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Oral Contraceptives and Reproductive Cancers: Weighing the Risks and Benefits

Ann L. Coker
University of South Carolina - Columbia, ann.coker@uky.edu

Susan Harlap
Memorial Sloan-Kettering Cancer Center, Susan.Harlap@nyumc.org

Judith A. Fortney
Family Health International, jaf2001@columbia.edu

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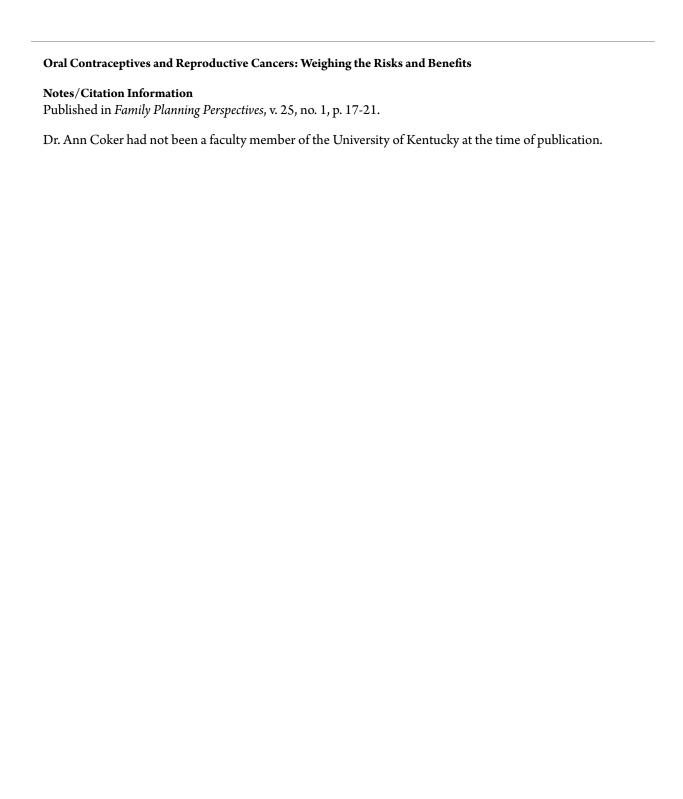Follow this and additional works at: https://uknowledge.uky.edu/crvaw_facpub

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Oral Contraceptives and Reproductive Cancers: Weighing the Risks and Benefits

By Ann L. Coker, Susan Harlap and Judith A. Fortney

The hypothetical incidence of reproductive cancers resulting from oral contraceptive use was estimated in several models comparing the cumulative lifetime incidence of cancer of the breast, cervix, ovary and endometrium expected in pill users with the incidence expected in nonusers. The potential number of cancer-free days that would be gained or lost by pill users was compared with similar estimates among nonusers. If five years or more of pill use were associated with a 20% increase in the risk of breast cancer being diagnosed before age 50, a 20% increase in cervical cancer risk and a 50% reduction in the risks of ovarian and endometrial cancers, then every 100,000 pill users would experience 44 fewer reproductive cancers during their lifetime than would nonusers, and would gain one more day free of cancer. If higher estimates of the five-year pill-associated risks of breast and cervical cancer are used—a 50% increased risk of each, for example—then pill users would experience more reproductive cancers than nonusers and would have 11 fewer cancer-free days of life. (Family Planning Perspectives, **25**:17, 1993)

Oral contraceptives are a safe and effective contraceptive method, with many beneficial effects on health.[1] Although the majority of studies have found no association between breast cancer and oral contraceptive use,[2] several recent reports have suggested that this cancer is diagnosed more frequently in young women who have used oral contraceptives.[3] The existence of a causal relationship between pill use and breast cancer would raise questions about the benefit-risk equation for pill use.

Oral contraceptives are known to protect against endometrial cancer[4] and ovarian cancer,[5] and this protection is believed to be causal. In some studies, oral contraceptives have been associated with an increased risk of cervical cancer,[6] but one recent report suggests that this association is not causal.[7] We have created models to compare the risk of reproductive cancer among women choosing and not choosing to use oral contraceptives. This analysis aims to determine whether, given current knowledge, pill use would be expected to result in a net increase or reduction in the risk of reproductive cancer.

Our approach uses decision analysis, a tool that is increasingly being used not only in clinical practice but also in public health policy.[8] Methods of decision analysis lead to numerical "what if?" calculations that allow the comparison of the projected outcomes and values of a particular decision. In our decision analysis, the decision is about whether to use oral contraceptives. Although the outcome for an individual woman can never be known in advance, the probability of different outcomes can be estimated before the decision regarding whether to use oral contraceptives is made.

Probabilities, however, are inexact, because they are usually based on a best guess or on a synthesis of sometimes conflicting results of published studies. Decision analysis allows the calculation and recalculation of these estimated probabilities under varying assumptions—known as sensitivity analysis. In addition, we can weight different outcomes according to their desirability—assigning different "utilities" (i.e., weights) to each of the reproductive cancers. In this article, we assign such weights based on the probability of surviving five years after diagnosis with each cancer.

Subjects and Methods

Three comparisons were made in this decision analysis: The risk of reproductive cancer incidence among oral contraceptive users was compared with that among nonusers; the potential number of cancer-free years gained or lost for pill users was compared with that among nonusers; and the relative benefit or risk (using a decision-analysis tree) to oral contraceptive users was compared with that among nonusers, after taking into account five-year survival probabilities.

In this analysis, women who had used the pill for at least five years were compared with those not using oral contraceptives for this length of time. The comparison category therefore includes women who used oral contraceptives for less than five years, as well as women who used an IUD or a barrier method and those who had never used any contraceptive method. Clearly, the risk of reproductive cancer varies according to the use of these other contraceptive methods. For example, users of barrier methods are less likely than other women to develop cervical cancer. To simplify the analysis, however, we compare oral contraceptive users with "nonusers," recognizing that the nonusers are a heterogeneous group with respect to their contraceptive use.

To conduct this analysis, we required data on the incidence of cancer, by site and age, the prevalence of pill use by age, and estimated relative risks for the relationship between oral contraceptive use and each cancer. We obtained incidence rates for ovarian, endometrial, cervical and breast cancer, in five-year age-groups, from the 1981–1985 U. S. Surveillance, Epidemiology and End Results (SEER) Program.[9] We used data reported in the 1982 National Survey of Family Growth for the prevalence of pill use at each age.[10] For the effects of oral contraceptives on ovarian and endometrial cancer, we took summary estimated relative risks presented in two previous analyses.[11]

Table 1 (page 18) shows the most probable relative risks for oral contraceptive use and each of the four types of reproductive cancer, by age-group. We selected these estimates after reviewing the current literature describing the relationship between each cancer and pill use. A recent meta-analysis of studies on oral contraceptive use and breast cancer reported an estimated relative risk of 1.22 for pill use of

Ann L. Coker was formerly in the Division of Reproductive Epidemiology and Sexually Transmitted Diseases, Family Health International (FHI), Research Triangle Park, N. C., and is currently assistant professor in the Department of Epidemiology and Biostatistics, University of South Carolina, Columbia, S. C. Susan Harlap, formerly in the Division of Reproductive Epidemiology and Sexually Transmitted Diseases, FHI, is currently chief, Epidemiology Services, Department of Epidemiology and Biostatistics, Memorial Sloan-Kettering Cancer Center, New York. Judith A. Fortney is director of the Division of Reproductive Epidemiology and Sexually Transmitted Diseases, FHI. The authors wish to thank Herbert Peterson of the Centers for Disease Control and Prevention for his suggestions and constructive criticism in the preparation of this article.

Table 1. Estimated relative risks of reproductive cancer for oral contraceptive use of five years or more, by type of cancer, according to age-group

Cancer type	Age-group		
	15–49	50–59	≥60
Breast	1.20	1.00	1.00
Cervical	1.20	1.00	1.00
Ovarian	0.50	0.75	1.00
Endometrial	0.50	0.75	1.00

more than 10 years among women followed after 1980.[12] For a conservative estimate, we have used a relative risk of 1.2 for pill use of five or more years among women younger than 50 and a relative risk of 1.0 for women aged 50 and older. Similarly, to estimate the rate of cervical cancer among oral contraceptive users younger than 50, we applied a relative risk estimate of 1.2 to the crude incidence rate for cervical cancer,[13] and a relative risk of 1.0 for women older than 50. A relative risk of 0.5 was applied to estimate pill users' risk of ovarian and endometrial cancer among those younger than 50,[14] a relative risk of 0.75 was applied to women aged 50–59 and one of 1.0 was applied to women aged 60 or older.

Cancer Incidence in Users and Nonusers

Each comparison in our analyses requires an estimate of the cancer incidence among pill users and nonusers. To calculate these user-specific cancer rates, we applied the relative risk for pill use and each cancer to the age-specific cancer incidence rates obtained from SEER registry data. To calculate the number of women at risk of a specific cancer, we also needed the prevalence of oral contraceptive use of five years or more in duration, by age. We were able to calculate the number of pill users at risk of pill-related cancer using the U. S. age-specific population of women and the age-specific prevalence of oral contraceptive use of five years or more.

The number of pill users actually developing cancer was calculated using the age-specific cancer incidence, the relative risk estimates for the pill-cancer relationship and the number of women at risk (i.e., who had used the pill for five years or more). The cancer rates were calculated by dividing the number of oral contraceptive users with cancer by the overall number of pill users. (The formulas we used in these calculations appear in the appendix.)

*To simplify the analysis, we ignored the possibility of more than one cancer occurring in the same woman, so the probability of remaining free of cancer is one minus the sum of the probabilities of the four cancers.

For each type of cancer, we used the prevalence of pill use by age-group in conjunction with the relative risk for oral contraceptives' effect on the specific cancer incidence to compute the cancer-specific incidence rates (per 100,000) for pill users and nonusers. We then computed cumulative rates by taking the sum of the five-year age-specific cancer incidence rates over the lifetime (through 85 or more years) and multiplying the sum by five, for the five-year age-groups.

The cancer incidence rates used for this analysis are those reported for all races. Although cancer incidence rates do vary by race, we chose to simplify our analysis by using aggregate or summary cancer incidence rates for U. S. women of all races. Since it is not certain that the relationship between pill use and each cancer is modified by race, we feel that this approach provides a reliable comparison of the risks and benefits of pill use on the incidence of reproductive cancers for all women.

Excess Risk Among Users and Nonusers

The difference in the cancer incidence rates between users and nonusers (for each cancer and for all reproductive cancers combined) is the number of additional cancer cases per 100,000 users. The difference in risk can be interpreted as the added or reduced risk associated with pill use. This index provides an indicator of the magnitude of the risk or benefit in cancer incidence associated with pill use.

Cancer incidence alone was considered in these models. Risks from competing health problems were not considered, because reproductive cancer incidence, even considered as one outcome, is still rare; therefore, the exclusion of competing risks should not affect our selected cancer incidence outcomes. Further, no long-term effect of pill use on cardiovascular disease, the outcome most strongly associated with the pill, has been reported.[15]

Potential Years of Cancer-Free Life Lost

Our calculation of the potential years of cancer-free life lost is almost identical to the method used by the Centers for Disease Control and Prevention for calculating person-years of life lost.[16] The difference is that our outcome is cancer incidence, not the incidence of cancer death. To compute the potential years of cancer-free life lost, we multiplied (separately for each user or nonuser group) the five-year age-specific and cancer-specific incidence rates by the difference in the mean age at cancer onset among the nonusers and by the midpoint of the age interval.

These products were calculated for all age intervals up to the interval including the mean age of cancer onset. Since the mean age at onset varies by cancer site, we performed these calculations separately by cancer site, and summed them to yield the potential years of cancer-free life lost for all reproductive cancers combined. We did these calculations separately for oral contraceptive users and nonusers, applying to both groups the mean age of cancer onset for nonusers. We then took the difference in potential years of cancer-free life lost between the two user groups, which indicated the number of years (or days) of cancer-free life lost or gained because of pill use.

Decision Tree

In the decision tree used in this analysis, there are two choices—to use oral contraceptives for five or more years, or not to do so. Whether women in need of contraception elect to use or not to use oral contraceptives, each has five possible outcomes: one of the four reproductive cancers, or no cancer.* The tree compares the risk of reproductive cancer separately for pill users and for nonusers.

We multiplied the cumulative lifetime incidence of each cancer by two sets of weighting factors, for both users and nonusers. The first set is based on the five-year survival probabilities for each cancer— 85% for endometrial cancer, 76% for breast cancer, 67% for cervical cancer and 38% for ovarian cancer.[17] The second set is based on a ranking of the types of cancer in terms of their "desirability." In this measure, having no reproductive cancer was ranked as 1.0, while the types of cancer were ranked as follows: 0.8 for endometrial cancer, 0.6 for cervical cancer, 0.4 for breast cancer and 0.2 for ovarian cancer.

We compared the two branches of the decision tree by calculating the cancer-specific products of the cumulative incidence and the corresponding set of weights. By convention, this summed product is termed the "expected value." The larger the expected value, the more favored the decision.

Sensitivity Analysis

The assumptions regarding the strength of the relative risk estimates that characterize the relationship between reproductive cancer and oral contraceptive use are currently subject to much debate; thus, we chose to conduct a sensitivity analysis, in which several relative risk estimates for the relationship between pill use and breast and cervical cancer could be ap-

plied. (The estimated relative risks for ovarian and endometrial cancer associated with pill use did not change.)

When conducting this sensitivity analysis, we used three relative risk estimates other than those we considered most probable for the relationship between pill use and breast cancer. A relative risk of 1.5 corresponded to that reported in a meta-analysis for pill use of 10 years or more among premenopausal women;[18] a relative risk of 1.1 used for women of all ages corresponded with that reported by the World Health Organization (WHO) in a large, multisite, hospital-based case-control study;[19] and a relative risk of 1.0 indicated no increased risk of breast cancer associated with pill use.

The relative risk estimate of 1.2 for oral contraceptive use and cervical cancer was selected as a best guess for this relationship, given the controversy surrounding whether pill use is causally associated with cervical cancer. We also applied the following relative risk estimates for the relationship between pill use and cervical cancer: A relative risk of 1.5 corresponded to that reported in one study of ever-users of the pill,[20] while a relative risk of 1.0 corresponded with reports suggesting no causal relationship between pill use and cervical cancer.[21]

Results

Table 2 presents the difference in risk of developing a reproductive cancer over a woman's lifetime (up to age 85 or older) associated with pill use of five years or more, compared with nonuse. Under the assumptions regarding the size and nature of the estimated relative risk presented in Table 1, pill users would experience 44 fewer diagnoses of cancer per 100,000 users than would nonusers. Across their lifetime, pill users would experience 374 additional breast cancers per 100,000 users and 67 additional cervical cancers per 100,000, compared with nonusers. Pill users would, however, experience 215 fewer ovarian cancers and 270 fewer endometrial cancers per 100,000 than would nonusers.

Table 2 also presents the period of cancer-free life gained or lost among pill users, relative to nonusers. (Cancer-free life measures the time until cancer develops, not the time until death.) As this table clearly shows, the difference in the period of cancer-free life lost or gained among pill users and nonusers is so small that it can be measured only in days. Overall, a pill user would gain one day free, on average, from all types of reproductive cancer considered. Users would lose seven days free of breast

Table 2. Excess reproductive cancers per 100,000 oral contraceptive users, compared with nonusers, and number of cancer-free days lost or gained, by type of cancer

Cancer type	Excess cancers	Cancer-free days
Total	−44	+1
Breast	+374	−7
Cervical	+67	−1
Ovarian	−215	+4
Endometrial	−270	+5

cancer, compared with nonusers, and perhaps one day free of cervical cancer. Pill users would gain four days free of ovarian cancer and five days free of endometrial cancer, compared with nonusers.

The decision to use the pill would be slightly preferred to the decision not to use it. The expected value for pill use calculated using the decision tree and the five-year survival probabilities as weights (.943) was virtually the same as that for nonuse (.942). Expected values calculated using the same decision tree but using weights based on the desirability ranking show that for pill use and nonuse, the four cancer outcomes were equal (0.882), indicating no difference in the choice of use or nonuse.

Table 3 presents sensitivity analyses showing how these results change when different sets of assumptions are made about the effect of pill use on the relative risk for breast and cervical cancer, the two reproductive cancers for which the size of the pill-associated risk remains controversial. Three sets of assumptions regarding the relative risk estimates for pill use and breast cancer were applied: a 20% increase in breast cancer risk among women aged 15–49, a 50% increase in risk among women aged 15–49 and a 10% increase for women throughout their lifetime. For each of these three groupings, we also present findings for three different assumptions regarding the cervical cancer risk associated with pill use: a 50% increase among women aged 15–49, a 20% increase among women aged 15–49 and no increased risk for women of any age. The estimated relative risks for pill use and endometrial and ovarian cancer (0.5) were held constant.

If oral contraceptive use of five years or more

were to cause a 20% increase in breast cancer, a 50% increase in cervical cancer, and a 50% decrease in both endometrial and ovarian cancers (Table 3, line 1), users would experience 177 additional reproductive cancers per 100,000 users by age 50, but over their lifetime they would experience only 48 additional cancers per 100,000 users. Pill users would lose one cancer-free day, compared with nonusers. Using both sets of weights (those based on survival probabilities and on the cancer outcome rankings), the decision to use oral contraceptives would be as favored as the decision not to use them (expectancy values for survival of .942 and .942, respectively, and expectancy values for desirability of .882 and .882).

Changing the relative risk estimate for pill use and cervical cancer to 1.2 (i.e., a 20% increased risk) would result in pill users potentially experiencing 86 more cancers per 100,000 by age 50, but 44 fewer over their entire lifetime. Users would gain one cancer-free day, and the decision to use the pill would be equally favored, compared with nonuse.

Finally, if pill use were not associated with cervical cancer, pill users would experience 19 additional reproductive cancers per 100,000 by age 50, but experience 111 fewer cancers over their entire lifetime. Pill users would gain two cancer-free days, and the decision to use the pill would be equally favored (Table 3, line 3).

If we assume that oral contraceptive use is associated with a 50% increase in breast cancer (an illustration of a worst-case scenario, based on the 1990 meta-analysis[22]), pill users would experience a range of 528–687 additional reproductive cancers

Table 3. Excess cancers among women younger than 50 and throughout their lifetime; number of cancer-free days lost or gained; and expected values for use and for nonuse of oral contraceptives, by survival and desirability ranking; all according to excess breast and cervical cancer risk associated with oral contraceptive use of five years or more

% excess cancer risk*	Excess cancers per 100,000 users		Cancer-free days	Expected values (use/nonuse) based on:	
	<50	Lifetime		Survival	Desirability
Breast—20%					
Cervical—50%	177	48	−1	.942/.942	.882/.882
Cervical—20%	86	−44	+1	.943/.942	.882/.882
Cervical—0%	19	−111	+2	.943/.942	.882/.882
Breast—50%					
Cervical—50%	687	558	−11	.941/.942	.879/.883
Cervical—20%	596	476	−9	.942/.942	.879/.883
Cervical—0%	528	400	−8	.942/.942	.880/.883
Breast—10%					
Cervical—50%	90	1,156	0	.940/.942	.875/.882
Cervical—20%	−2	1,065	+1	.940/.942	.875/.882
Cervical—0%	−69	998	+2	.940/.942	.875/.882

*In all scenarios, the risks for ovarian and endometrial cancer are assumed to be 50% (i.e., a 50% reduction).

per 100,000 by age 50, depending upon the assumed level of pill-associated cervical cancer risk, and 400–558 additional cancers per 100,000 across their lifetime. Compared with nonusers, pill users would lose 8–11 cancer-free days during their lifetime. The decision to use the pill would be equally favored, relative to nonuse, when survival probabilities are used as weights, while the desirability weights would slightly favor the decision not to use the pill.

Whether oral contraceptives are associated with an excess breast cancer risk in women older than 50 remains unclear. To assess the cancer impact should any possible increase in breast cancer risk be not exclusive to women's reproductive years, we also present analyses that assume oral contraceptive use is associated with a 10% excess risk of breast cancer across all ages. In such a case, users would experience anywhere from 90 more to 69 fewer reproductive cancers by age 50, depending on the pill-related effect on cervical cancer risk. However, users would experience 998–1,156 more cancers per 100,000 during their lifetime, depending on the assumed pill–cervical cancer relationship. Users would gain only 1–2 cancer-free days. Based on both sets of weights, the decision not to use oral contraceptives would be favored (Table 3).

Discussion

Estimated models of the hypothetical incidence of reproductive cancers indicate that, at least in terms of cancer incidence, oral contraceptives are a safe option for birth control, even after taking into account current concerns over whether young pill users are more likely to be diagnosed with breast and cervical cancer.

As the sensitivity analysis (Table 3) illustrates, the decision whether to use oral contraceptives, based on cancer risk alone, depends on the assumptions one makes about the relationship between pill use and breast cancer. We chose to begin our decision analysis using the relative risk for oral contraceptive use and breast cancer estimated in a 1990 meta-analysis,[23] since this might be viewed as the best current estimate. Based on this relative risk estimate of 1.2 among women younger than 50, the decision to use the pill is a better choice than nonuse, because fewer users would develop cancer during their lifetime.

Whether pill use increases the risk of

cervical cancer is as controversial as whether oral contraceptives increase the risk of breast cancer. Therefore, in the sensitivity analysis, different relative risks for both breast and cervical cancer were used. We chose to present results based on the controversial report from a hospital-based case-control study as a presentation of a worst-case scenario.[24] (As was noted in a subsequent publication,[25] the choice of a hospital-based control group may have exaggerated the relative risk estimate, since hospitalized women may have conditions that contraindicate pill use.) Therefore, the estimates resulting from the sensitivity analysis using a 50% increased risk of breast cancer among younger women should be considered the most extreme estimate of risk associated with pill use, and perhaps an overestimate.

Finally, we used the relative risk estimate, reported by the WHO, of 1.1 for oral contraceptive use and breast cancer among women of all ages because the results were based on a recent and relatively large, well-designed hospital-based case-control study.[26] Given that studies allowing a sufficient latency period for pill-associated cancer development in older women have not been possible, we can only conjecture the true effect of pill use on breast cancer risk among women older than 50.

We applied a relative risk estimate of 1.1 to estimate the risk-benefit relationship for oral contraceptives on reproductive cancer if the pill did increase the risk of breast cancer beyond the reproductive years. Under those circumstances, each 100,000 pill users would experience a range of 998–1,156 more reproductive cancers than nonusers, depending on the relative risk for cervical cancer used. The reason for the increased number of reproductive cancers among pill users when the relative risk of 1.1 is applied to women of all ages is that the majority of breast cancer cases occur among women older than 50. Under the same assumptions, pill users would gain up to two cancer-free days relative to nonusers. Since the majority of breast and endometrial cancer cases occur after age 50 and the estimate of potential cancer-free time lost more heavily weights time lost before age 65, pill users fare better than nonusers only in terms of cancer-free time lost.

One limitation of this analysis is our simple but straightforward approach of comparing longer term pill users with all other women. Clearly, these nonusers are not a homogeneous group of women who have never used any contraceptive method; they include women who used the pill for fewer than five years, women who

used IUDs, barrier methods, other less reliable methods or a combination of these methods, and women who never practiced contraception. We chose this heterogeneous comparison group for several reasons: First, in many ways it is similar to the types of comparison groups used in the majority of studies of pill use and cancer;* second, it is a comparison more easily understood by consumers.

Our analysis considers only reproductive cancer. Pill use has many other health effects, including a reduction in the risk of iron deficiency anemia, ovarian cysts, uterine fibroids, benign breast disease, pelvic inflammatory disease and ectopic pregnancy,[27] as well as an increased risk of cardiovascular disease, primarily among women who smoke or those with other cardiovascular risk factors.[28]

This analysis did not consider the potential synergistic effects of other risk factors (e.g., family history of cancer or parity) on the relationship between pill use and the risk of reproductive cancer. It remains unclear whether such effects exist. Preliminary studies suggest no synergism between pill use and family history on the risk of breast cancer.[29] To be cautious, however, women at high risk of reproductive cancer should not use these models to weigh their risk of cancer, because the estimates presented are based on the risk associated with the average population of women— who are at a relatively lower risk of cancer.

Several authors have systematically contrasted risks and benefits of oral contraceptive use on health.[30] Because it includes in their risk-benefits models the finding that breast cancer is diagnosed more frequently among pill users younger than 45, recent work by Diana Petitti and Deborah Porterfield[31] and by Martin Vessey[32] is most comparable to our risk-benefit analyses. Petitti and Porterfield estimated the lifetime probability of developing any reproductive cancer for three regions with different cancer patterns (Western Europe, Asia and Central and South America), under three sets of assumptions regarding the size and nature of the relative risk estimate for pill use and cancer. Although they chose slightly different relative risk estimates for pill use and cancer, as well as a different outcome measure (lifetime probability of cancer development), their results and conclusions were similar to ours. Under a likely case assumption regarding pill use and cancer risk, they found that pill users, compared with nonusers, would increase only slightly their lifetime probability of any reproductive cancer.

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*It is true that these studies do not include pill use of less than five years' duration with nonuse, but we believe that pill use of more than five years best distinguishes longer term users, who may be the women at most increased risk of pill-related cancer (where such risk is relevant).

In a more comprehensive assessment of the pill-related health risks and benefits—estimating the expected mortality difference (in terms of numbers of deaths) between pill users and nonusers for hepatic, endometrial, ovarian, breast and cervical cancers, acute myocardial infarction, subarachnoid hemorrhage, cerebral thrombosis, venous thromboembolism and unplanned pregnancy—Vessey concluded that unless early use of combined oral contraceptives is found to have an effect on breast cancer risk that persists beyond age 35, the benefits of pill use on the selected outcomes exceed the risks. Again, although Vessey assessed a different outcome measure (mortality), looked at a wider range of risks and benefits of pill use and made slightly different assumptions regarding the relative risk estimates for pill use and the selected outcomes, his estimates regarding the favorable benefit-risk balance for continued pill use are supported by our results.

Our analyses indicate that pill use has a minimal net effect on reproductive cancer risk. Nonetheless, many American women believe oral contraceptive use is associated with cancer. In a 1985 Gallup poll, 31% of American women said they believed that cancer is a major health risk associated with using the pill.[33] In the same poll, 65% of women rated childbearing as less risky than or as risky as pill use. If these myths about the risks and benefits of oral contraceptive use are to be dispelled, women must continue to be provided with objective information on the risks and benefits of the pill, in a clear and understandable format.

The ultimate choice of whether to use the pill rightly rests with the individual woman experiencing the risks and benefits of its use. Our analysis provides a comparison of the risks and benefits of pill use in terms of reproductive cancers alone. The primary purpose of oral contraceptives, reducing unwanted fertility, was not separately considered in this analysis. The value placed on effectively controlling one's fertility must also be considered when a woman chooses whether or not to use the pill.

Appendix

To calculate cancer incidence rates among oral contraceptive users and nonusers at each age, we applied the following formulas for the age-specific incidence of cancer among all women (I) and the number of cancers among nonusers (y): $I=(x+y)/(N_1+N_2)$ and $y=[(x/N_1)/RR] \times N_2$. In these equations, x equals the number of cancers

among pill users, by age-group; N_1 equals the number of women using the pill, by age-group (calculated from the total population in an age-group multiplied by the proportion of pill users in the age-group); N_2 equals the number of women not using the pill (calculated from the total population in an age-group multiplied by one minus the proportion of pill users in the age-group); and RR equals the age-specific estimated relative risk associated with pill use for a specific type of cancer.

The second equation was substituted into the first and solved for x to produce the following equation: $x=I-(N_1+N_2)/([N_2/RR \times N_1]+1)$. The cancer incidence among pill users could then be calculated as x/N_1, while the cancer incidence among nonusers could be calculated as y/N_2.

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data. Do women rationalize having received inadequate prenatal care by providing acceptable responses to questions about barriers to care? It is impossible to know how often they may do so.

Nonetheless, the challenge to maternity care providers and public health professionals is to develop a comprehensive, multifaceted approach that addresses the numerous and complex structural and personal barriers to good prenatal care. If the United States is to achieve its objective of no more than seven infant deaths per 1,000 live births by the year 2000,[16] a commitment to long-term solutions that involve political and social change is essential. Addressing only the behavioral manifestations of our social ills, without touching on the causes, maintains the status quo without improving the health and well-being of women and children.

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Correction

In "The Association of AIDS Education and Sex Education with Sexual Behavior and Condom Use Among Teenage Men," by Leighton C. Ku, Freya L. Sonenstein and Joseph H. Pleck [24:100], the minus sign was left off the coefficient shown in Table 2 for AIDS education and number of partners. The coefficient should be −.305.