

# Risk Factors for Breast Cancer

A Report by the American Council on Science and Health  
(ACSH)

by Kathleen Meister, M.S., and John Morgan, Dr.P.H.

*Project Coordinator*  
Catherine Maroney, M.A., M.P.H.  
*Assistant Director of Public Health*

*Art Director*  
Yelena Ponirovskaya

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AMERICAN COUNCIL ON SCIENCE AND HEALTH  
1995 Broadway, 2nd Floor, New York, NY 10023-5860  
Tel. (212) 362-7044 • Fax (212) 362-4919  
URL: <http://www.acsh.org> • E-mail: [acsh@acsh.org](mailto:acsh@acsh.org)

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Ruth Kava, Ph.D., R.D.  
*ACSH*

Alice M. Ottoboni, Ph.D.  
*Sparks, Nevada*

Kathryn Kolasa, Ph.D., R.D., LD/N  
*East Carolina University*

Sidney Shindell, M.D., LL.B.  
*Medical College of Wisconsin*

David Kritchevsky, Ph.D.  
*The Wistar Institute*

Gilbert L. Ross, M.D.  
*ACSH*

John Neuberger, Dr.P.H.  
*University of Kansas School of  
Medicine*

Elizabeth M. Whelan, Sc.D., M.P.H.  
*ACSH*

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**ABOUT THE AUTHORS**

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**Kathleen Meister, M.S.,** is a freelance medical writer and former ACSH research associate.

**John Morgan, Dr.P.H.,** is an Associate Professor of Public Health and Preventive Medicine at Loma Linda University and is the cancer epidemiologist for Region 5 of the California Cancer Registry. His interests include cancer control and prevention, and epidemiologic research.

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## EXECUTIVE SUMMARY

A wide variety of factors may influence an individual's likelihood of developing various types of cancer. These factors are usually referred to as *risk factors*. Different types of cancer may have different risk factors.

Some factors that influence cancer risk, such as dietary and exercise habits, are modifiable. By changing these aspects of their lifestyle, people may reduce their risk of cancer. Other factors that influence risk, such as age, gender, or family history, cannot be modified. Traditionally, it was thought that little could be done about these risk factors.

However, it is now possible for individuals who are at high risk of some types of cancer because of non-modifiable risk factors to reduce their chances of getting the disease through special measures such as chemoprevention or preventive surgery. Additionally, knowledge of risk factors can be useful when considering the benefits of early detection methods for breast cancer, including X-ray mammography, clinical breast examination, and breast self-examination.

Many possible risk factors for breast cancer have been proposed. Compelling scientific evidence supports the importance of some of these factors. These factors are referred to as “established” risk factors. Other proposed risk factors have more limited support; the evidence for their role is inconclusive. These risk factors can be described as “speculated.” Still other factors have little or no scientific support. They are primarily myths and misconceptions and are best described as “unsupported.”

The established risk factors for breast cancer are female gender, age, previous breast cancer, benign breast disease, hereditary factors (family history of breast cancer), early age at menarche (first menstrual period), late age at menopause, late age at first full-term pregnancy, postmenopausal obesity, low physical activity, and high-dose exposure to ionizing radiation early in life.

Speculated risk factors for breast cancer include never having been pregnant, having only one pregnancy rather than many, not breast feeding after pregnancy, use of postmenopausal estrogen replacement therapy or postmenopausal hormone (estrogen/progestin) replacement therapy, use of oral contraceptives, prescribed diethylstilbestrol (DES), certain specific dietary practices (high intake of fat and low intakes of fiber, fruits, and vegetables), alcohol consumption, tobacco smoking, abortion, breast augmentation, low intake of phytoestrogens (estrogens from plant sources), and non-use of nonsteroidal anti-inflammatory

drugs (NSAIDs).

There is only limited evidence in support of the possibility that xenoestrogens (synthetic estrogens) and large breast size might increase breast cancer risk. Unsupported risk factors include premenopausal obesity, exposure to low-dose ionizing radiation in midlife, high intake of phytoestrogens, electromagnetic fields, breast trauma, and the use of antiperspirants.

For all women, ACSH recommends the following.

1. Discuss your risk factors for breast cancer with your physician.
2. Stay active and watch your weight.
3. Be sure to have mammograms and breast examinations as often as your doctor recommends.

## INTRODUCTION

**B**reast cancer is the most common type of cancer among American women. An estimated 182,800 new cases are expected to occur during the year 2000, and about 40,800 U.S. women will die from breast cancer this year. Approximately 30 percent of all cancers diagnosed in women are breast cancers.

One of the best ways to fight cancer is to prevent it from occurring, by identifying and controlling factors that increase a person's risk of developing the disease. For some types of cancer, this is a fairly straightforward process. For example, cigarette smoking greatly increases an individual's risk of developing lung cancer. In fact, at least 80 percent of all lung cancers are attributable to smoking. Therefore, not smoking cigarettes is an effective way to prevent lung cancer.

For breast cancer, however, the situation is not so simple. Many different factors may influence a woman's risk of developing this disease. The importance of some of these factors is well established; but for others, the link is more a matter of speculation than fact. In addition, some of the factors that influence breast cancer risk cannot be modified; several involve aspects of the woman's family and reproductive history rather than her personal habits. Thus, it is far more difficult to develop a strategy for reducing the risk of breast cancer than it is for lung cancer.

This report by the American Council on Science and Health (ACSH) reviews the scientific evidence pertaining to a variety of factors that may influence breast cancer risk and rates each of these factors as "established," "speculated," or "unsupported." (See Table 1.) The report also discusses ways in which individual women can use this information to help reduce their personal risk of breast cancer.

## THE CONCEPT OF RISK FACTORS

**U**nlike some other diseases, such as infections, most cancers do not have a single cause. Instead, they result from the interaction of multiple factors that range from genetic characteristics to personal lifestyle. Researchers who study the causes of cancer use the term risk factor to refer to anything that is associated with an increased chance of developing a particular type of cancer.

Risk factors are a matter of probability. They influence an individual's odds of developing a disease. That's not the same thing as actually causing a disease to occur. Some people with one or more risk factors

Table 1. Established, Speculated, and Unsupported Risk Factors for Human Breast Cancer

**Established Risk Factors**

Female gender  
Age  
Previous breast cancer  
Benign breast disease  
Hereditary factors (family history of breast cancer)  
Early age at menarche  
Late age at menopause  
Late age at first full-term pregnancy  
Obesity (postmenopausal)  
Low physical activity  
High-dose exposure to ionizing radiation early in life

**Speculated Risk Factors**

Never having been pregnant<sup>a</sup>  
Having only one pregnancy rather than many  
Not breast feeding after pregnancy  
Postmenopausal estrogen replacement therapy<sup>a</sup>  
Postmenopausal hormone (estrogen/progestin) replacement therapy  
Use of oral contraceptives<sup>a</sup>  
Prescribed diethylstilbestrol (DES)  
Specific dietary practices (i.e., high intake of fat; low intakes of fiber, fruits, and vegetables)  
Alcohol consumption  
Tobacco smoking  
Abortion  
Breast augmentation  
Low intake of phytoestrogens  
Non-use of nonsteroidal antiinflammatory drugs (NSAIDs)

**Unsupported Risk Factors**

Obesity (premenopausal)  
Exposure to low-dose ionizing radiation in midlife  
High intake of phytoestrogens

Table 1 (*continued*).

Xenoestrogens<sup>b</sup>  
Large breast size<sup>b</sup>  
Electromagnetic fields  
Breast trauma  
Antiperspirants

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<sup>a</sup> Speculated risk factors marked with an “a” are gaining scientific support.

<sup>b</sup> Risk factors marked with a “b” have slight scientific support but not enough to place them in the “speculated” category.

for a particular type of cancer never develop it, while other people who have no known risk factors do develop that type of cancer. Most breast cancer cases fall into the second category, because they are not predicted by known risk factors. Nevertheless, identification of risk factors for cancer can be useful for risk modification or to identify individuals who may benefit more from cancer screening.

Different cancers have different risk factors. For example, smoking is the most important risk factor for lung cancer, but it is not a risk factor for skin cancer. Conversely, exposure to ultraviolet light from the sun is a risk factor for skin cancer but not lung cancer.

Traditionally, scientists divided the factors that influence an individual’s odds of developing a disease into two groups: modifiable risk factors and non-modifiable risk factors (also called predisposing factors or predispositions).

Modifiable risk factors are aspects of an individual’s lifestyle that affect the risk of a disease that can be altered. Personal habits such as smoking and dietary patterns fall into this category. Individuals may be able to reduce their risk of becoming ill by changing their personal habits (for example, smokers can stop smoking). Health education efforts have usually focused on modifiable risk factors because they can be altered or eliminated.

Non-modifiable risk factors (or predisposing factors) are inherent conditions (such as age) or aspects of an individual’s genetic program (such as sex, ethnic background, or specific gene mutations) that increase that person’s likelihood of developing a disease. Traditionally, it was assumed that little could be done about non-modifiable risk factors. However, this is no longer true.

New techniques are being developed which can reduce the risk of cancer in high-risk individuals—even if those people are at increased risk because of inherent predispositions that cannot be changed. One such technique is *chemoprevention*—the use of medicines to reduce the risk of developing a disease. Another technique, which is usually used only in cases of extremely high risk, is preventive surgery. Both of these approaches have been used successfully to reduce the risk of breast cancer in high-risk women. In fact, breast cancer is the first type of cancer for which a chemoprevention drug has become available. Additionally, the benefits of early detection methods for breast cancer can be maximized among women experiencing the highest risk for breast cancer, regardless of whether the risk factors are modifiable. Women at high risk for breast cancer who regularly receive mammography and clinical breast exams can benefit from early detection, even if their risk, *per se*, is not modified. Similar benefits may result from breast self-examination.

Women who are at increased risk of breast cancer for reasons that they cannot change should not feel that nothing can be done to help them. Thanks to early detection and chemoprevention, these women may be able to reduce their chances of developing breast cancer or the severe consequences of the disease even though they cannot change their predisposition *per se*.

## ESTABLISHED RISK FACTORS FOR BREAST CANCER

There is clear scientific evidence linking several factors with breast cancer risk. These factors are called “established” risk factors for breast cancer. Some are inherited predispositions, while others are aspects of a woman’s lifestyle or reproductive history. The established risk factors for breast cancer include female gender, age, previous breast disease, family history/genetic risk factors, early age at menarche, late age at menopause, late age at first full-term pregnancy, postmenopausal obesity, lack of physical activity, and exposure to high doses of radiation.

### *Gender*

Simply being female is the most important risk factor for breast cancer. Although men can and do develop breast cancer, the disease is 100 times more likely to occur in a woman than in a man. Women are

## CHEMOPREVENTION: A NEW WEAPON AGAINST BREAST CANCER

**W**hen doctors use medicines to treat cancer, they refer to it as *chemotherapy*. Similarly, the use of medicines to reduce the risk of cancer is called *chemoprevention*.

Chemoprevention is a new and promising strategy for reducing cancer risk. The first drug approved for this purpose in the United States is tamoxifen, which is used to reduce the risk of breast cancer in high-risk women. Tamoxifen is one of a group of drugs called selective estrogen-receptor modulators. Drugs of this type have actions similar to those of the female hormone estrogen in some body tissues, but they block the effect of estrogen in other tissues, including breast tissue. Since estrogen promotes the development of breast cancer, drugs that block its effect may reduce breast cancer risk.

Chemoprevention is not for everyone. The women who are most likely to benefit are those who are at high risk of breast cancer. Low-risk women have less to gain because few of them will develop breast cancer anyway. Any small benefit that the medicine would give them is likely to be outweighed by the potential for side effects from the use of the drug.

Because the use of tamoxifen for breast cancer chemoprevention involves a complex mix of potential benefits and risks, decisions about its use should be made on an individual basis. Any woman who believes that she may be at high risk of breast cancer because of her age, personal medical history, family history of breast cancer, or other reasons should discuss her risk factors with her physician to find out whether she is an appropriate candidate for chemoprevention.

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For more information on this subject, see the ACSH report *Chemoprevention of Breast Cancer*.

at higher risk of breast cancer because they have much more breast tissue than men do. In addition, the female hormone estrogen promotes the development of breast cancer.

## *Age*

The risk of breast cancer is higher in middle-aged and elderly women than in young women. In the United States, more than three-fourths of all breast cancers occur in women aged 50 or older.

The impact of age on breast cancer risk is sufficiently strong so that many older women, especially those over the age of 60, may be candidates for breast cancer chemoprevention with the drug tamoxifen. (See “Chemoprevention: A New Weapon Against Breast Cancer.”) These women should discuss the option of chemoprevention with their physicians.

## *Previous Breast Disease*

A woman who has previously had breast cancer has a three- to four-fold increased risk of developing a new cancer in the other breast. Women who have had noncancerous (benign) breast problems are also at increased risk—but to a lesser extent. Benign breast disease, considered as a single condition, is associated with a 1.5 to 3-fold increase in breast cancer risk. However, the various types of benign breast disease are not all associated with the same degree of risk; some types have little or no effect on risk, while others may represent early stages in the progression to breast cancer.

Women who have a history of any type of breast disease should discuss their histories with their physicians. Some women with previous breast disease (especially those who have been treated for lobular carcinoma *in situ* (LCIS) or ductal carcinoma *in situ* (DCIS)) are at sufficiently high risk of breast cancer that they may be good candidates for tamoxifen chemoprevention. (See “Chemoprevention: A New Weapon Against Breast Cancer.”)

## *Family History/Genetic Factors*

The risk of breast cancer is higher among women who have a close blood relative (mother, sister, or daughter) who have had the disease. The increase in risk is especially high if the relative developed breast cancer before the age of 50 or in both breasts. According to the American Cancer Society, however, most women who get breast cancer—approximately 80 percent—have no such family history of the disease. Indeed, most women who get breast cancer would not have been considered to be in the high-risk group before their diagnosis.

The effect of family history on breast cancer risk is believed to be due primarily to genetic factors. As much as 5–10 percent of all breast cancer cases are attributable to specific inherited single-gene mutations,

and many other cases have some genetic component.

Scientists compare risks of disease by using *risk ratios*. A risk ratio of one means that the individual's risk of developing a disease is the same as that expected among people who don't have any special risk factors. A risk ratio greater than one means that the individual has a higher risk. As Table 2 shows, the risk ratios for breast cancer among close relatives of breast cancer patients varies greatly, depending on the age at diagnosis and whether cancer was present in one or both breasts. A close relative of a woman who developed breast cancer in one breast after age 50 has only a slightly increased risk of developing the disease herself (risk ratio 1.2, or a 20 percent increase in risk). On the other hand, close relatives of a woman who developed cancer in both breasts before age 50 have a much larger increase in risk (risk ratio 8.8, or a nearly 9-Fold increase in risk). This risk ratio is similar to that seen for lung cancer among smokers, when compared to nonsmokers.

Any woman who has a family history of breast cancer should discuss that history with her physician. In some instances, the increase in risk associated with family history is substantial enough so that the woman and her physician may want to consider tamoxifen chemoprevention. (See "Chemoprevention: A New Weapon Against Breast Cancer.") In rare instances, if a woman's family history of breast cancer is extremely strong or if it is known that the woman carries gene mutations associated with very high breast cancer risk, the possibility of preventive surgery (mastectomy and/or removal of the ovaries) may also be considered.

### *Reproductive History*

Women who reach menarche (the first menstrual period) at a relatively early age (12 or younger) and those who reach menopause at a relatively late age (55 or older) are slightly more likely than other women to develop breast cancer. These relationships are believed to be mediated through estrogen produced within the woman's body.

During the reproductive years, a woman's body produces high levels of estrogen. Women who start to menstruate at an early age and/or reach menopause at a late age are exposed to high levels of estrogen for more years than are women who have a late menarche or early menopause. However, the effect of age at menarche and menopause on breast cancer risk is relatively small. The increase in breast cancer risk associated with a five-year increase in age at menopause is only about 17 percent. Similarly, the decrease in breast cancer risk associated with a two-year delay in menarche is only about 10 percent.

Table 2. Risk Ratio for Breast Cancer in First-Degree Female Relatives of Women with Breast Cancer<sup>a</sup>

<b>Characteristics of the Breast Cancer</b>	<b>Risk Ratio in First-Degree Relatives</b>
Premenopausal (before age 50) <sup>b</sup>	3.1
Postmenopausal (age 50 or over)	1.5
<b>Cancer in one breast</b>	
Premenopausal or postmenopausal	1.3
Premenopausal	1.8
Postmenopausal	1.2
<b>Cancer in both breasts</b>	
Premenopausal or postmenopausal	5.4
Premenopausal	8.8
Postmenopausal	4.0

<sup>a</sup> A woman’s first-degree female relatives are her mother, sisters, and daughters.

<sup>b</sup> Because it is difficult to determine when individual women reach menopause, researchers generally assume that women under the age of 50 are premenopausal and that those age 50 and over are postmenopausal.

Another aspect of reproductive history that is associated with breast cancer risk is age at first pregnancy. Women who have their first full-term pregnancy at a relatively early age have a lower risk of breast cancer than those who never have children or those who have their first child relatively late in life. The biologic basis for this relationship is not entirely clear. Scientists suspect, though, that pregnancy may lead to lasting changes in the sensitivity of breast tissue to cancer-causing agents, as well as in the maturation of breast tissue. In addition, several hormonal changes occur after a full-term pregnancy and may persist for years.

### *Obesity and Physical Inactivity*

In scientific studies, obesity has been consistently associated with an increased risk of breast cancer among postmenopausal women. As is the case with reproductive risk factors, this relationship may be mediated by estrogen production. Fat cells produce some estrogen (though nowhere near as much as the ovaries produce during a woman's reproductive years), and obese postmenopausal women, therefore, tend to have higher blood estrogen levels than lean women do.

Obesity does not seem to be a risk factor for breast cancer in premenopausal women. In these younger women, the ovaries are the main producers of estrogen. The much smaller amount of estrogen produced by the fat cells doesn't appear to have any significant impact on breast cancer risk.

Scientific studies have consistently shown that the risk of breast cancer is lower among physically active premenopausal women than among sedentary women. Physical activity during adolescence may be especially protective, and the effect of physical activity may be strongest among women who have at least one full-term pregnancy. Scientists believe that the effect of physical activity on breast cancer risk may be due at least in part to effects of exercise on the female hormones.

Although the effects of obesity and physical inactivity on breast cancer risk are not as strong as the effects of previous breast disease or family history of breast cancer, they are important risk factors because they are modifiable. Exercise and weight control currently represent the most effective lifestyle changes that a woman can make to reduce her risk of breast cancer.

### *Exposure to High Doses of Radiation*

Women who were exposed to high doses of radiation, especially during adolescence, have an increased risk of breast cancer. This association has been observed both among atomic bomb survivors and among women who received high-dose radiation for medical purposes. The low radiation exposures involved in modern x-rays (including chest x-rays and mammograms) have not been associated with any measurable increase in breast cancer risk.

## SPECULATED RISK FACTORS FOR BREAST CANCER

“Speculated” risk factors for breast cancer are those for which there is some scientific support but not enough to be considered conclusive. In some instances, support for these factors may increase as more research is completed. In other cases, though, future research may demonstrate that some of these factors don’t relate directly to the risk of breast cancer.

Speculated risk factors include number of pregnancies, not breast feeding, use of postmenopausal estrogen replacement therapy (ERT) or combination estrogen/progestin hormone replacement therapy (HRT), use of oral contraceptives, exposure to prescribed diethylstilbestrol (DES), specific aspects of diet, alcohol consumption, tobacco smoking, abortion, and breast augmentation. The consumption of phytoestrogens and the use of nonsteroidal anti-inflammatory drugs are speculated to be protective against breast cancer.

### *Number of Pregnancies*

As mentioned earlier, a woman’s age at the time of her first full-term pregnancy is an established risk factor for breast cancer. Whether the number of pregnancies she experiences in her lifetime is also related to breast cancer risk is less clear. There is consistent evidence that first pregnancy completed before age 30-35 lowers risk of breast cancer, and that first full-term pregnancy after age 30-35 raises risk. More limited evidence suggests that women who have many pregnancies may be less likely to develop breast cancer than those who have only one pregnancy.

### *Not Breast-Feeding*

Some scientific studies have indicated that women who breast-feed their babies may be less likely to develop breast cancer than those who have children but do not breast-feed. Other studies, however, indicate that there may be little or no relationship between breast feeding and breast cancer risk. If breast-feeding does protect against breast cancer, it may do so by delaying the resumption of ovulation (with its accompanying high estrogen levels) after pregnancy.

The uncertainty regarding the effect of breast-feeding on breast cancer risk should not be regarded as an argument against breast-feeding. The benefits of breast-feeding for the infant are well established, and all authorities agree that breast-feeding is the preferred method of

infant feeding unless it is contraindicated for a specific medical reason.

### *Postmenopausal Estrogen and Hormone Replacement Therapy*

As mentioned earlier, factors that influence the amount of estrogen produced by a woman's body over her lifetime (such as the ages at the onset of menstruation and at menopause) are known to influence breast cancer risk. Whether estrogen from outside sources has a similar effect on breast cancer risk is less clear.

Some scientific studies have associated long-term (more than five years) use of postmenopausal estrogen therapy (ERT) or combination estrogen/progestin hormone replacement therapy (HRT) with a small increase in breast cancer risk, but others have not found such a relationship. Women who take ERT or HRT for less than five years probably do not have an increased risk of breast cancer. The addition of progestin to estrogen does not decrease the risk of breast cancer (in the way that it does for endometrial cancer). In fact, there is some evidence—although it is not conclusive—that the increase in breast cancer risk associated with combination estrogen/progestin HRT may be greater than that associated with estrogen alone.

Possible effects on breast cancer risk are only one of the many factors that need to be considered by a woman and her physician when making decisions about ERT/HRT. Experts agree that for most women, the benefits of ERT/HRT outweigh the risks. However, decisions about ERT/HRT should be made on an individual basis, after a careful evaluation of all of the potential benefits and risks of this form of therapy.<sup>1</sup>

### *Oral Contraceptives*

Numerous scientific studies have investigated the relationship between the use of oral contraceptives (birth control pills) and the risk of breast cancer. These studies have consistently shown that oral contraceptives do not have a large effect on breast cancer risk. Whether they have a small effect on risk is less clear. A combined analysis of many studies indicates that they probably do, but that the effect decreases and eventually disappears within ten years after oral contraceptives are discontinued.

If oral contraceptives do increase breast cancer risk, it's likely that at least part of the effect is simply due to the fact that the "Pill" does its job: it prevents a woman from becoming pregnant. Pregnancy (especial-

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<sup>1</sup> For more information about ERT and HRT, see the ACSH report *Postmenopausal Hormone Replacement Therapy: Benefits, Risks, and Options*.

ly a first pregnancy that occurs at an early age) is protective against breast cancer.

### *Diethylstilbestrol (DES)*

From the late 1940s to the early 1960s, the drug diethylstilbestrol (DES) was used in the U.S. to reduce the risk of miscarriages, especially among women who were at high risk of miscarriage. A few scientific studies have associated the use of DES with a moderate increase in breast cancer risk later in life. Other studies, however, have not detected any association between DES and breast cancer.

Medical authorities recommend that any woman in the child-bearing years avoid DES because of the risk of harm to an unborn child, even in a woman who may not be aware that she is pregnant.

### *Specific Dietary Factors*

During the 1980s and early 1990s, there was much enthusiasm over the idea that a diet low in fat and high in fruits, vegetables, and fiber could help to prevent breast cancer. More recent research indicates, however, that these specific dietary factors may not be as important in modifying breast cancer risk as was previously supposed. Some of the effects that were once attributed to dietary fat intake were probably due to obesity (which is often linked with high fat intake) rather than to fat intake *per se*. And the effects of fiber, fruits, and vegetables now appear to be small, at best.

This does not mean, however, that eating plenty of fruits and vegetables and limiting fat and calorie intake is a bad idea. Diets high in fruits and vegetables and low in fat and calories are healthful for many reasons, and they may indirectly reduce the risk of breast cancer by helping to prevent obesity.

### *Alcohol*

Women who drink moderate amounts of alcohol have been found to have a slightly higher risk of breast cancer than do those who abstain.

The weaker an association is, the more difficult it is to tell whether that association is due to a true cause-and-effect relationship or to something else. The relationship between alcohol intake and breast cancer is weak. It is extremely difficult for scientists to determine whether an effect of this magnitude reflects a true cause-and-effect relationship or is due to other factors—such as difficulties in measurement or differences between the lifestyles of drinkers and abstainers. The use

of alcohol may vary among women who differ with regard to other factors that are known to influence breast cancer risk—such as age, obesity, and reproductive history. Failure to consider these so-called “confounding factors” could create the impression of a small association between alcohol intake and breast cancer even if no independent effect exists.

However, recent studies have confirmed a small but clear link between levels of alcohol intake and increased risk for breast cancer. The range of risk is approximately 10% increased for those women who ingest one drink daily and about 20% for those who drink two drinks daily. For those who drink more than two daily, the risk is substantially increased, in the range of 40%. Thus, there is a dose-response relationship.

We can now state that alcohol intake should be added to the list of probable or likely risk factors for breast cancer, although the degree of increased risk is small.

### *Tobacco*

There is some evidence that cigarette smoking may be associated with a small increase in breast cancer risk. However, because the results of scientific studies have not been consistent, this relationship is currently regarded as merely speculative. Among women who have already been diagnosed with breast cancer, smoking may be associated with an increased risk that the cancer will progress more rapidly.

### *Abortion*

Some scientific studies indicate that having an induced abortion may lead to a small increase in breast cancer risk. However, the validity of these studies has been questioned.

To investigate the relationship between abortion and breast cancer, researchers conduct surveys in which they ask women (both those with breast cancer and those who do not have the disease) whether they have ever had an abortion. Some women may not answer this extremely personal question truthfully. There’s reason to suspect that women with breast cancer (who are more highly motivated to cooperate with researchers) may be more likely to admit to having had an abortion than healthy women would be. If this is the case, this bias might create the impression of a relationship between abortion and breast cancer even if none really exists.

### *Breast Augmentation*

It has been suspected that breast augmentation surgery might

increase the risk of breast cancer. However, the currently available scientific data don't support this idea.

Although breast implants probably don't cause breast cancer, it is possible that the presence of implants might delay the detection of cancer in some instances. On the other hand, women who undergo breast augmentation may have a heightened awareness of this part of their bodies, and they are likelier than other women to have regular mammograms. These factors may lead to earlier detection of tumors, perhaps offsetting any disadvantage from the implants themselves.

### *Phytoestrogens (as protective factors)*

It has been speculated that plant substances called isoflavones most commonly found in soy products may be protective against breast cancer. These substances, sometimes referred to as *phytoestrogens*, appear to have effects similar to those of estrogen in some body tissues while antagonizing, or "blocking," the effects of estrogen in other tissues.

It has been suggested that the lower rate of breast cancer in Asia, as compared to North America, may be at least partly due to the higher intake of soy products in many Asian countries. Several scientific studies have demonstrated weak protective relationships between soy product intake and breast cancer. However, it is possible that constituents of soy other than phytoestrogens or aspects of diet and lifestyle other than soy product consumption might be responsible for these relationships. Thus, the evidence linking phytoestrogens with reduced breast cancer risk is regarded as inconclusive. The scientific evidence does not support the idea that high intakes of phytoestrogens could increase breast cancer risk.

### *Nonsteroidal Anti-Inflammatory Drugs (as protective factors)*

Recent studies have suggested that aspirin and other nonsteroidal anti-inflammatory drugs (such as ibuprofen, naproxen, indomethacin, and piroxicam) may be protective against some types of cancer. Two studies in humans showed that women who regularly used aspirin or other nonsteroidal anti-inflammatory drugs had lower rates of breast cancer than those who did not. Other studies, however, have not confirmed this relationship. Since the evidence for a beneficial effect of nonsteroidal anti-inflammatory drugs is uncertain and since these drugs can have significant side effects, no recommendations have been made for the use of these drugs in breast cancer prevention.

## SUGGESTED RISK FACTORS THAT HAVE LITTLE OR NO SCIENTIFIC SUPPORT

In addition to the established and speculated risk factors listed above, a wide variety of other factors have been suggested as possible “causes” of breast cancer. These ideas are primarily myths or misconceptions rather than true risk factors and are best described as “unsupported.” Three unsupported risk factors have already been mentioned in previous sections of this report: premenopausal obesity, low-dose radiation, and high intake of phytoestrogens. The others are described below. Of the factors that will be discussed in this section, only two—xenoestrogens and breast size—have even slight scientific support.

### *Xenoestrogens*

The term “xenoestrogen” refers to synthetic substances with estrogenic activity. These include certain fat-soluble organochlorine compounds, such as the insecticide DDT, its metabolite DDE, and polychlorinated biphenyls (PCBs). Some of these compounds (though not PCBs) have shown weak estrogenic effects in laboratory tests.

In several studies, the levels of certain organochlorines in breast tissue or blood samples were found to be higher in women with breast cancer than in healthy women. In other studies, however, no such relationship was found. Researchers assessing the relationship between organochlorines and breast cancer have concluded that the weak estrogenic effect of these compounds would be minimal when compared to the estrogenic activity of more significant estrogen sources, such as postmenopausal estrogen replacement therapy.

An expert panel of the National Cancer Institute of Canada recently concluded that there was no definitive evidence linking organochlorine pesticides to cancer. The panel also concluded that there is no evidence that the increased intake of pesticide residues that would result from official recommendations to increase the intake of fruits and vegetables would lead to an increase in cancer.

### *Breast Size*

While it would seem to make sense that women with more breast tissue would be more likely to develop breast cancer, the scientific evidence on this point is actually quite unclear.

Much of the variation in breast size among women is due to differences in the amount of adipose (fat) tissue, rather than differences in the amount of glandular breast tissue (the actual tissue in which cancer

develops). Most scientific studies have found no relationship between breast size and the risk of breast cancer when the degree of obesity and other related factors are taken into consideration. Nevertheless, it seems reasonable to assume that a woman who has a greater amount of glandular breast tissue might be more likely to develop breast cancer than one who has less such tissue.

### *Electromagnetic Fields*

There is no persuasive scientific evidence to show that low-level, low-frequency electromagnetic fields can influence any of the stages in carcinogenesis. Electromagnetic fields have not been shown to be a cause of any type of cancer. The limited research that has been completed to date does not implicate electromagnetic fields as a cause of breast cancer in women.

### *Breast Trauma*

The idea that breast trauma can cause breast cancer is widely accepted by some societal groups, including some groups of Hispanic Americans, but it is not supported by the scientific evidence. Although many women believe that childhood trauma to the breast, bruising and rough handling during breast feeding, or fondling of the breasts during sexual relations could cause breast cancer, there is actually no cause for concern about any of these factors.

### *Antiperspirants*

Recent rumors, spread largely through e-mail, have aroused concern over the possibility that the use of antiperspirants, especially in combination with underarm shaving, could cause breast cancer. The claims include the following.

- Underarm shaving allows cancer-causing substances in antiperspirants to be absorbed through razor nicks, and antiperspirants prevent the underarm lymph nodes from removing cancer-causing toxins from the breasts through sweating.
- Most breast cancers develop in the portion of the breast (the upper outer quadrant) that is closest to the underarm lymph nodes.
- Women are likelier than men to develop breast cancer because men do not shave their underarms; antiperspirant therefore gets caught in men's underarm hair and is not absorbed by their skin.

In actuality:

- There is no evidence that antiperspirants cause cancer.
- Antiperspirants are not absorbed through the skin, regardless of whether razor nicks are present.
- Razor nicks may increase the risk of skin infection, but they do not increase the risk of cancer.
- The lymph nodes do not remove toxins through sweating; sweat glands are located in the skin, not the lymph nodes.
- The reason that breast cancers occur most commonly in the upper outer quadrant has nothing to do with underarm lymph nodes; instead, it is due to the fact that the largest portion of breast tissue is located in this quadrant. The number of breast cancers in the upper outer quadrant is proportional to the amount of tissue located there.
- The reasons why men are less likely than women to develop breast cancer have to do with the much smaller amount of breast tissue in a man's body and with hormonal factors. The fact that men do not shave their underarm hair is not relevant.

## REDUCING YOUR RISK OF BREAST CANCER

When attempting to improve your health, it makes sense to focus your attention on the things that matter the most and to consider both the risks and the benefits of any action that you're planning to take.

In terms of reducing your risk of breast cancer, therefore, it's best to concentrate your efforts on the established risk factors, especially those that you can modify without risking any type of harm. For example, consider the following choices.

- Does it make sense for women to stop using antiperspirants in an effort to reduce their breast cancer risk? No. There's no scientific evidence that antiperspirants are a breast cancer risk factor, so it's not worth the trouble.
- Does it make sense for women to make a great effort to increase their intake of soy products in order to reduce their breast cancer risk? Probably not. Since the evidence linking phytoestrogens in soy products with reduced breast cancer risk is less than definitive, it's unclear whether this dietary change would really be beneficial. Of course, women who enjoy soy products can feel free to include

them in their diets. But in terms of breast cancer prevention, it's better for women to focus their efforts on other factors that have been more conclusively linked to breast cancer risk.

- Does it make sense for women to exercise regularly in order to reduce their breast cancer risk? Yes, definitely. Lack of physical activity is an established risk factor for premenopausal breast cancer and represents part of a complete approach to weight management. In addition, women who stay active can also reduce their risk of other diseases, such as coronary heart disease and colon cancer, and they can increase their quality of life.

For all women, ACSH recommends three courses of action.

1. Discuss your risk factors for breast cancer with your physician. If you find out that you are at high risk, ask your physician whether chemoprevention would be appropriate for you.
2. Stay active and watch your weight. Of all the established risk factors for breast cancer, obesity and lack of physical activity stand out as the two that can be most readily and safely modified.
3. Be sure to have mammograms and breast examinations as often as recommended for women in your age group.<sup>2</sup> Although these screening tests do not prevent breast cancer, they do enable it to be detected early, when treatment is most likely to be effective.

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<sup>2</sup> At the time that this report was written, experts agreed that all women should have screening mammograms on a regular basis starting at age 50 and continuing until about age 70. Experts did not agree on whether screening mammograms are warranted for women in their 40s and for those in their 70s or older. The U.S. government's Preventive Services Task Force has made no specific recommendation for or against screening mammography for women under age 50 or over age 69. On the other hand, the American Cancer Society has recommended annual mammograms for all women age 40 and older. Recommendations about when to start and stop having mammograms may change when additional research is completed, and they may differ for low- and high-risk women. ACSH recommends that women consult their physicians for up-to-date, individualized advice on when and how often to have mammograms.

## REFERENCES AND FURTHER READING

The information presented in this booklet is taken from a published scientific review that was prepared for the American Council on Science and Health. Please see:

Morgan, J., Gladson, J.E., and Rau, K.S., "Position Paper of the American Council on Science and Health on Risk Factors for Breast Cancer: Established, Speculated, and Unsupported," *The Breast Journal*, Vol. 4, No. 3, 1998, pp.177–197.

ACSH also has several other booklets on related topics, including:

*Chemoprevention of Breast Cancer: Postmenopausal Hormone Replacement Therapy: Benefits, Risks and Options*

*Moderate Alcohol Consumption and Health*

You can purchase these publications from ACSH, 1995 Broadway, 2<sup>nd</sup> Floor, New York, NY 10023 or download them free of charge from ACSH's website at [www.acsh.org](http://www.acsh.org).

Readers who want to find out more about breast cancer risk factors, prevention, and treatment may also want to visit the American Cancer Society's web site at [www.cancer.org](http://www.cancer.org) and the National Cancer Institute's web site at [www.nci.nih.gov/](http://www.nci.nih.gov/). These two sites contain extensive, authoritative information on a wide variety of cancer-related topics for both health professionals and the general public.

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