Advances in the detection and medical and surgical treatment of breast cancer have caught the attention of the media and the public. Such widespread media attention has been a mixed blessing, however; the anxiety engendered may actually lead to poorer compliance with breast cancer screening recommendations and may jeopardize early detection. Despite being better informed, many women seem to fatalistically await the development of breast cancer.

Despite all the attention breast disease has received, 14 times as many women succumb to cardiovascular disease as die of breast cancer. A 1999 survey of 757 women conducted by Newsweek magazine found that women's greatest health fear was of developing breast cancer—greater even than their fear of other cancers or heart disease. Nevertheless, only 37% of the surveyed women aged 40 to 49 years received regular mammograms, and only 63% of those older than 50 years did so. One cannot help but ask why breast cancer provokes such fear, yet fails to motivate women to comply with recommended screening regimens. The answer is complex and incompletely understood. Probable explanations include women's exaggerated perception of risk, perceived lack of control over risk reduction, and fear of the mutilating effects of breast cancer surgery. Studies have shown that most women with family histories of breast cancer have exaggerated perceptions of their risk of the disease and experience excessive anxiety. Some women estimate their risk of breast cancer to be as much as 10 times higher than their actual risk. Perceived susceptibility and accompanying anxiety have been shown to interfere with adherence to breast cancer surveillance regimens, possibly attributable to women's efforts to reduce their focus on the threat of breast cancer. Other women may deal with their discomfort by making ill-considered requests for genetic testing or prophylactic surgery. As new strategies become available for reducing a woman's risk of breast cancer, physicians will be challenged to meet the educational and counseling needs of women seeking this information. Physicians should also recognize that efforts to counsel women about their breast cancer risk may not improve compliance with screening recommendations until breast cancer anxiety is also addressed. Primary care physicians are often the first to become aware of women's anxieties about breast cancer and are in a unique position to accurately identify and appropriately counsel patients who may be at high risk. By reducing their fears and presenting the facts, barriers to surveillance can hopefully be reduced and patients at risk can choose a proactive approach from an educated perspective.

Much of our knowledge regarding breast cancer risk and breast cancer prevention derives from surveillance studies over the past 10 years and the ensuing National Surgical Adjuvant Breast and Bowel Project (NSABP) P-1 Study, published in 1998. This landmark report demonstrated that tamoxifen citrate—an agent originally approved by the United States' Food and Drug Administration for use in breast cancer treatment—could be used for breast cancer risk reduction in women at increased risk of the disease. Subsequent quantitative analyses of the NSABP popu-
lateral by Gail and collaborators\textsuperscript{11} attempted to discern the risk-benefit parameters for women in whom use of this form of preventive therapy might be considered. For details describing these analyses and the tools developed by the investigators to help identify women for whom tamoxifen therapy might be expected to provide the greatest benefit, refer to the original report by Gail et al.\textsuperscript{11}

To assist primary care physicians in evaluating patients at risk for breast cancer, the present article reviews the status of breast cancer risk assessment, counseling, chemoprevention, and follow-up.

**RISK ASSESSMENT**

One of the most quoted statistics in medicine is the lifetime risk of breast cancer. An average woman has a 1 in 8 chance of being diagnosed as having breast cancer during her lifetime.\textsuperscript{12} This is a frightening statistic that can often encourage a woman to participate in annual breast examinations, mammograms, and monthly breast self-examination. Unfortunately, it can also have the negative effect of unnecessarily increasing a woman’s anxiety about breast cancer, to the degree that she may avoid these activities that may offer her the greatest protection.\textsuperscript{9}

Epidemiologic studies have been conducted in attempt to provide more realistic and individually relevant assessments of women’s lifetime risk of breast cancer. For example, insight into breast cancer risk as a function of age was discerned from the Surveillance, Epidemiology, and End Results program data.\textsuperscript{12} It was found that although a woman’s lifetime risk of breast cancer may approach 13%, much of that risk is accumulated in advanced age (\textbf{Table 1}). Stated another way, an average 30-year-old woman has more than a 92% chance of living free from breast cancer for the next 40 years.

Other established risk factors are shown in \textbf{Table 2}. The relative risks are calculated for each risk factor compared with a category of patients at low risk. Although the relative risk of breast cancer associated with a particular risk factor is important, most women are likely to find information regarding their absolute risk more useful.

Models have been developed that calculate the percentage of women who are likely to develop breast cancer given a specific risk profile. The most successful and useful model for calculating the absolute risk of breast cancer is the Gail model.\textsuperscript{13} It has been well validated in clinical settings\textsuperscript{16-18} and has shown remarkable accuracy in predicting breast cancer incidence. The breast cancer risk factors used in this model are as follows: age, age at menarche, age at first live birth (nulliparity), number of first-degree relatives with breast cancer, number of previous biopsies, presence of atypical hyperplasia on a breast biopsy specimen, and race.\textsuperscript{13}

With validation of the Gail model, the National Cancer Institute (NCI) has made available a personal computer–based program to calculate the projected risk of breast cancer. This “Risk Disk,” as it is commonly called, prompts the user to input each of her known risk factors. The program then provides a printout identifying the patient, her set of risk factors, her projected breast cancer risk for the next 5 years, and her projected lifetime risk. A 5-year risk level of 1.66% or greater is considered high risk. This level reflects the risk of an average 60-year-old woman; women younger than 60 years must have additional risk factors to reach this level of projected risk. For comparative purposes, the Risk Disk program also calculates 5-year and lifetime risks for a woman of the same age and race as the woman evaluated, but who is in the lowest risk category for all other risk factors. A copy of the Risk Disk can be obtained by contacting the NCI’s

**Table 1. 1987 to 1991 Age-Specific Breast Cancer Incidence Rates (Women, per 100,000) in the United States by Race**

<table>
<thead>
<tr>
<th>Age at Diagnosis, y</th>
<th>All</th>
<th>White</th>
<th>Black</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-24</td>
<td>1.0</td>
<td>0.9</td>
<td>1.7</td>
</tr>
<tr>
<td>25-29</td>
<td>7.8</td>
<td>7.4</td>
<td>11.1</td>
</tr>
<tr>
<td>30-34</td>
<td>25.6</td>
<td>25.0</td>
<td>32.3</td>
</tr>
<tr>
<td>35-39</td>
<td>63.6</td>
<td>63.1</td>
<td>68.6</td>
</tr>
<tr>
<td>40-44</td>
<td>126.9</td>
<td>127.1</td>
<td>138.9</td>
</tr>
<tr>
<td>45-49</td>
<td>198.3</td>
<td>203.6</td>
<td>176.3</td>
</tr>
<tr>
<td>50-54</td>
<td>228.9</td>
<td>238.4</td>
<td>209.0</td>
</tr>
<tr>
<td>55-59</td>
<td>274.8</td>
<td>285.6</td>
<td>235.4</td>
</tr>
<tr>
<td>60-64</td>
<td>348.3</td>
<td>364.2</td>
<td>287.4</td>
</tr>
<tr>
<td>65-69</td>
<td>412.1</td>
<td>430.0</td>
<td>326.0</td>
</tr>
<tr>
<td>70-74</td>
<td>450.3</td>
<td>468.5</td>
<td>335.6</td>
</tr>
<tr>
<td>75-79</td>
<td>483.9</td>
<td>502.5</td>
<td>366.5</td>
</tr>
<tr>
<td>80-84</td>
<td>477.1</td>
<td>490.7</td>
<td>379.0</td>
</tr>
</tbody>
</table>

\*Data adapted from Ries et al.\textsuperscript{13}

**Table 2. Established Risk Factors**

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Low</th>
<th>High</th>
<th>Relative Risk</th>
<th>Prevalence, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at menarche</td>
<td>16 y</td>
<td>&lt;12 y</td>
<td>1.3</td>
<td>16</td>
</tr>
<tr>
<td>Age at menopause</td>
<td>45-54 y</td>
<td>&gt;56 y</td>
<td>1.5</td>
<td>6</td>
</tr>
<tr>
<td>Age when first child born</td>
<td>&lt;20 y</td>
<td>Nulliparous or &gt;30 y</td>
<td>1.9</td>
<td>21</td>
</tr>
<tr>
<td>Benign breast disease</td>
<td>No biopsy or fine-needle aspiration</td>
<td>Any benign disease</td>
<td>1.5</td>
<td>15</td>
</tr>
<tr>
<td>Family history of breast cancer</td>
<td>No first-degree relatives affected</td>
<td>Mother affected</td>
<td>1.7</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Two first-degree relatives affected</td>
<td>Atypical hyperplasia</td>
<td>4.0</td>
<td>1</td>
</tr>
</tbody>
</table>

\*Modified from Harris et al.\textsuperscript{14}
Cancer Information Service at 1-800-4-CANCER or from the NCI’s web site: http://cancertrials.nci.nih.gov.

**LIMITATIONS OF THE RISK DISK**

The Gail model used for the Risk Disk does not take into account the age at onset in first-degree relatives with breast cancer, and does not consider family history in second-degree relatives in its risk calculations. Because these can be independent risk factors for breast cancer, the Risk Disk may underestimate a woman’s risk if she has these risk factors.

The Risk Disk is not accurate for women with mutations in **BRCA1** or **BRCA2**, genetic loci known to be relevant to breast cancer development. Mutations in these genes are thought to have a cumulative breast cancer risk to age 70 years in the range of 37% to 85%. Although women with mutations in these loci constitute only 0.7% of the general US population, in the Ashkenazi Jewish population the incidence may be as high as 2%. True hereditary breast cancer accounts for 2% to 5% of all breast cancers. For a patient with a strong family history of the disease, referral to a medical geneticist may be warranted. In such circumstances, the geneticist’s use of the Claus model, a breast cancer model that mainly considers familial risk factors, may yield a more accurate assessment of individual risk.

Risk assessment and counseling are important, indeed critical, roles in primary care practice. Patients at increased risk can be targeted for potential risk reduction strategies.

**BACKGROUND AND RATIONALE FOR THE USE OF TAMOXIFEN IN RISK REDUCTION**

Tamoxifen has been used for more than 20 years in the treatment of women with breast cancer. In a meta-analysis of trials studying the adjuvant use of tamoxifen, it was found that the drug unexpectedly reduced the incidence of breast cancers in contralateral breasts by 39%. A 1998 update to this meta-analysis showed that women who received tamoxifen for 5 years had a 47% relative risk reduction for contralateral breast cancer.

To investigate this risk-reducing effect, the NSABP conducted the Breast Cancer Prevention Trial (P-1 trial) to test whether tamoxifen reduced the incidence of breast cancer in women at elevated risk for the disease and whether the net benefits of tamoxifen therapy outweighed the risks. A total of 13,388 women were enrolled in the trial. Subjects were enrolled if they were aged 60 years or older; aged 35 years or older and lobular carcinoma in situ (LCIS) had been diagnosed on a prior breast biopsy specimen; or aged 35 years or older and they had a 5-year risk of invasive breast cancer greater than 1.66%, as determined by the Gail model. Participants were randomized to receive a 5-year course of either tamoxifen, 20 mg/d, or placebo. The trial was terminated early when an independent data review committee found a significant reduction in the incidence of breast cancer in the tamoxifen-treated group. The relative risk reduction was 49% for invasive breast cancer and 50% for noninvasive breast cancer (Figure 1).

Lobular carcinoma in situ and atypical hyperplasia are important markers for the development of breast cancer. Patients with atypical hyperplasia have a 4- to 5-fold increased risk of invasive breast cancer, and patients with LCIS, a 10-fold increased risk. The P-1 trial included the most patients with these markers who have ever been prospectively studied. Tamoxifen therapy was associated with an 86% reduction in the incidence of invasive breast cancer in women who had a history of atypical hyperplasia and a 56% reduction in those with a history of LCIS (Figure 2).

**COUNSELING WOMEN ON THE BENEFITS AND RISKS OF TAMOXIFEN**

Before tamoxifen therapy or any preventive measure can be used to reduce a woman’s risk of breast cancer, a risk-benefit analysis must be done. The major safety concern regarding use of tamoxifen is endo-
In the overall population, endometrial cancer is rare, occurring at a rate of about 1 per 1000 women annually. Most cases occur in postmenopausal women; these cancers are generally detected early because they often cause vaginal bleeding that prompts women to seek medical care. As a consequence, endometrial cancer is one of the most curable of all cancers, having an annual mortality of 3 per 100000 women; this is in distinct contrast to the 26 deaths per 100000 women attributable to breast cancer each year.

In the P-1 trial, tamoxifen was associated with an increased rate of endometrial cancer. From the expected annual baseline of 0.91 cases per 1000 women, the rate increased to 2.30 cases per 1000 among patients treated with tamoxifen. Most of these neoplasms (75%) were diagnosed in women who were aged 50 years or older (Figure 3); all were stage I at the time of diagnosis. These cancers were not associated with higher-grade pathological features or worse prognosis than those observed in the general population.

In addition to advanced age, independent risk factors may be operative in the development of endometrial cancer among women receiving tamoxifen. Prior unopposed estrogen use and obesity are especially important; other selected factors that may modify patient risk for endometrial cancer or stroke are shown in Table 3.

Thromboembolic events are more common in postmenopausal women treated with tamoxifen. In the P-1 trial, the relative risks for deep venous thrombosis and pulmonary embolus were 1.6 and 3.0, respectively. Among women older than 50 years who were cataract free at the time of randomization, the relative risk of cataract development in the tamoxifen-treated group was 1.14 (95% confidence interval, 1.01-1.29). The incidences of strokes and fractures were not statistically different in the 2 treatment groups (Figure 4 and Figure 5). Hot flashes and vaginal discharge were more common in the tamoxifen-treated group, but there were no differences in weight gain, depression, or gastrointestinal tract symptoms—adverse reactions that had anecdotally been associated with tamoxifen therapy.

![Figure 2. Breast cancer in women with a history of lobular carcinoma in situ (LCIS) or atypical hyperplasia in the National Surgical Adjuvant Breast and Bowel Project P-1 Study. Overall, more than 6% of the participants had a history of LCIS (411 in the placebo group and 415 in the tamoxifen-treated group), and about 9% had a history of atypical hyperplasia (614 in the placebo group and 579 in the tamoxifen-treated group). Data from Fisher et al.](https://www.arcpub.com/doi/10.1001/archinternmed.2000.01830040059013)

![Figure 3. Incidence of endometrial cancer by age in relation to the incidence of breast cancer among participants in the National Surgical Adjuvant Breast and Bowel Project P-1 Study.](https://www.arcpub.com/doi/10.1001/archinternmed.2000.01830040059013)

![Figure 4. No. of Events](https://www.arcpub.com/doi/10.1001/archinternmed.2000.01830040059013)

![Figure 5. Annual Rate per 1000 Women](https://www.arcpub.com/doi/10.1001/archinternmed.2000.01830040059013)

**Table 3. Selected Factors That Modify Risks of Health Outcomes**

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Factors</th>
<th>Effect on Risk (Relative Risk)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endometrial cancer</td>
<td>Unopposed estrogen replacement (≥10 y)</td>
<td>Increased (5-10)</td>
</tr>
<tr>
<td></td>
<td>Nulliparity, obesity, or menopause after the age of 55 y</td>
<td>Increased (2)</td>
</tr>
<tr>
<td></td>
<td>Diabetes or hypertension</td>
<td>Increase possibly related to obesity</td>
</tr>
<tr>
<td></td>
<td>Estrogen therapy with progestins</td>
<td>Little risk</td>
</tr>
<tr>
<td></td>
<td>Oral contraceptives</td>
<td>Protective (0.5)</td>
</tr>
<tr>
<td></td>
<td>Current smoking</td>
<td>Protective (0.5)</td>
</tr>
<tr>
<td>Stroke</td>
<td>Transient ischemic attack</td>
<td>Increased, especially in older women (5-30)</td>
</tr>
<tr>
<td></td>
<td>Mitral valve disease or atrial fibrillation</td>
<td>Increased (2.5)</td>
</tr>
<tr>
<td></td>
<td>Smoking, ischemic heart disease, diabetes, or hypertension</td>
<td>Increased (2)</td>
</tr>
<tr>
<td></td>
<td>Oral contraceptives, pregnancy, or systemic lupus erythematosis</td>
<td>Increased</td>
</tr>
<tr>
<td>Pulmonary embolism or deep vein thrombosis</td>
<td>Trauma or surgery, immobility, pregnancy, smoking, obesity, or oral contraceptives</td>
<td>Increased</td>
</tr>
</tbody>
</table>

*Data from Gail et al. †Where available.
To apply the results of the P-1 trial to clinical practice, the benefits and risks of tamoxifen therapy must be discussed and weighed. Each woman’s level of risk, the likelihood that she will benefit from treatment, side effects, and personal issues should be considered. Individual patient perceptions of the various beneficial and detrimental effects, and the severity of those effects, should be weighed. Many, but not all, women who are at high risk of breast cancer are willing to exchange the potential risks of therapy to obtain the potential benefits.

The NCI, using the Gail model for breast cancer prediction of breast cancer risk and population-based estimates of side effects, concluded that those who will likely have positive net benefit-risk ratios from tamoxifen therapy include the following: (1) women who have a high risk of breast cancer (with a history of LCIS, ductal carcinoma in situ, or atypical hyperplasia of the breast or who have a combination of risk factors giving them a predicted 5-year risk of 6.5% or more), (2) women with a 5-year risk of greater than 1.66% who are in an age group (<50 years) that puts them at low risk of experiencing detrimental effects, or (3) women aged 50 years and older with a 5-year risk of greater than 1.66% who are without a uterus and at low risk for vascular events (deep venous thrombosis, pulmonary embolism, and stroke).

More than 97% of the participants in the P-1 trial were white; thus, results may not be generalizable to women of other races.

The NCI and the NSABP researchers have also made algorithms available to assist in counseling and in weighing the risks and benefits of tamoxifen therapy. Gail et al developed a quantitative scheme in which the severity of risks and the degree of benefits were weighted and used to calculate an overall benefit-risk index. The benefit-risk index describes the probability of deriving benefit from tamoxifen therapy and the relative magnitude of that benefit (Figures 6, 7, and 8).

Figure 6 depicts one way of summarizing the results of the benefit-risk analysis. The decision trees shown in this figure can be used as a starting point for the process of determining whether tamoxifen therapy is likely to be of benefit for a given woman. To use the trees, obtain information about the woman’s age, race, and projected 5-year risk of breast cancer and determine whether she has an intact uterus. By choosing the appropriate tree (according to race and presence of a uterus), then following each branch (based on age and 5-year projected risk), an estimate can be obtained for the likelihood that tamoxifen therapy will provide net benefit when used in the setting of breast cancer prevention. A branch that ends in 2 asterisks indicates a strong probability of net benefit; one that ends in 1 asterisk indicates a moderate probability. If a woman’s 5-year projected risk is not represented on the appropriate tree, she has a low probability of obtaining net benefit from tamoxifen therapy for breast cancer prevention. These decision trees are based on the weights of severity of
benefits and side effects estimated by the developers of the model. They are also based on event rates obtained from large groups of women. Individual patients may ascribe slightly different weights to some of these values, and some women may be at higher than average (or lower than average) risk of specific side effects (eg, those with increased risk for endometrial cancer or thromboembolism [Table 3]). Thus, the decision tree should be used as a starting point for the decision, not the end point.

Each woman’s care needs to be individualized. For example, a woman may elect to take tamoxifen even if the calculated risks outweigh the benefits, particularly if she is at lower than “average” risk for uterine cancer or thromboembolic events. Alternatively, a woman with independent risk factors for uterine cancer or clotting may choose to emphasize the occurrence of these side effects in her individual weighting scheme. In these individual scenarios, the physician needs to convey relevant risk-benefit and adverse event information to the patient for individual events. The report by Gail et al11 provided estimates (categorized by age and race) of baseline rates and incidence rates of individual adverse events that were affected by tamoxifen therapy in the P-1 trial. Reference to these data may be useful to physicians or patients who want to weight particular adverse events differently from the weights selected by the model’s creators, or for patients who are interested in evaluating risks of individual events.

Figures 7 and 8 depict the anticipated magnitude of benefit of preventive tamoxifen therapy for women of varying age and race and for those with or without a uterus. Net benefit-risk index values greater than zero denote an expected net benefit of preventive tamoxifen therapy. Indexes with larger positive values indicate a greater likelihood of deriving net benefit from a preventive course of tamoxifen therapy. As is evident from these figures, the greatest benefit of preventive tamoxifen therapy is derived by younger women.

Special situations should be addressed11:
1. Lobular carcinoma in situ. Patients with LCIS are thought to have a projected 5-year risk of 6.5%.
2. Ductal carcinoma in situ. Patients with ductal carcinoma in situ treated with lumpectomy alone have a 5-year risk of 14.7%; when treated with lumpectomy and irradiation, the risk decreases to 7.0%.

**Figure 6.** Decision trees illustrating the probability that the net benefit-risk index exceeds zero when tamoxifen citrate is used in the setting of breast cancer prevention. These trees were developed by weighting events according to the following: 1 indicates the weight assigned to life-threatening events; 0.5, the weight assigned to severe events; and 0, the weight assigned to other events. One asterisk indicates a probability of 0.60 to 0.89, providing moderate evidence of a net benefit of tamoxifen therapy; and 2 asterisks, a probability of 0.90 to 1.00, providing strong evidence that tamoxifen therapy is beneficial. To assess the magnitude of the benefit, see Figures 7 and 8. Figure from Gail et al.11 PIBC indicates probability of invasive breast cancer.

---

**Figure 7.** Net benefit-risk indexes for tamoxifen treatment by level of 5-year projected risk of invasive breast cancer, age, and race for women with a uterus. A, White women. B, Black women. Data from Gail et al.11

---

©2000 American Medical Association. All rights reserved.
3. Recent small breast cancers. Patients with recent (within the last 5 years), small (<1.0 cm), invasive breast cancers, even if they are estrogen receptor negative, have a 5-year risk of contralateral disease of 3%, with a cumulative lifetime risk of 20%. Because the risk of a contralateral, second invasive breast malignancy approaches 20% during the remaining years of life of a woman diagnosed as having a first breast cancer at the age of 40 years, and is similar to the risk for women in the P-1 trial, Gail et al concluded that the use of tamoxifen for risk reduction may be a reasonable option, particularly for younger women.

4. Remote history of cancer is defined as more than 5 years ago. In such patients, the subsequent 5-year cumulative risk of contralateral breast cancer (after the initial 5 years) is 3.4%; the cumulative lifetime risk is 14.4%. Any decision to use tamoxifen for risk reduction in this group of patients must be made by assessing the anticipated duration and quality of life remaining, the risks and potential benefits of tamoxifen therapy, and the presence and relevance of competing comorbidities (eg, diabetes, with its increased cardiovascular risk). Also, because it would be inappropriate to prescribe tamoxifen for breast cancer prevention for a patient who had already received it as part of her breast cancer therapy, it is important to first consult the woman’s oncologist to ascertain whether tamoxifen had previously been used.

5. BRCA1 or BRCA2 mutation carriers. It is unknown whether tamoxifen reduces the risk of breast cancer in women with BRCA1 or BRCA2 mutations. DNA samples from women who participated in the P-1 trial are being analyzed to address this issue.

Women with a 5-year predicted breast cancer risk that is less than 1.66% should not be considered for tamoxifen therapy at this time. These individuals have breast cancer risks at a level such that potential beneficial effects of therapy are low and insufficient to justify exposure to the possible harmful effects of therapy. Furthermore, tamoxifen is contraindicated in women with histories of thromboembolism or coagulopathy (tamoxifen can potentiate the effects of warfarin sodium [Coumadin]–like anticoagulants) and in those who are or plan to become pregnant.

**FOLLOW-UP**

When using tamoxifen for breast cancer risk reduction, women should be treated with a dose of 20 mg/d for 5 years, and should be monitored with semiannual physician visits. A breast examination should be performed at each visit. Bilateral mammograms and pelvic examinations should be done annually. Routine blood screening is not indicated because no hematologic or hepatic side effects attributable to tamoxifen therapy were demonstrated in the P-1 trial or in clinical trials using tamoxifen as adjuvant therapy.

There is insufficient evidence for or against the use of transvaginal ultrasonography or endometrial sampling for the early detection of endometrial cancer, and the American College of Obstetricians and Gynecologists has issued the recommendation that women taking tamoxifen should have annual gynecologic examinations and should be evaluated further based on symptoms.

At each semiannual visit, patients should be questioned about thromboembolic symptoms (eg, leg pain or swelling, pleuritic chest pain, or shortness of breath) and instructed to immediately report these symptoms should they develop. Unless the patient has had a hysterectomy, she should be questioned about gynecologic symptoms and instructed to immediately report any abnormal vaginal bleeding. Such bleeding should be investigated with appropriate diagnostic testing, recognizing that ultrasonography is of little use in this context. Thickening of the endometrial stripe on transvaginal ultrasonography is common in patients receiving tamoxifen therapy.

Because of the modest increase in the risk of cataracts (relative risk, 1.14) and cataract surgery among women taking tamoxifen in the P-1 trial, compared with those taking placebo, women receiving the drug should be questioned about symptoms of cataracts and should be encouraged to have periodic eye examinations. It is particularly important to warn women of the need to avoid pregnancy and to rely on barrier methods of contraception.
rier methods of contraception while taking tamoxifen.

Other anticipated adverse reactions to tamoxifen therapy have been well-defined. Hot flashes are the most common side effect; they occur in 20% to 30% more patients taking tamoxifen than those taking placebo. Hot flashes can sometimes be managed with reassurance, as this symptom commonly diminishes with time. Exercise and avoidance of caffeine are also sometimes useful. Several forms of pharmacologic management are listed in Table 4. Vitamin E can be started initially, with the addition of ascorbic acid and bioflavonoids (Peridin-C), then prescription medications 1 at a time for 6- to 8-week trial periods. The vitamins can be maintained, but only one prescription medication at a time is recommended.

Phytoestrogens can be used as a last resort, although there are no data on whether they may inhibit the breast cancer risk-reducing effects of tamoxifen. If hot flashes become unresponsive to these approaches, the tamoxifen dose can be changed to 10 mg, given orally twice daily, or the drug can be discontinued for 2 to 4 weeks, then restarted—often without re-emergence of symptoms.

Some patients experience a clear mucous-like vaginal discharge associated with tamoxifen therapy. This side effect, although it often resolves spontaneously with time, can actually be a positive consequence if the discharge relieves vaginal dryness. Other women may experience worsened vaginal dryness with tamoxifen therapy. This symptom may be managed with nonhormonal lubricants, such as Lubrin (Bradley Pharmaceuticals, Fairfield, NJ), Vagisol (Combe Inc, White Plains, NY), Astroglide (Harlow Lubricants, Ltd, Middlesex, England), or Replens (Columbia Laboratories, Aventura, Fla); or with estradiol (Estring; Pharmacia & Upjohn, Kalamazoo, Mich), a vaginal ring formulation of slow-release estrogen that is inserted every 3 months.

**DISCUSSION**

Breast cancer is a major concern among women in this country, one that often leads to anxiety and poor compliance with screening programs. It has been shown that fear, cancer anxiety, and increased general anxiety can lead to reduced adherence to mammography guidelines and avoidance of regular breast examinations. Such anxiety can also adversely affect quality of life. Alternatively, overestimation of personal risk may lead a subset of women to engage in overscreening; they may excessively perform breast self-examinations. Of greater concern, however, is the potential for inappropriate decisions about prophylactic mastectomies based on women’s misunderstanding of their breast cancer risk.

The first step in reducing a woman’s fear of breast cancer is to present her with a prediction of her actual risk, educating her about what that risk level means and what her options are. There is evidence that women from genetically prone families who obtain thorough risk assessments are less likely to be depressed than are those who refuse risk assessment, even when the counseled women are found to carry BRCA1 or BRCA2 mutations.

Primary care providers have the unique opportunity to identify patients at risk and differentiate them from those with exaggerated fears. Because primary care physicians’ opinions have been shown to be the most critical factor in patients’ decisions to use hormone replacement therapy, education, counseling, and initiation of risk reduction strategies are likely to be well received. The same will likely be true of risk reduction therapy.

Health care providers who counsel women about tamoxifen therapy should strive to ensure that each patient makes a highly informed decision that incorporates her personal values and preferences. The counseling process should be interactive and sensitive to the woman’s educational level and cultural background. The encounter should include a qualitative assessment of the patient’s risk and, ideally, a quantitative assessment. There should be a clear description of the benefits and risks of tamoxifen therapy, including a description of the drug’s side effects. Based on the patient’s age, race, and projected 5-year risk of invasive breast cancer, one could refer to Figure 6 to determine whether there is strong evidence for a net benefit of tamoxifen therapy and to Figures 7 and 8 to assess the magnitude of that benefit. A woman whose net benefit-risk index calculates to a negative value may still choose to take tamoxifen to reduce breast cancer risk; the counselor should be prepared to support such a decision if it represents an informed choice.

**SUMMARY**

We are entering an exciting era in breast care; for the first time, it is possible to reduce the incidence of cancer among women at increased risk. It is clinically appropriate to offer tamoxifen therapy to women who are similar to those in the P-1 study and who may benefit from its use as a breast cancer preventive agent. Any decision to use tamoxifen therapy to reduce the risk of breast cancer is complicated, however, by the presence of several potential risks that must be weighed against anticipated beneficial effects. Benefit-risk analysis and counseling for breast cancer prevention can be a time-consuming, but rewarding process, and may offer an opportunity to reduce anxiety and provide a more accurate perception of risk and en-

**Table 4. Management of Hot Flashes**

<table>
<thead>
<tr>
<th>Medicine</th>
<th>Dosage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamin E, 800 U/d</td>
<td></td>
</tr>
<tr>
<td>Ascorbic acid (vitamin C) and bioflavonoids</td>
<td></td>
</tr>
<tr>
<td>Clonidine patch (Catapres; Boehringer Ingelheim, Ridgefield, Conn), 0.1 mg/ wk</td>
<td></td>
</tr>
<tr>
<td>Ergotamine tartrate, belladonna alkaloids, and phenobarbital (Bellergal-S; Novartis Pharmaceuticals, Hanover, NJ), 1 tablet at bedtime</td>
<td></td>
</tr>
<tr>
<td>Paroxetine hydrochloride (Paxil; SmithKline Beecham, Philadelphia, Pa), 10-20 mg given orally at bedtime</td>
<td></td>
</tr>
</tbody>
</table>

©2000 American Medical Association. All rights reserved.
hance informed deliberation about the benefits and limitations of risk-reducing therapy.39,40

Accepted for publication May 18, 2000.

Reprints: Holly Jane Smedira, MD, Department of General Surgery, Cleveland Clinic Foundation, 9500 Euclid Ave, Cleveland, OH 44195 (e-mail: smedirn@stratos.net).

REFERENCES