who had given birth to their first child at a relatively late age, women with previous benign breast disease, and women with a history of breast cancer in a sister or mother. Heavy women were at high risk for postmenopausal breast cancer, and thin women were at high risk for premenopausal breast cancer.


In a case-control study by the Centers for Disease Control involving eight population-based cancer registries in the United States, it was found that increasing parity (live born children) and duration of breastfeeding had a strong protective influence on the risk of breast cancer. (Table I) Compared with parous women who never breastfed, women who had breastfed for 25 months or more had an adjusted relative risk of 0.67 (0.52-0.85, CI 95%).


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<thead>
<tr>
<th>Number of Liveborn Children</th>
<th>Relative Risk</th>
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<tr>
<td>1</td>
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<tr>
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Premenopausal women who had lactated when compared with women who were parous but had never lactated had a reduced risk of breast cancer (0.78, 0.66-0.91, CI 95%), but there was no reduced risk in postmenopausal women who had lactated.

Induced Abortion as an Independent Risk Factor

The major debate in the induced abortion-breast cancer area is whether or not an induced abortion exerts an independent risk of breast cancer. It is not claimed that induced abortion protects against breast cancer. The controversy is over whether or not it independently increases the risk for breast cancer and, if so, what is the magnitude of that risk and under what circumstances does the increased risk arise.

Induced abortion as an independent risk factor for breast cancer a comprehensive review and analysis, J. Brind et al, J of Epidemiology and Community Health 50: 481-49.

A meta-analysis was undertaken of 28 published reports which constituted 23 independent studies with specific data on induced abortion and breast cancer incidence. It was concluded that there was an independent risk of 30-50% for breast cancer as a result of induced abortion. Slightly higher risks for breast cancer among women with multiple induced abortions compared to one induced abortion were found in seven of ten studies.

The authors stated that a crucial distinction in the assessment of the real magnitude of breast cancer risk attributable specifically to induced abortion, is the ability to distinguish this from the known increased risk attributable to a delay in the first full term pregnancy by any means. From the point of view of women considering abortion, parous women would be subject only to the independent effect of induced abortion, whereas nulliparous women would be subject to both risk enhancing effects of the abortion, depending on their age at time of abortion, and if and when they subsequently have any children.
The authors also stated that induced abortion may independently increase risk via the tumor promoting effect of the considerably raised estradiol concentrations of early pregnancy, while denying a woman the benefit of the differentiating effect of the hormonal milieu of late pregnancy. This differentiating effect is presumably the mechanism by which an early completed pregnancy confers permanent protection against breast cancer. In addition, induced abortion may enhance the estrogen mediated proliferation of normal but primitive cells, resulting in the presence of more cells which are vulnerable to subsequent primary carcinogenesis.


Updating the meta-analysis in quantitative terms, the number of worldwide published studies showing data on induced abortion and breast cancer incidence has increased from 23 to 30, 24 of which (up from 18) reflect overall increased risk in women who had chosen abortion.


The authors stated that both major hormones, estradiol and progestosterone play important roles in increasing breast cancer risk. Varying serum levels of these two hormones can "explain" most of the epidemiologic observations that have been made regarding breast cancer etiology, including the large difference between the high breast cancer rates in the United States and Western Europe and the low rates in Japan and most other Asian countries.


The author stated that if a woman's first pregnancy resulted in a first trimester abortion, the dramatic rise in undifferentiated cells that takes place during the first trimester would not be followed by the marked differentiation occurring during the second and third trimesters. The consequent sharp increase in the number of vulnerable cells would thus elevate breast cancer risk. Abortion, occurring shortly before a woman's first full-term pregnancy, however might not increase risk, since most of the newly-produced undifferentiated cells would soon undergo differentiation. Similarly, abortions occurring after a woman's first full term pregnancy or any subsequent full term pregnancy, also might have little effect, because the number of undifferentiated cells eligible to proliferate would be markedly smaller, due to the prior pronounced breast development induced by each full term pregnancy.


A population-based Danish cohort of women with information on parity and vital status of all Danish women born from April 1, 1935 through March 31, 1978 was studied through linkage with the Danish National Registry of Induced Abortions. It was concluded that no increases in risk of breast cancer were found in subgroups according to age at abortion, parity, time since abortion, or age at diagnosis. The relative risk of abortion increased with increasing gestational age of the fetus. It was concluded that induced abortions have no overall effect on the risk of breast cancer.

Comment: This study was touted by some as having put to rest any dispute over whether or not induced abortion increases the risk of breast cancer in women.

In an editorial accompanying the Danish study, an official of the National Cancer Institute concluded, based upon this study, that "a woman need not worry about the risk of breast cancer when facing the difficult decision of whether to terminate a pregnancy.

However, the Danish study, far from settling the issue of induced abortion and breast cancer, has been severely criticized. In a letter to the editor, Joel Brind, PhD, stated that since the study encompasses such a wide age range, women who had induced abortions are concentrated in the younger range of the total sample, resulting in considerably less average follow-up time for them compared to women without induced abortions. (9.6 vs. 20.7 years) He stated that this could
have been avoided by birth cohort matching of women with and without induced abortions. He also noted that the incidence of breast cancer in Danish women has been found to be increasing among women of the same age over time and that induced abortion may be at least partly responsible for the increase. However, the Danish study by adjusting for age, may have been eliminating the very factor (induced abortion) that they were investigating. It was also claimed that more than 30,000 women in the study who had abortions were misclassified as having had no abortions.


In an analysis of data taken from 6 case-control studies in France, it was found that there was an increased risk for breast cancer associated with a family history (1.8) which further increased for both spontaneous and induced abortions (1.9 for one abortion and 2.8 for two or more) and especially when abortion occurred before the first childbirth (1.9 for abortion after first childbirth, and 2.7 for abortion before first childbirth). The authors stated that these findings suggest firstly an effect of abortion itself rather than predisposition to abortion, and secondly an effect of the time when abortion occurs. Abortion may be a catalytic event which exacerbates an existing familial risk of breast cancer.


In a study of the effects of carcinogens on the mammary glands of rats, it was found that pregnancy and lactation protected the mammary gland from developing carcinomas and benign lesions by induction of full differentiation, but pregnancy interruption did not elicit sufficient differentiation in the gland to be protective, and those rats were at the same risk as virgin animals treated with the carcinogen.


In a case-control study of breast cancer in Athens, Greece in 1989-91 women with confirmed breast cancer were compared with orthopedic patient controls and healthy visitor controls, and matched to cases by age and interviewer. When parous women with no history of abortion were used as the base-line (1.0), the odds ratio was 2.06 (1.45-2.90) for an induced abortion before the first full-term pregnancy and 1.59 (1.24-2.04) for induced abortion after a first full-term pregnancy.


All Danish women less than 70 years of age diagnosed with breast cancer in 1983-84 identified from the files of the Danish Breast Cancer Registry were compared with an age stratified sample of women drawn from the general population. It was found that women whose first pregnancy was terminated by spontaneous or induced abortion before 28 weeks gestation had a 1.43 relative risk (1.10-1.84, 95% CI) compared to women whose first pregnancy was carried to term.

Ovarian Cancer

The American Cancer Society estimates that 25,400 new cases of ovarian cancer in U.S. women will occur in 1998 and that 14,500 women will die from ovarian cancer in 1998. It is often "silent," showing no obvious signs or symptoms until late in its development.

It is well established that women who never have children are more likely to develop ovarian cancer than women with live-born children. In a review of the medical literature, incomplete pregnancies, including induced abortion, had no association with ovarian cancer in five studies; were slightly protective but not as much as childbirth in four studies; slightly increased risk in two studies; and had approximately the same protection as childbirth in two studies.


In a study of deaths from ovarian cancer researchers reported, "The findings suggest that
pregnancy—or some component of the childbearing process—protects directly against ovarian cancer. This protection seems to persist throughout life." The authors of the study observed that "ovarian cancer is rare in populations which do not practice birth control." They also observed that if suppression of ovulation is the key factor in reducing the risk of ovarian cancer, then a pregnancy of short gestation i.e. one which ended as an abortion, should confer less protection from ovarian cancer than one which went to term.


In a study of 322 white female residents aged 20-79 diagnosed with invasive or borderline ovarian cancer in three counties in Washington state in 1986-88, compared to 426 women randomly selected from the same counties, the number of births increasingly reduced the risk of ovarian cancer from 0.7 (0.4-1.1) for one birth compared to no births, and 0.6 (0.4-0.8) for two or three births compared to no births. When the analysis was restricted to ever-pregnant women, a prior induced or spontaneous abortion (evaluated separately) was not found to be associated with the incidence of ovarian tumors, and was decreased only slightly in nulliparous women. It was concluded that "it is possible that if incomplete pregnancies do affect the risk of ovarian cancer, their impact might be too small to be identified through epidemiologic studies."

Table II.

<table>
<thead>
<tr>
<th>Number of Term Pregnancies</th>
<th>Relative Risk</th>
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<tbody>
<tr>
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<td>1.00</td>
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<tr>
<td>1</td>
<td>0.60 (0.47-0.76)</td>
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<tr>
<td>2</td>
<td>0.53 (0.44-0.64)</td>
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<tr>
<td>3</td>
<td>0.48 (0.39-0.59)</td>
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<tr>
<td>4</td>
<td>0.36 (0.28-0.46)</td>
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<tr>
<td>5</td>
<td>0.33 (0.23-0.46)</td>
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<tr>
<td>6+</td>
<td>0.29 (0.20-0.42)</td>
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Comment: This is by far the most comprehensive study of spontaneous and induced abortions (studied separately) and their possible impact on ovarian cancer. Age at time of abortion, gestational age, whether the abortion was before or after a first birth, and total gestational age of all abortions were studied.


A case-control study of 116 women diagnosed with serous and mucinous borderline ovarian tumors between 1980-85 in three counties in western Washington state and compared with 158 randomly selected women in the same counties, found that the risk of these ovarian tumors among women who had given birth to one or two children and to three or more children was respectfully 0.7 (0.3-1.3) and 0.4 (0.2-1.0) compared to nulliparous women. (A similar proportion of cases and controls reported a history of induced abortion.)


824 cases of women diagnosed with epithelial ovarian cancer in Queensland, New South Wales, and Victoria, Australia between 1990-1993 were compared to 860 controls drawn at random from the electoral roll and stratified by age and geographic region. A reduced risk of ovarian cancer was found to be associated with increasing parity, but there were no associations between the development of ovarian cancer and the number of incomplete pregnancies.


In a case-control study of 188 women with histologically confirmed epithelial ovarian cancer and 280 hospital controls and 259 women selected from the general population in the San...
Francisco Bay area during 1983-85, ovarian cancer patients were more likely to be nulliparous (20.7%) compared to hospital controls (17.1%) or general population controls (10.0%). Ovarian cancer patients also had fewer number of term pregnancies (2.2) compared to hospital or general population controls (2.5) and had the same number of abortions (0.6) compared to controls.

Comments: This U.S. study demonstrated no protective effect from abortions but did not indicate whether or not they were induced or spontaneous.


Data collected from 2197 white ovarian cancer patients and 8893 controls in 12 US studies conducted during 1956-86 were used to evaluate the risk of invasive epithelial ovarian cancer to reproductive variables. When cases were compared to hospital controls, and using women with no term pregnancies i.e. at least 20 weeks gestation, as the reference point (1.0), one term pregnancy had a 0.94 OR (0.73-1.2), two term pregnancies had an 0.86 OR (0.68-1.1), three term pregnancies had a 0.67 OR (0.51-0.88), four term pregnancies had a 0.73 OR (0.53-1.0), five term pregnancies had a 0.28 OR (0.15-0.51) and 6 or more term pregnancies had a 0.46 OR (0.29-0.72). Using women with no failed pregnancies i.e. abortions, miscarriages, ectopic pregnancies, and stillbirths as the reference point (1.0), women with 1 or 2 failed pregnancies had a 0.86 OR (0.68-1.1) and women with 3 or more failed pregnancies had a 0.80 OR (0.50-1.3).

When cases were compared to the general population and using women with no term pregnancies i.e. at least 20 weeks gestation, as the reference point, there was a strong consistent protective effect from term pregnancies. (Table II) When women with no failed pregnancies i.e. abortions, miscarriages, ectopic pregnancies and stillbirths are used as the reference point (1.0), women with one or two failed pregnancies had an 0.88 OR (0.75-1.0), and women with 3 or more failed pregnancies had a 0.83 OR (0.59-1.2).

Comment: This is a large study because it gathered data from 12 U.S. studies. Two groups of controls were used (hospital and general population). The comparison between cases and general population controls showed a consistent statistically significant decrease in risk for ovarian cancer than cases compared to hospital controls. Most importantly, the protective effect from term pregnancies was greater than the protective effect from incomplete pregnancies, particularly with respect to cases and general population controls.

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A case-control study of Swedish women born between 1925 and 1960 diagnosed 3486 cases of invasive ovarian cancers including 2992 epithelial, 300 stromal, 149 germ-cell, and 15 not classifiable plus 510 tumors of borderline malignant potential up until 1984. After simultaneous adjustment for parity and age at first birth, increasing parity was associated with a pronounced consistent decrease in relative risk of all invasive cancers, but a less consistent decrease for borderline tumors.


In a case-control study in Milan, northern Italy from 1983-1991 of 953 cases of epithelial ovarian cancer (median age, 54) compared to 2500 hospital control subjects admitted for acute diseases (median age, 52) a relative risk of 0.7 (0.5-1.0, CI 95%) was found for women with one voluntary abortion compared to women with no voluntary abortions. A relative risk of 0.8 (0.6-1.2, CI 95%) was found for women with two or more voluntary abortions compared to women with no voluntary abortions. The authors estimated that an abortion confers a protection of the order of 10% against the risk of epithelial cancer.

Comment: This study reported that voluntary abortions reduced the risk of ovarian cancer by about 10% for each abortion. An earlier study published in 1991 on this same population reported that nulliparous (no
children) increased the risk of ovarian cancer by 42% compared to parous women. (RR 1.42, 1.1-1.7) Thus, even with some protective effects from voluntary abortion, it would appear that childbirth would generally offer greater protection.


In a case-control study of 150 ovarian cancer patients among white women under age 50 in Los Angeles County during 1973-76 compared to 150 neighborhood controls, the relative risk for ovarian cancer decreased with increasing numbers of live births and with increasing numbers of incomplete pregnancies and with increasing duration of oral contraceptive use, although none were statistically significant. Pregnancy months (12 months for each live birth) plus the total months of incomplete pregnancies had a stronger association but still was not statistically significant. When months of oral contraceptive use were added to pregnancy months to obtain a "protected time", the negative association reached statistical significance. It was concluded that "the risk of ovarian cancer is clearly decreased by factors which suppress ovulation."

**Endometrium (Uterus) Cancer**

The American Cancer Society estimates that there will be 34,900 cases of cancer of the uterine corpus of the uterus, usually of the endometrium, among U.S. women in 1997 and that 6000 women will die from it in 1997. However, the relationship between endometrial cancer and reproductive history, parity, or induced abortion has been little studied, but the findings that childbirth is protective and incomplete pregnancies are not protective have been consistent. The following represent virtually the only published studies in the last 20 years which can be found in the medical literature.


Estrogen is the major risk for one type of endometrial cancer. Estrogen-related exposures include never having children and a history of failure to ovulate have been shown to increase risk. Pregnancy and the use of oral contraceptives appear to provide protection against endometrial cancer.

Comment: In light of the available data, it appears that it is childbirth and not pregnancy which protects against endometrial cancer.


A large study of 765,756 Norwegian women representing a total of 9,307,118 person years in the age interval of 30-56 years was undertaken using various registries. Compared to women with one full term pregnancy (1.0), nulliparous women had a 1.94 (1.46-2.59) incidence rate ratio (IRR) women with two full-term pregnancies had an 0.85 (0.64-1.09) IRR, women with 3 full-term pregnancies had a 0.61 (0.46-0.82) IRR, women with 4 or more full term pregnancies had a 0.48 (0.34-0.69) IRR for endometrial carcinoma. The reduction in risk was found to be more pronounced with the first pregnancy than that observed for any subsequent pregnancy. The risk of endometrial carcinoma increased with increasing time since last birth. The reduction in risk among parous women compared to nulliparous women diminished with increasing time since last birth. They concluded that "our results support the hypothesis that the reduction in risk of endometrial carcinoma associated with a pregnancy is related to a mechanical shed of malignant or pre-malignant cells at each delivery."

Comment: In Norway, there is a vast array of registries available to researchers which enabled the study to be done. The conclusion that delivery of a child helps shed malignant or pre-malignant cells and thus reduces the likelihood of endometrial cancer, was an important one which had been hypothesized earlier by other researchers.


A hospital-based case control study of cancer of the endometrium was conducted in Athens, Greece from 1992-94 by researchers at the University of Athens Medical School and the Harvard School of Public Health.
It was found that the risk of endometrial cancer consistently decreased with the number of livebirths but did not decrease with one miscarriage or one induced abortion. Compared with never-pregnant women as the base reference (1.0), women who had been pregnant with no live birth had a 1.09 OR (0.28-4.19).


During 1987-90, a study was undertaken of 405 cases of newly diagnosed cancer of the uterine corpus in women between the ages of 20-74 years which were obtained from seven hospitals throughout the United States. Population controls (297) were matched for age, race and location of residence and were obtained by random digit dialing techniques. The mean age of the cases at interview was 59.2 years compared to 58.0 years for controls. Compared to women with no term births (1.0), women with term births had a consistently lower risk of endometrial cancer. (Table III).

Women who reported ever having an induced abortion had the same risk as women reporting not ever having an induced abortion (1.00, 0.5-2.0). Women having one or two or more miscarriages had virtually the same risk as women reporting no miscarriages (0.99-1.09). It was concluded that the protective effect was limited to term births.

### Table III.

<table>
<thead>
<tr>
<th>Number of Term Births</th>
<th>Relative Risk</th>
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<tr>
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<tr>
<td>2</td>
<td>0.32 (0.2-0.6)</td>
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<td>4</td>
<td>0.54 (0.3-1.0)</td>
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<tr>
<td>5+</td>
<td>0.22 (0.1-0.4)</td>
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</table>

Source: Brinton et al (1992)


A case-control study of women age 45 years or less at diagnosis in Los Angeles County during 1972-79, found that increasing parity was strongly associated with decreased risk for endometrial cancer. Compared to nulliparous women (1.0), the relative risk was 0.54 for women with one full-term pregnancy i.e. 28 weeks or more, 0.22 for women with two full-term pregnancies, 0.12 for women with three full-term pregnancies and 0.06 for women with four or more full-term pregnancies.Incomplete pregnancies (spontaneous and induced abortions) were associated with a slight decrease in risk (data not shown). Although the decrease was not statistically significant, it was estimated that 5.6 incomplete pregnancies were equivalent to one full term pregnancy in terms of risk reduction.

A case-control study of cancer of the endometrium in the Boston area from 1965-69 found that married women with 3 or more live births had a relative risk of 0.3, married women with one or two live births had a relative risk of 0.6, compared to married nulliparous women (1.0). A history of one or more stillbirths or miscarriages compared to women with no history was 1.1 (0.8-1.6).

Compiled by: Thomas W. Strahan, J.D., Editor