



YOUR GUIDE TO BREAST HEALTH

FACTS, TIPS AND KEY QUESTIONS
YOU SHOULD KNOW TO ASK



The National Women's Health Resource Center, Inc. (NWHRC), is the leading independent not-for-profit health information source for women. NWHRC develops and distributes up-to-date and objective women's health information based on the latest advances in medical research and practice.

**For more information,
contact:**

National Women's Health
Resource Center
157 Broad Street, Suite 106
Red Bank, NJ 07701
877-986-9472
www.healthywomen.org

**Medical advisor for this
publication and the Learn.
Love. Commit. Campaign:**

Lydia T. Komarnicky, MD
Chair and Professor
Department of Radiation Oncology
Drexel University College
of Medicine
Philadelphia, PA

© October 2008 National Women's Health Resource Center, Inc.

The Learn. Love. Commit. Campaign is supported by an educational grant from Eli Lilly, & Co.

The information suggested in this publication is not intended as a substitute for medical advice and does not suggest diagnoses for individual cases. Consult your health care professional to evaluate personal medical problems.

Your Guide to Breast Health

Your breasts. Whether you view them as a sign of your sexuality, your motherhood, two body appendages you have to stuff into an uncomfortable piece of clothing every day, or all three, they have, throughout the centuries, come to epitomize the divine feminine.

This guide is designed to help you understand the facts about your breasts, breast disease (particularly breast cancer) and breast cancer prevention and screening. It will also provide you with information about breast surgery and even about changes in your breasts throughout your lifetime. The goal? That you understand how to keep your breasts as healthy as possible throughout your life, no matter *how* you view them!

Table of Contents

| | |
|--|----|
| Your Breasts on Hormones..... | 4 |
| Pregnancy and Breastfeeding | 6 |
| The Best Bra | 10 |
| My Breasts Hurt | 12 |
| Too Big or Too Small? Surgery to Change Your Breasts..... | 15 |
| Breast Cancer..... | 18 |
| Preventing Breast Cancer | 27 |
| Screening for Breast Cancer | 28 |
| Resources..... | 35 |
| References | 36 |



1 Your Breasts on Hormones

Maybe you didn't notice you had breasts until you hit puberty. Actually, however, they've been there since you were but a six-week-old collection of cells in your mother's uterus. By the time you were born, nipples and the beginning of a milk duct system already existed. This makes humans the only mammal that develops milk-producing glands *before* any newborn needs them.

Ah, but then puberty hit. The same symphony of hormones that led to hair growth under your arms and in your pubic area, a waist (who would have thought!) and your period, jump-started the growth of fat—yes, fat!—in your breasts (truth be told, much of breast tissue is fat, particularly as you age). But fat is just one part of your breasts. Other parts include:

- **alveoli:** hollow cavities lined with cells that secrete milk
- **lobules:** several alveoli
- **nipple:** the part of the breast into which the ducts from the lobules drain

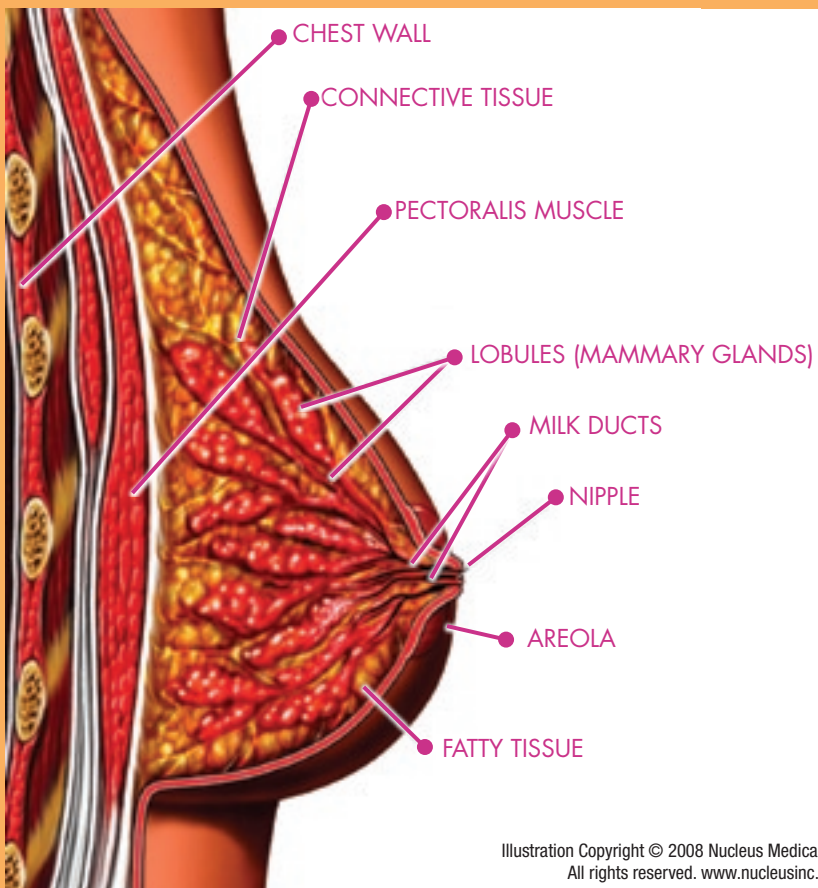
Estrogen conducts this entire process, as it does so many other things during puberty in women. That's because breast cells and estrogen go together like a training bra and an 11-year-old, with breast cells expressing, or creating, receptors for two types of estrogen. When estrogen molecules encounter these receptors, they lock in, stimulating cells in the breast's milk ducts to grow and divide. Before you know it, that training bra has become a B cup.

But a conductor is nothing without her orchestra. So while estrogen may lead the hormonal orchestra, it doesn't operate in a vacuum. Progesterone has its job to do, stimulating the development of the alveoli and lobules. Then other hormones such as insulin, cortisol, prolactin and growth hormone add their expertise to the breast growth concerto.



Since these hormones rise and fall with your menstrual cycle, your breasts change throughout the month. Those tender, lumpy, swollen and painful breasts you experience just before you start menstruating? Blame high levels of progesterone.

ANATOMY OF THE BREAST



2 Pregnancy and Breastfeeding

No matter what size bra you wore when you graduated high school, your breasts aren't considered "fully" developed until the hormones of pregnancy and lactation kick in. That's when major growth occurs in the milk duct system, producing numerous lobules. These changes occur very early in pregnancy, even though they won't be needed for nine months. In fact, for some women the breast tenderness and soreness of early pregnancy, along with their first-ever appearance of cleavage, is their first clue that they might be pregnant.

As the pregnancy progresses, your breasts grow larger, veins may appear on the surface as the blood supply increases and the nipples darken. By the fifth or sixth month of pregnancy, your breasts are ready to produce milk. In fact, you may already see a watery discharge from your breasts called colostrum, the "pre-milk" that will be your baby's first meal if you breastfeed. Now you know why you have breasts—to feed your baby.

BREASTFEEDING'S BOOST

KEY FACT

Even if you only nurse your baby for a few days or weeks, that early milk provides an important source of antibodies to protect against disease as the infant's own immune system develops during the first year. That's one reason the American Academy of Pediatrics recommends that babies be exclusively breastfed for the first six months. Other reasons to breastfeed are the long-term health benefits.

Benefits of Breastfeeding

Studies find that breastfed babies score slightly higher on IQ tests, especially babies who were born prematurely. Breastfeeding also reduces the number of ear infections and the risk of Sudden Infant Death



Syndrome (SIDS), decreases the likelihood of later obesity and may protect children from allergies. Breastfed children also have fewer dental cavities later in life, are less likely to develop type 1 diabetes and have fewer psychological, behavioral and learning problems as they grow. Also, those who were breastfed as infants are less likely to develop childhood lymphoma, leukemia, multiple sclerosis, diabetes, inflammatory bowel disease, childhood obesity and celiac disease. Plus, human milk enhances cognitive development, antibody response to routine immunizations and your child's visual development.¹

TIPS FOR BREASTFEEDING SUCCESS

- Have your nurse or a lactation consultant check how Baby latches on while you're still in the hospital. While it might be uncomfortable, it shouldn't be painful.
- Plan to breastfeed about eight to 12 times in every 24-hour period. Always feed on demand.
- Try not to use a bottle or other nipples, including pacifiers, until breastfeeding is well-established.
- Stay hydrated to ensure your body can make enough milk. Sip water when nursing.
- Nurse in a calm environment to help your milk let down.

But breastfeeding doesn't only benefit the baby. It benefits you, too!

- It helps your uterus return to its pre-pregnancy size and reduces post-delivery bleeding.
- It makes it easier to lose those pregnancy pounds (you burn up to 500 extra calories a day nursing).
- It may reduce your risk of postpartum depression and breast and ovarian cancer.
- It can delay the return of your period (although you should still use some form of birth control when you resume intercourse).
- It saves money (no formula!).

The good news is that more women are breastfeeding their babies. In 2005, the latest year for which figures are available, an estimated 74 percent of women breastfed their newborns, about a 6 percent

increase since 1999. The bad news is that women don't breastfeed for long; by three months, just 43 percent of women were still breastfeeding, a figure that dropped to 21 percent at one year.²

Ask your health care professional:
Should my diet change when I'm breastfeeding?
Will certain foods affect my baby?

If you're worried about breastfeeding, seek help. Ask your health care professional to recommend a certified lactation consultant for coaching before and after the birth and throughout the first few weeks of your baby's life until both of you have breastfeeding down pat. A lactation consultant also can help you plan to continue to breastfeed after you return to work.

How to Avoid—or Manage—Common Breastfeeding Challenges

Breastfeeding isn't all soft music and rocking chairs. Here are the most common breastfeeding-related problems and how you can avoid them:

Sore and cracked nipples

Check the position of the baby when she latches on, smooth lanolin over your nipples after each nursing session and let your nipples air dry after each nursing session. Also, alternate which breast you start on for each session. To help you remember which breast was last used, put a reminder, such as a plastic bracelet, on your wrist on the side to start with next session. And limit nursing to five to 10 minutes on each side initially until your nipples toughen up (just a few days). You should also not hear any clicking or sucking sounds. If you do, the baby isn't positioned right. Move the baby closer and hold his head firmly so his mouth covers as much of the areola as possible.

Engorgement (overly full breasts) or blocked milk duct

Warm compresses, letting warm water run over your breasts in the shower or laying cabbage leaves on your breasts can help



relieve some of the pressure. You can also try pumping some milk between feedings.³

Mastitis or breast infection

If you feel like you have the flu and one breast is red, hot and sore, you probably have mastitis. You'll likely need an antibiotic to clear up the infection. In the meantime, keep nursing and/or pumping on that side as much as possible, even though it hurts. If you take antibiotics for the infection, add a probiotic (good bacteria such as lactobacillus) supplement, or eat a container of live-culture yogurt every day, to help prevent the next complication: thrush. To prevent mastitis, make sure you empty your breasts regularly.

Thrush

Thrush is a fungal infection that can form on the breast and be passed between your breast and the baby's mouth. Overly moist breasts; sore or cracked nipples; taking antibiotics, birth control pills or steroids; or eating a diet high in sugar or yeasty foods can all throw your body's natural yeast levels out of control and lead to thrush. Symptoms are very sore nipples, achy or painful breasts, or pink, flaky, shiny, itchy or cracked nipples. Your baby may have little white spots in her mouth or a diaper rash that won't heal. You need to treat your breasts *and* the baby's mouth with a prescription antifungal or with the over-the-counter antifungal gentian violet. To prevent thrush, air dry your nipples, use nipple pads in your bra, wear a clean bra every day and reduce the amount of sugar and yeasty products in your diet.

RELAX!

Believe it or not, babies aren't born knowing how to breastfeed and new mothers don't immediately become breastfeeding experts. It takes patience and hard work to be a successful breastfeeding team. But, don't give up. With a little support and experience you can get over the learning curve fast and into the rhythm you thought looked so easy.

Most important: Don't be hard on yourself if the first few tries seem like failures. They're not—they're just part of the process.

3 The Best Bra

Did you know that an estimated seven out of 10 women are walking around in poorly fitted bras? Beyond what a bad bra does to your profile, the wrong-sized bra can wreak havoc on your back and shoulders if it doesn't provide the support it should for large breasts. Plus, it simply doesn't feel good! Here, then, are six steps to finding the right bra:

1. Get professionally fitted

It's worth it to have a professional fitting at a lingerie store or in the lingerie department of a good department store. Ask if the salesperson is a "certified bra fitter." Even if she isn't, someone who is trained will do just fine. Another option is to have a girlfriend (or your partner) measure you. To determine the band size, wrap a flexible tape measure around your body just under your breasts. For the cup size, measure around your chest over the fullest part of your breasts. The cup size is the difference between the two measurements:

- *Less than 1-inch difference* AA cup
- *1-inch difference* A cup
- *2-inch difference* B cup
- *3-inch difference* C cup
- *4-inch difference* D cup
- *5-inch difference* DD or E cup

2. Try it on

One brand's 34D may be another's 36C. Plus, you're looking for comfort as well as support. Also, try the bra on under a shirt so you can see how it looks in real life.



3. Choose the right bra

Save the lace and satin for special occasions; for everyday wear, a cotton or microfiber bra is best. They look good and breathe. If you're buying a bra for a special outfit, take the outfit with you and try it on with the bra to make sure it works. And if you're full-figured, choose a bra with wider straps, more material to cover the breast and underwire to provide support. Don't forget maternity and nursing bras. They're best purchased in specialty shops with a trained professional to fit you.

4. Go for quality

Check the quality of materials and construction. A high-quality bra that fits will give you the best wear in the long run.

5. Wash properly

Do not, repeat, do not toss your bras in with your underwear and wash on hot. They should be washed in the delicate cycle and air dried or should be hand washed.

6. Replace often

Wearing and washing wreak their own havoc on a bra, but changes in your body due to weight gain and loss, exercise (or lack thereof) or having a baby can all make that drawer full of lingerie obsolete before you know it. One lingerie expert estimates women's bust lines can change six times throughout her life. So an annual measurement is a good idea.

MENOPAUSE AND YOUR BREASTS

As you might already know, your breasts continue to change with age. While dense and glandular in your youth, after menopause the alveoli and lobules shrink and, in some women, disappear entirely. In addition, the tough, strong fibrous tissue that kept your breasts so perky throughout your 20s and 30s also weakens with age. It is replaced by fat, leading to the sagging breasts of middle age and beyond.

4 My Breasts Hurt

Breast pain is one of the most common breast-related symptoms women experience. It's called *mastalgia* in medical lingo and was first described in the medical literature as early as 1829.⁴

As noted earlier, many women experience *cyclic mastalgia*, or breast pain related to their menstrual cycle.⁵ This is not a benign symptom; studies find that the pain from cyclic mastalgia can interfere with sleep, work, school, social functioning, physical activity— even sex!⁵ Since it lasts seven or more days, that's a large chunk of the month to be in pain.

Cyclic Mastalgia

One cause of cyclic mastalgia may be fibrocystic breasts (see “Fibrocystic Breasts” on page 13).⁴ Another, as you might expect, is hormones. Some studies suggest that high levels of prolactin, the so-called “breastfeeding hormone,” might be to blame.⁴ Another possible cause could be high levels of fat in your diet, which can trigger production of inflammatory chemicals called prostaglandins; or caffeine, which has long been linked with painful, lumpy breasts. To relieve the pain, try the following:⁴

- Wear a supportive bra during the day *and* at night.
- Practice relaxation techniques. One study of women with breast pain who listened to a tape of progressive muscle relaxation for four weeks found 61 percent experienced a substantial or complete relief of the pain, compared to 25 percent of a control group who didn't listen to the tape.
- Supplement with evening primrose oil. A few small studies find some



benefit from taking recommended doses of this supplement, which is an excellent source of anti-inflammatory omega-3 fatty acids.

- Try over-the-counter pain relievers. These include aspirin, ibuprofen and even topical analgesics that you rub on your breasts.


If none of these options help, talk to your health care provider about prescription medication. Most are hormonal options, such as oral contraceptives. Only one medication has been approved specifically for the treatment of mastalgia. Called danazol (Danocrine), it is a form of the male hormone testosterone. Overall, 59 to 92 percent of women treated with this drug find relief from their pain, although it carries a risk of significant side effects, including hair growth, voice deepening and acne.

Fibrocystic Breasts

One in three women in the United States, primarily those in their 30s and 40s, have fibrocystic breasts. This condition likely results from hormonal changes throughout the menstrual cycle and tends to disappear after menopause, although this condition may become worse as menopause approaches.^{6,7}

The primary symptoms are breast pain, breast cysts and noncancerous lumpiness. The lumps are called “fibroadenomas.” There is some evidence that a history of fibroadenomas can *slightly* increase your risk of breast cancer, particularly if you have a history of breast cancer in your family or have had hyperplasia, also known as abnormal breast cell growth.

Treatments for fibrocystic breasts include the synthetic male hormone danazol (Danocrine) and oral contraceptives. Some studies suggest that 400 IU of vitamin E a day may help. You can also try abstaining from caffeine, which some studies suggest may contribute to fibrocystic breasts.



Ask your health care professional:
Are my breasts fibrocystic? Do I need any type of special breast screenings if they are?

FIBROCYSTIC BREAST

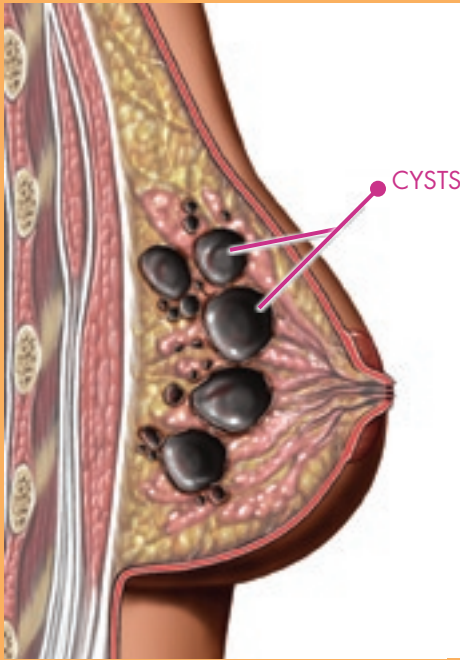


Illustration Copyright © 2008 Nucleus Medical Art,
All rights reserved. www.nucleusinc.com

If the lumps are particularly painful or obvious but a biopsy shows no sign of cancer, your doctor may be able to remove them during an office-based, minimally invasive procedure called cryoablation. The surgeon uses a special gas to create an “iceball” around the lump. The lump eventually shrinks, although it may take up to a year or more to disappear entirely.⁸ This procedure is still relatively new, however, and there is little long-term data on its effectiveness.

BIOPSY MAY BE RECOMMENDED

KEY FACT

Given the slightly higher risk of breast cancer in women with fibrocystic breasts, your doctor may recommend that some of the lumps be biopsied just to be on the safe side. If you are at moderate to high risk based on family history, ask your health care professional if a screening MRI is appropriate along with your annual mammogram. An MRI is better at identifying breast cancers in women with dense breasts like those resulting from fibrocystic breasts.



Too Big or Too Small? Surgery to Change Your Breasts

5

These days, the breasts you're born with are not the breasts you need to live with. Several cosmetic surgeries are available that can increase or decrease the size of your breasts and/or change the shape. Here's a brief overview:

Breast augmentation

If you want bigger breasts, you're usually talking about breast implants. You have two options: saline-filled or silicone-gel implants. While silicone implants provide a more natural appearance and are less likely to leak, saline implants are more flexible in terms of sizing.

Implants come with certain caveats, however. For one, they will not last forever. A U.S. Food and Drug Administration study found that about eight percent of implants used for augmentation had been removed after three years, and 12 to 14 percent after five years.⁹ If you remove or replace your implants, you're

THE SAFETY OF SILICONE

Silicone implants were pulled from the market for cosmetic use in 1992 after reports of leaking silicone and possible health implications. New versions came back on the market in 2007 after more than 100 studies on their safety showed no increased risk of connective tissue diseases (like lupus, scleroderma or rheumatoid arthritis), breast or other cancers, or neurological disorders in women who used the implants. Today's silicone-gel implants are also much stronger and thicker than their predecessors, with a barrier between the implant's inner and outer layers that prevents silicone from leaking out if the implant ruptures. Plus, their textured shells are less likely to lead to contracture, a condition in which fibrous tissue grows around the implant.¹⁰ In addition, the silicone gel used today is more cohesive and thicker than gels used in the past. Thus, even if the outer shell ruptures, the gel tends to remain in place instead of leaking outside the breast capsule.

BREASTFEEDING AND BREAST SURGERY

Most women can safely breastfeed after breast surgery, even after implants.¹³ If you've opted for silicone-gel implants, don't worry about silicone getting into your breast milk. One published report found more silicone in store-bought cow's milk and commercially available infant formula than in the breast milk of women with silicone implants.^{14,15} However, if you are still planning to have children and breastfeed them, tell your surgeon. The type of incision and placement of the implants can make a difference.

responsible for covering the costs of the surgery.

Also, if you opt for silicone implants, you have to find a mammogram center that performs Eklund view mammograms, designed to ensure quality images in women with implants.

Breast lift (mastopexy)

Gravity, pregnancy, nursing and age all contribute to the drooping and sagging of a woman's breasts over time. A breast lift, or

mastopexy, can restore your breasts to a perkier, more youthful appearance. Sometimes mastopexy is performed together with a breast implant, particularly if a woman's breasts have shrunk after pregnancy. The best candidates for mastopexy are healthy, emotionally stable women with realistic expectations of what the procedure will accomplish, particularly women with small, sagging breasts. This procedure isn't worth having, however, if you plan to have more children—another pregnancy and breastfeeding will just stretch your breasts again. Also keep in mind that the results of a mastopexy aren't permanent; gravity and age will continue to wreak their effects.

Breast reduction (reduction mammoplasty)

Extremely large breasts (also called "hypermastia") can cause numerous physical problems, including neck, back and shoulder pain, chafing or rash under the fold of the breast, headaches and even nerve damage. They can also significantly limit physical activities and lead to emotional



issues regarding your appearance, including depression, stigmatization, poor self-esteem and anxiety.^{11,12} Given the significant emotional and physical repercussions of large breasts, many health insurance companies will pay for reduction mammoplasty, even though it's still considered a "cosmetic" surgery. Most only pay for the procedure if you're within 10 percent of your ideal body weight, since being overweight can make the surgery more difficult and increase the risk of complications.¹¹

BREAST IMPLANT

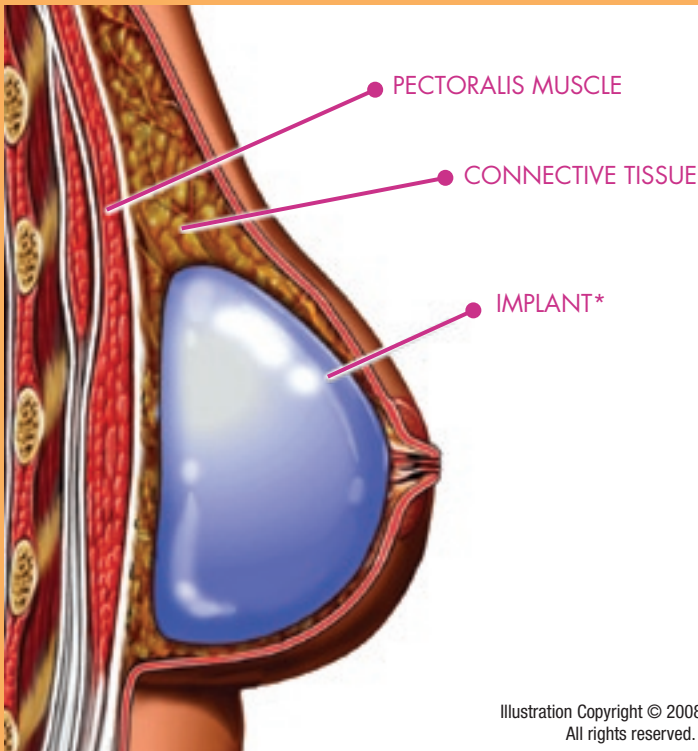


Illustration Copyright © 2008 Nucleus Medical Art,
All rights reserved. www.nucleusinc.com

*For augmentation, the implant can be positioned above or below the pectoralis muscle. For reconstruction following mastectomy, the implant is placed below the pectoralis muscle (not shown).

6 Breast Cancer

Now let's get to the elephant in the room: breast cancer. Study after study shows that women's greatest health-related fear is breast cancer. Yet you're much more likely to die from heart disease than breast cancer. Even if you get breast cancer, it is much less likely to kill you than lung cancer.

We understand the fear. Everywhere you turn in our society women are confronted with reminders about breast cancer. Pink ribbons. Breast cancer awareness month. Magazine articles. Your best friend's mother/sister/aunt/cousin/neighbor's diagnosis.

Today's women, however, are too strong and savvy to allow fear of this disease to dominate their thinking. So instead of fearing breast cancer, it's time to confront it. The best way to confront fear? With knowledge. This section of the National Women's Health Resource Center's *Guide to Breast Health* is designed to arm you with knowledge about your individual risk of breast cancer, what you can do to reduce that risk and the most important steps you can take to identify any breast cancer as early as possible—when the five-year survival rate is 98 percent.¹⁶



Declining Numbers

Here's some good news on the breast cancer front: After more than 20 years of rising incidence, breast cancer rates plateaued in 1999, then abruptly plummeted nearly seven percent between mid-2002 and mid-2003 before leveling off again in 2004. The bulk of the sudden decline occurred in women 50 to 69 and in tumors that depend on estrogen for their growth.¹⁷

The reasons for the decline? The number of women getting mammograms peaked around 1999, meaning breast cancer rates might have continued increasing if more women were getting mammograms. In addition, in 2002 the results of the Women's Health Initiative (WHI), a major clinical trial that linked higher rates of breast cancer to postmenopausal estrogen/progestin therapy, were released. Millions of women quit taking hormone therapy. Because estrogen fuels most breast cancers, researchers suspect this sudden withdrawal may be slowing the growth of miniscule tumors too small to be seen on mammogram, at least in the short term.¹⁷

Will the decline continue? Only time will tell, but as we learn more about preventable risk factors for breast cancer and about preventing breast cancer in high-risk women, it's quite likely that we'll continue to see rates dropping or, at the very least, remaining steady.

Breast Cancer and Ethnicity

Your risk of breast cancer differs based on your ethnicity. Before age 40, African-American women are more likely to develop the disease; after age 40, Caucasian women are.¹⁸ While the incidence of breast cancer in white women dropped between 2001 and 2004, it remained steady in African-American women, possibly because

**Ask your
health care
professional:
Am I at higher risk
for breast cancer
because I'm
African American
or Latina?**

YOUR REAL RISK

Although the overall risk of breast cancer in the United States is 12.7 percent, wouldn't you like to know what your risk is? Now you can. Go online to www.cancer.gov/bcrisktool/ and answer the questions there. Some caveats about the tool, however:

- It is designed for use by health care professionals. So either take the quiz *with* your health care professional, ask your health care professional to take it *for* you or make an appointment to discuss the results with your health care professional.
- Do not use the tool to calculate your breast cancer risk if you have already had a diagnosis of breast cancer, lobular carcinoma in situ (changes in the cells lining breast lobules) or ductal carcinoma in situ (cancer cells in the lining of the lobules or ducts that have not spread to the surrounding fatty tissue or nearby lymph nodes).
- The tool does not consider the impact of radiation therapy to the chest or recent immigration from a country with low breast cancer rates.

fewer women were receiving mammograms and fewer African-American women used hormone therapy in the first place.¹⁸

Even though overall rates of breast cancer are higher in Caucasian women, African-American women are more likely to die from the disease. The possible explanations are numerous: African-American women are more likely to develop more aggressive types of cancer and types that don't respond as well to treatment; they may be less likely to have mammograms and take longer to follow up after an abnormal mammogram^{18,19}; they are more likely to be diagnosed at a later stage in the disease; and they may have less access to care.²⁰

Understanding Your Breast Cancer Risk

Women who are diagnosed with breast cancer often wonder what they did to

“cause” the cancer. The answer: Nothing. While there are certain risk factors for breast cancer, described on pages 22 to 24, none is single-



handedly responsible for your cancer. Most cancers result from the complex interplay between environmental factors and genetic factors. Even women who carry the so-called “breast cancer genes” BRCA-1 and BRCA-2 are not destined to develop breast cancer.

The 2008 National Women’s Health Resource Center’s Breast Cancer Awareness Survey of 815 women aged 30 to 70 found that most women identify family history as the greatest risk factor for breast cancer.²¹ Yet just five to 10 percent of breast cancers are directly related to mutations in the so-called “breast cancer genes,” and only about one in five breast cancers have any genetic basis at all.^{22,23} Plus, only about two percent of women in the United States have an increased risk of breast cancer based on their family history.²⁴

The greatest risk for breast cancer (or, for that matter, most cancers) is age. Throughout your lifetime you have a 12.7 percent risk of developing breast cancer—if you live to be 80 or 90. That translates into one in eight women.²⁵ Don’t panic at that number! The “one-in-eight” applies to women in their 80s and 90s. The box below shows you real-life risk based on where you are today:

PROBABILITY OF DEVELOPING BREAST CANCER WITHIN THE NEXT 10 YEARS

- *By age 20*..... 1 out of 1,837
- *By age 30*..... 1 out of 234
- *By age 40*..... 1 out of 70
- *By age 50* 1 out of 40
- *By age 60*..... 1 out of 28
- *By age 70*..... 1 out of 26
- *Lifetime*..... 1 out of 8

Source: American Cancer Society Breast Cancer Facts & Figures, 2007.

The reason for this is simple: The older you are, the more times the cells in your breasts have divided. Every time a cell divides, there’s the

THE GENETICS OF BREAST CANCER

Even though the contribution of family history to breast cancer risk is relatively low, it is important that you tell your health care professional about any family history of breast cancer, as well as your ethnic background. That's because the BRCA mutations are more common in women with an Ashkenazi Jewish background.

If you don't have an Ashkenazi Jewish background, your risk is higher if you have had:

- Two first-degree relatives (mother or sister) with breast cancer, one of whom received the diagnosis before the age of 50
- A combination of three or more first- or second-degree (aunt, first cousin) relatives with breast cancer, regardless of age at diagnosis
- A combination of breast and ovarian cancer among first- and second-degree relatives
- A first-degree relative with cancer in both breasts
- Two or more first- or second-degree relatives with ovarian cancer regardless of age at diagnosis
- A first- or second-degree relative with both breast and ovarian cancer at any age
- A history of breast cancer in a male relative²⁶

If you are of Ashkenazi Jewish heritage, your risk is higher if you have had:

- Any first-degree relative with breast or ovarian cancer
- Two second-degree relatives on the same side of the family with breast or ovarian cancer

If your health care professional suspects you may have a genetic mutation, you should talk to an oncologist or genetic counselor. You can find a genetic counselor in your area through the National Society of Genetic Counselors: www.nsgc.org.



risk that something could go wrong, creating an abnormal cell. Your body has mechanisms in place designed to seek out and destroy these abnormal cells; indeed, many commit cellular suicide, called apoptosis, on their own. But sometimes an aberrant cell gets missed. Then it keeps dividing, making more and more copies of itself, recruiting its own blood supply, taking up space that should be allotted to healthy cells. Now you have a tumor, or cancer.


Estrogen drives the growth of breast cells. So the less estrogen in your body, the less those cells divide, meaning the fewer opportunities for mistakes. That's one reason why women who menstruate late, have several children and breastfeed their children have a lower risk of developing breast cancer—because their breast cells have been exposed to less estrogen over the course of their lifetime (estrogen levels are low before puberty and during pregnancy and breastfeeding).

Women who have their first child at 30 or older, or who never have children, have nearly twice the risk of breast cancer as a woman who had a child earlier (See “Your Real Risk” on page 20.)²⁷ Experts suspect this may be due to the type of breast stem cell that develops during a woman's first full-term pregnancy and breastfeeding. These stem cells give rise to all other breast cells, which are less likely to become cancerous.

Other risk factors for breast cancer include:

Benign breast disease

Benign breast disease includes breast pain, breast cysts, mastitis (breast inflammation/infection), fibrocystic breasts and related lesions. If you required a biopsy for any of these conditions, your risk of breast cancer is higher. Not because of the biopsy, but because the need for



**Ask your
health care
professional:
Should I have a
genetic test for
breast cancer?**

one suggests the possibility of precancerous changes in breast cells that could, eventually, lead to breast cancer.²⁸

Atypical ductal hyperplasia

This condition, also called atypia, is overactive growth of the cells lining breast ducts. If a biopsy shows you have atypia, your risk of breast cancer is higher than a woman your age with your family history who doesn't have it. Don't panic! It just means you and your doctor need to be aware of your risk and pay special attention to screening.²⁹

KEY FACT

BREAST DENSITY RAISES CANCER RISK

If your breasts are dense, your risk of breast cancer is between three and five times higher than a woman without dense breasts, particularly if you have a family history of breast cancer. If you're using hormone therapy, consider stopping; hormone therapy may increase breast density in some postmenopausal women.³⁰ You may also want to consider having an MRI along with your mammogram.

Use of menopausal hormone therapy

The Women's Health Initiative (WHI) study found a 24 percent increased risk of breast cancer in women using the hormone therapy Prempro. This might sound like a lot, but if your overall risk is 12 percent, it only increases your risk by 2.9 percent. That's still really small! Plus, the increased risk in the WHI was only seen in women who had been using Prempro prior to enrolling in the study. Women who used the estrogen-only hormone therapy (Premarin) had no increased relative risk.^{31,32}

Radiation exposure

Multiple chest x-rays, radiotherapy for Hodgkin's disease or exposure during atomic bomb explosions increase the risk of breast cancer by varying degrees.³³



WHAT ABOUT SOY?

Women in Asian countries like Japan, China and Korea who eat a diet very high in soy products have much lower rates of breast cancer. So it makes sense to think that soy might protect against breast cancer. The mechanism may be related to compounds in soy protein called isoflavones, which act as weak estrogens in your body, ostensibly preventing your body's own hormone from triggering cellular growth.

However, numerous studies conducted on the relationship between soy and breast cancer remain inconclusive. One analysis of 10 major studies concluded that while a high amount of soy intake slightly reduced breast cancer risk, the reduction was only statistically significant among premenopausal women, and it wasn't nearly strong enough to suggest that women add soy to their diets just to reduce their risk of breast cancer.^{35,36}

There is also some concern that high amounts of soy could *trigger* breast cancer because of its estrogen-like effects, or trigger cancer growth or recurrence in women diagnosed with breast cancer. But studies don't support this, either.

In 2005, the National Institutes of Health held a conference to evaluate the risks and benefits of soy on high-risk women and women with breast cancer. The panel concluded that there simply isn't enough data yet to say whether soy-based foods with isoflavones are safe in these women.³⁵

Bottom line: If your risk of breast cancer is average or low and you love tofu, keep eating it. But there's no reason to add soy-based products or eliminate them from your diet if you're worried about your breast cancer risk. And if you have a high risk of breast cancer and/or already have breast cancer, talk with your health care professional about the potential impact soy-based foods may have on your risk.

Obesity

Every 2.2 pound weight gain increases a woman's risk of breast cancer by 1.08 percent. Why? Fat cells produce estrogen.³⁴ The risk appears related more to the percentage of body fat than to the actual weight.³⁷ So start your weight-management program today!

Alcohol intake

An estimated four percent of breast cancers are linked to alcohol consumption. One major study found that one drink a day from age 18 onward increased a woman's relative risk of developing breast cancer by seven percent compared to women who never drank.³⁸⁻⁴⁰ Other studies, however, suggest this risk may be erased if you get high levels of the B vitamin folate in your diet.^{42,43} Good sources include whole grains, beans and legumes and dark green, leafy vegetables like collards and spinach.

WHAT ABOUT BIRTH CONTROL PILLS?

Although a 1996 analysis suggested a small increased risk of breast cancer in women who used birth control pills, particularly those who began using them as a teenager,⁴⁶ other studies show no increased risk.⁴⁷ Plus, even the study showing a slightly higher risk in birth control pill users also showed that 10 or more years after the women stopped taking the Pill, the increased risk disappeared.

Physical activity

There is some evidence that women who exercise vigorously for 45 to 60 minutes five or more days of the week may have a lower risk of breast cancer after menopause. The benefit may be related to the effect of physical activity on hormonal levels and weight.^{44,45}



Preventing Breast Cancer 7

There are two ways we know to prevent breast cancer: Prophylactic mastectomy, in which the breasts are surgically removed, and chemoprevention, in which you take a daily medication for five years.

While deciding to cut off perfectly healthy breasts is a pretty drastic step, it's one some young women take upon learning they have a BRCA mutation. Studies find this surgery reduces the risk of breast cancer as much as 90 percent in women with the mutations and up to 95 percent in women who also have their ovaries removed.⁴⁷

Two medications are currently approved for breast cancer prevention: tamoxifen and raloxifene (Evista). Both are selective estrogen receptor modulators, or SERMS. They work by mimicking estrogen in the body and binding to estrogen-sensitive cells (like those in the breast). When estrogen turns up, it can't get into the cells because the receptor, or "lock," is already filled.

Tamoxifen is approved for use in pre- and postmenopausal women, while raloxifene is approved for postmenopausal women. Studies find each slashes the risk of breast cancer by half in high-risk women and reduces the risk of estrogen-positive cancer even more.^{48,49} Side effects vary, but include a slightly higher risk of uterine cancer and cataracts (higher with tamoxifen than raloxifene), stroke, pulmonary embolism and blood clots.

So how do you know if you're a "high-risk" woman? For starters, you go over your family history with your health care professional and you take the breast cancer risk assessment described on page 20.

If your five-year projected breast cancer risk is greater than 1.66 percent based on the risk assessment, or you have a strong family history of the disease and/or a genetic mutation that increases your personal risk, talk to your doctor about chemoprevention. If you're postmenopausal, raloxifene is considered the first-choice option because it has fewer side effects than tamoxifen. It is important, however, that you consider the risks as well as the benefits of any intervention given your specific health status.

Screening for Breast Cancer

Mammograms are still the best way to find breast cancer early, and finding breast cancer early is still the best way to survive it. The five-year survival rate for women whose disease is found before it has spread is 98 percent.⁵⁰ But if the disease has spread to the lymph nodes, the rate drops to 84 percent, plummeting to 27 percent in those in whom it has spread to a distant location, such as the lungs or brain. One additional benefit to mammograms is that they not only find breast cancers, but can also help identify dense breasts or benign (noncancerous) breast disease, both of which could increase your risk of breast cancer.⁵¹

DUCTAL LAVAGE

Ductal lavage is a screening procedure in which cells are collected from milk ducts in the breasts. It is sometimes used in addition to mammography in high-risk women. With ductal lavage, the doctor inserts a catheter about as thick as a single hair into the nipples and squirts some saline through the tube into the duct. The water washes away some breast cells, then is sucked back into the tube for inspection under a microscope. Studies on the test, however, find that it is not very reliable at finding cancerous cells.⁵⁴

Most major medical organizations recommend that women begin having annual mammograms at age 40 and continue until age 70. Once you reach age 70, it's up to you and your health care professional whether you continue.⁵² If your risk of breast cancer is more than 20 percent, you should also have an MRI, which can find miniscule tumors that don't show up on mammogram.⁵³ If your risk is between 15 and 20 percent, talk to your health care professional about the



need for an MRI, and if your risk is below 15 percent, a mammogram alone is sufficient.

In addition to MRI, your health care professional may also recommend a breast ultrasound to look at any suspicious areas. The ultrasound uses sound waves that bounce off solid tissue, creating an image of the breast on a computer screen. It is not a substitute for mammography but an additional test for women with a high risk of breast cancer or those with fibrocystic breasts. Ultrasounds are particularly beneficial at telling the difference between fluid-filled cysts in the breasts and solid masses and between cancerous and noncancerous lumps.

Breast screenings of the future

Ongoing research continues to improve breast cancer screening and evaluation, with innovations such as breast-specific gamma imaging and cone beam breast computed tomography (CT), basically more sophisticated forms of imaging that will do a better job at differentiating cancerous cells from noncancerous cells and, in the case of cone-based CT, won't even require breast compression.

WHAT ABOUT BREAST SELF-EXAMS?

You can do a breast self-exam, if you'd like. Just make sure your health care professional periodically reviews your technique to be sure it's correct. You should be aware that there is no evidence that breast self-exams provide any benefit and, in fact, they may lead to harm because they unnecessarily subject women to biopsies.⁵⁵ Thus, most major medical organizations, including the American Cancer Society (ACS), no longer recommend that women conduct them unfailingly each month. Rather, the ACS suggests regular breast self-exams as a way to get to know how your breasts normally look and feel, so if something abnormal does develop, you might notice it more quickly. It's interesting to note, though, that studies find that women who find their own cancers by touch tend to do it outside of a formal breast exam, such as while putting on a bra or bathing. And remember to ask your health care professional to perform a clinical breast examination once a year; about five percent of breast cancers are identified in this way.⁵⁶

Choosing a Mammography Center

Choosing a mammography center is an important decision that should be based on more than just the center's decor and whether it provides plush robes. Instead, look for the following:

- **A high-volume center.** Studies find that the more mammograms radiologists read, the less likely they are to miss a potential cancer. However, this benefit is a two-edged sword; studies also find that the more mammograms the radiologist reads, the greater the risk of a false-positive reading.⁵⁷
- **A dedicated breast radiologist.** This individual deals only with mammograms and other breast-related radiographic tests. Sometimes the radiologist will have completed a fellowship in breast radiology; other times, this person is simply a doctor who does nothing but read mammograms.

Digital or Analog?

Ask your health care professional:
How should I prepare for a mammogram or MRI?

It depends. Analog mammograms, which use film that is developed just like the film in the cameras of yore, tend to be less sensitive for women with dense breasts, with studies suggesting that between 10 and 20 percent of cancers identified by breast exam in these women were not detected on film mammograms. They also can't be altered once the film is developed, so the doctor can't zoom in on a certain site, make one part darker to get better contrast or make other changes to create a clearer picture.

Digital mammograms, however, can be uploaded and stored on computers, transmitted electronically and digitally manipulated to improve the view, reducing the likelihood that you'll have to return and redo the mammogram. Digital mammograms also use less radiation than film mammography.⁵⁸



If you're over 50, either is just as good at identifying potential problems. If you're under 50, pre- or perimenopausal, or have dense breasts, a major national study comparing the two in nearly 50,000 women found digital mammography was significantly more accurate.⁵⁹

Mammograms for Low-Income Women

Low-income, uninsured women ages 18 to 64 can get free mammograms and cervical cancer screenings in all 50 states, the District of Columbia, four U.S. territories and 13 American Indian/Alaskan Native organizations under the National Breast and Cervical Cancer Early Detection Program (NBC-CEDP). However, just 12.6 percent of the women eligible for the program in 2004 received mammograms. Still, about 1 percent of the women screened were diagnosed with breast cancer.⁶⁰ For information on screening programs in your area, go to <http://apps.nccd.cdc.gov/cancercontacts/nbccedp/contacts.asp> and click on your state.

QUICK FACTS ABOUT MAMMOGRAMS

- A mammogram uses only a very small dose of radiation. It does not increase your chances of getting breast cancer.
- Mammograms have helped more women than ever before survive breast cancer.
- Your health care provider will tell you if you need a mammogram more often than what's usually recommended.
- Mammograms are uncomfortable but not unbearable. Having very large or very small breasts doesn't matter. The equipment will work either way.

HOW OFTEN SHOULD I BE SCREENED FOR BREAST CANCER?

| Screening Type | Age | How Often |
|---|--------------|-----------------------------|
| Mammogram | 40+ | Every year |
| Breast exam by a health care professional | 20–39 40+ | Every 3 years Every year |
| Breast self-exam | 20+ | Periodically |

KEY FACT

9 Breast Cancer Today

A breast cancer diagnosis today is hardly a death sentence. Between 1990 and 2004, the death rate dropped 2.2 percent a year, even more in younger women. The reason for the decline is twofold: Women are getting diagnosed earlier and numerous new treatments have become available. In fact, so many breast cancers are diagnosed so early in the disease that many women require just a lumpectomy, in which only the cancer is removed, followed by radiation and, in some instances, chemotherapy. New partial-breast radiation techniques will treat only the highest area at risk, and the radiation can be given in five days versus seven weeks. This is especially important for patients where the heart needs to be avoided, since the partial breast treatment is aiming to treat much less tissue.

Other treatment options include mastectomy, or complete removal of the breast, and hormone therapy, in which drugs are used to reduce your body's production of estrogen and/or progesterone or prevent their effect on breast cells.

If mastectomy is a choice you must make, there are two main breast reconstructive surgery options you may want to consider: breast implants, using silicone shells filled with silicone gel or saline, or autologous reconstruction, which uses fat and tissue from your abdomen, back, buttocks or thigh to shape a new breast. In many instances, breast reconstructive surgery can be performed immediately after mastectomy—so you never wake up without a breast.

If you have health insurance, your carrier must pay for breast reconstructive surgery. The 1998 Federal Breast Reconstruction Law requires all health insurance companies to cover reconstruction of the breast on



which mastectomy has been performed, and surgery and reconstruction of the other breast to produce a symmetrical appearance.

If you don't have health insurance, talk to your surgeon and the hospital about negotiating a discount rate. Many are willing to reduce fees for women without insurance. You may also qualify for health insurance under your state's Medicaid program or other health-coverage programs for low- and moderate-income individuals.

These days, doctors will evaluate the type of cancer you have before deciding on a treatment plan. Most breast cancers are estrogen positive, meaning estrogen fuels their growth; some are progesterone positive, some respond to both hormones, and the minority of cancers responds to neither. Many cancer centers can also test the genetic makeup of the cancer, enabling your doctor to determine if a specific drug will work before you even start taking it.

One indication of how much better we've become at treating breast cancer can be seen in the percentage of women with breast cancer that has spread (metastasized) who survive at least five years. In the 1970s, just 17 percent of women whose cancer spread were still alive five years after diagnosis; in the 1980s, that figure increased to 26 percent. Yet between 1995 and 2000, 44 percent of women with recurrent or metastasized cancer survived five years.⁶¹ That figure is likely higher today, given new treatments that have since become available.

All of this means that doctors are now treating breast cancer as a chronic disease, much like high blood pressure or diabetes. Once one drug stops working, they try another or a different combination. And since many treatment options today are targeted—meaning they go after the cancer cells instead of all cells—the side effects are minimal, enabling women to enjoy a high quality of life even while undergoing treatment that may continue for years.



Ask your health care professional:
Will I be able to get pregnant and breastfeed after my cancer treatment?

SURVIVAL RATES

The most recent breast cancer survival rates from the American Cancer Society show that:

- **89 percent** of women are still alive five years after diagnosis
- **81 percent** are still alive 10 years after diagnosis
- **73 percent** are still alive 15 years after diagnosis

Expect those figures to keep getting better, given the improved treatment options and our own improved knowledge about the disease.¹⁶

Talk About It!

According to the 2008 Breast Cancer Awareness Survey conducted by the National Women's Health Resource Center, a vast majority of women report talking to their health care professionals about breast health screenings—specifically mammograms and breast self-exams. Sixty percent of the women surveyed reported discussing breast cancer with either their mothers or their daughters and, in some cases, both. This is very good news. Women who are a part of discussions about breast cancer in one part of their life are more likely to discuss it in other parts of their life as well.

Perhaps the best news about these discussions is that our survey found that mothers and daughters who discuss breast health with each other are more likely to be up-to-date with their screenings. Mammography remains our best tool for identifying breast cancer at its earliest, most treatable stage.

There is much more to be done to better understand breast cancer and ways to treat and prevent it. And, more work is needed to reach all women with information and encouragement to pursue breast screenings. But, in the meantime, spread the word—talk about breast cancer.



National Women's Health Resource Center

To empower women with the latest breast cancer information and the confidence to translate that knowledge into action, the National Women's Health Resource Center (NWHRC) has introduced the Learn.Love.Commit. breast cancer awareness campaign: **LEARN** the facts about breast cancer. **LOVE** your body. **COMMIT** to regular preventive health screenings.

learn.  love.commit.

As part of the Learn.Love.Commit. campaign, the NWHRC offers free breast-health related information at its award-winning Web site, **www.healthywomen.org**. Visit the NWHRC's new online Breast Health Center to learn more. Or, call: 1-877-986-9472.

Additional Resources

Breast Cancer Screening

FDA Certified
Mammography Facilities
1-888-463-6332
www.fda.gov/cdrh/mammography

Breast Cancer Support for Women of Color

African-American Breast Cancer Alliance
612-825-3675
www.aabcainc.org

Native American Cancer Research
303-838-9359
www.natamcancer.org

Sisters Network Inc.
1-866-781-1808
www.sistersnetworkinc.org

Breast Cancer Support for Younger Women

Young Survival Coalition
1-877-972-1011
www.youngsurvival.org

General Breast Cancer Information & Support

American Cancer Society
1-800-227-2345
www.cancer.org

Breastcancer.org
www.breastcancer.org

Breast Cancer Network of Strength
1-800-221-2141
1-800-986-9505 Spanish
www.networkofstrength.org

11 References

- 1 Wight NE. Management of common breastfeeding issues. *Pediatr Clin North Am.* 2001;48(2):321-344.
- 2 Centers for Disease Control and Prevention. Breastfeeding among US children born 1999-2005. CDC National Immunization Survey. August 2008. Available at: http://www.cdc.gov/breastfeeding/data/NIS_data/index.htm. Accessed August 7, 2008.
- 3 Snowden HM, Renfrew MJ, Woolridge MW. Treatments for breast engorgement during lactation. *Cochrane Database Syst Rev.* 2001;(2):CD000046.
- 4 Smith RL, Pruthi S, Fitzpatrick LA. Evaluation and management of breast pain. *Mayo Clin Proc.* 2004;79(3):353-372. Review.
- 5 Ader DN, Browne MW. Prevalence and impact of cyclic mastalgia in a United States clinic-based sample. *Am J Obstet Gynecol.* 1997;177(1):126-132.
- 6 Marchant DJ. Benign breast disease. *Obstet Gynecol Clin North Am.* 2002;29(1):1-20. Review.
- 7 Vorherr H. Fibrocystic breast disease: pathophysiology, pathomorphology, clinical picture, and management. *Am J Obstet Gynecol.* 1986;154(1):161-179.
- 8 Kaufman CS. Office-based cryoablation of breast fibroadenomas: 12-month followup. *J Am Coll Surg.* 2004;198(6):914-923.
- 9 Implant Consumer Handbook. US Food and Drug Administration. Updated June 8, 2004. Available at: www.fda.gov/cdrh/breastimplants/handbook2004/localcomplications.htm. Accessed March 8, 2005.
- 10 Bondurant S, Ernster V, Herdman R. Safety of Silicone Breast Implants, Report of the committee on the Safety of Silicone Breast Implants (IOM). Washington, DC: National Academy Press. 1999.
- 11 Grassley JS. Breast reduction surgery. What every woman needs to know. AWHONN Lifelines. Review 2002;6(3):244-9.
- 12 Netscher DT, Meade RA, Goodman CM, et al. Physical and psychosocial symptoms among 88 volunteer subjects compared with patients seeking plastic surgery procedures to the breast. *Plast Reconstr Surg.* 2000;105(7):2366-2373.
- 13 Kakagia D, Tripsiannis G, Tsoutsos D. Breastfeeding after Reduction Mammoplasty: A Comparison of 3 Techniques. *Ann Plast Surg.* 2005;55(4):343-345.
- 14 Semple JL. Breast-feeding and silicone implants. *Plast Reconstr Surg.* 2007;120(7 Suppl 1):123S-128S.
- 15 Johansson AS, Wennborg H, Blomqvist L, Isacson D, Kylberg E. Breastfeeding after reduction mammoplasty and augmentation mammoplasty. *Epidemiology.* 2003;14(1):127-129.



- 16 American Cancer Society. Cancer Facts & Figures, 2007. Atlanta: American Cancer Society; 2007.
- 17 Jemal A, Ward E, Thun M. Recent trends in breast cancer incidence rates by age and tumor characteristics among U.S. women. *Breast Cancer Research*. 2007;9(3):R28.
- 18 American Cancer Society, Cancer Facts & Figures for African Americans 2007-2008. Atlanta: American Cancer Society; 2007.
- 19 Ward E, Jemal A, Cokkinides V, et al. Cancer disparities by race/ethnicity and socioeconomic status. *CA Cancer J Clin*. 2004;54(2):78-93.
- 20 Morris GJ, Mitchell EP. Higher incidence of aggressive breast cancers in African-American women: a review. *Natl Med Assoc*. 2008;100(6):698-702.
- 21 National Women's Health Resource Center. 2008 Breast Cancer Awareness Survey.
- 22 Easton DF, Ford D, Bishop DT. Breast and ovarian cancer incidence in BRCA1-mutation carriers. Breast Cancer Linkage Consortium. *Am J Hum Genet*. 1995;56:265-271.
- 23 Struewing JP, Hartge P, Wacholder S, et al. The risk of cancer associated with specific mutations of BRCA1 and BRCA2 among Ashkenazi Jews. *N Engl J Med*. 1997;336:1401-1408.
- 24 Genetic risk assessment and BRCA mutation testing for breast and ovarian cancer susceptibility: recommendation statement. *Ann Intern Med*. 2005;143:355-361.
- 25 Ries LAG, Harkins D, Krapcho M, et al. SEER Cancer Statistics Review, 1975-2003. Bethesda, MD: National Cancer Institute; 2006.
- 26 Genetic risk assessment and BRCA mutation testing for breast and ovarian cancer susceptibility: recommendation statement. *Ann Intern Med*. 2005;143:355-361.
- 27 Sharpe CR. A developmental hypothesis to explain the multicentricity of breast cancer. *CMAJ*. 1998;159:55-59.
- 28 Gail MH, Brinton LA, Byar DP, et al. Projecting individualized probabilities of developing breast cancer for white females who are being examined annually. *J Natl Cancer Inst*. 1989;81:1879-1886.
- 29 Dupont WD, Parl FF, Hartmann WH, et al. Breast cancer risk associated with proliferative breast disease and atypical hyperplasia. *Cancer*. 1993;71:1258-1265.
- 30 Boyd NF, Guo H, Martin LJ, et al. Mammographic density and the risk and detection of breast cancer. *N Engl J Med*. 2007;356:227-236.
- 31 Anderson GL, Limacher M, Assaf AR, et al. Effects of conjugated equine estrogen in postmenopausal women with hysterectomy: the Women's Health Initiative randomized controlled trial. *JAMA*. 2004;291:1701-1712.
- 32 Writing Group for the Women's Health Initiative I. Risks and benefits of estrogen plus progestin in healthy postmenopausal women: Principal results from the Women's Health Initiative randomized controlled trial. *JAMA*. 288(3):321-333.
- 33 Hollingsworth AB, Singletary SE, Morrow M, et al. Current comprehensive assessment and management of women at increased risk for breast cancer. *Am J Surg*. 2004;187:349-362.

- 34 Carmichael AR. Obesity as a risk factor for development and poor prognosis of breast cancer. *BJOG*. 2006;113:1160-1166.
- 35 Messina M, McCaskill-Stevens W, Lampe JW. Addressing the soy and breast cancer relationship: review, commentary, and workshop proceedings. *J Natl Cancer Inst*. 2006;98(18):1275-1284.
- 36 Trock BJ, Hilakivi-Clarke L, Clarke R. Meta-analysis of soy intake and breast cancer risk. *J Natl Cancer Inst*. 2006;98(7):459-471.
- 37 Lahmann PH, Lissner L, Gullberg B, Olsson H, Berglund G. A prospective study of adiposity and postmenopausal breast cancer risk: The Malmö diet and cancer study. *Int J Cancer*. 2003;103:246-252.
- 38 Hamajima N, Hirose K, Tajima K, et al. Alcohol, tobacco and breast cancer—collaborative reanalysis of individual data from 53 epidemiological studies, including 58,515 women with breast cancer and 95,067 women without the disease. *Br J Cancer*. 2002;87:1234-1245.
- 39 Smith-Warner SA, Spiegelman D, Yaun SS, et al. Alcohol and breast cancer in women: a pooled analysis of cohort studies. *JAMA*. 1998;279:535-540.
- 40 Colditz GA, Rosner B. Cumulative risk of breast cancer to age 70 years according to risk factor status: Data from the Nurses' Health Study. *Am J Epidemiol*. 2000;152:950-964.
- 41 Baglietto L, English DR, Gertig DM, Hopper JL, Giles GG. Does dietary folate intake modify effect of alcohol consumption on breast cancer risk? Prospective cohort study. *BMJ*. 2005;331:807.
- 42 Rohan TE, Jain MG, Howe GR, Miller AB. Dietary folate consumption and breast cancer risk. *J Natl Cancer Inst*. 2000;92(3):266-269.
- 43 Friedenreich CM. Physical activity and cancer prevention: from observational to intervention research. *Cancer Epidemiol Biomarkers Prev*. 2001;10(4):287-301.
- 44 Dallal CM, Sullivan-Halley J, Ross RK, et al. Long-term recreational physical activity and risk of invasive and in situ breast cancer: the California teachers study. *Arch Intern Med*. 2007;167(4):408-415.
- 45 Collaborative Group on Hormonal Factors in Breast Cancer. Breast cancer and hormonal contraceptives: Collaborative reanalysis of individual data on 53,297 women with breast cancer and 100,239 women without breast cancer from 54 epidemiological studies. *Lancet*. 1996; 347:1713-1727.
- 46 Marchbanks PA, McDonald JA, Wilson HG, et al. Oral contraceptives and the risk of breast cancer. *New England Journal of Medicine*. 2002; 346(26):2025-2032.
- 47 Rebbeck TR, Friebel T, Lynch HT, et al. Bilateral prophylactic mastectomy reduces breast cancer risk in BRCA1 and BRCA2 mutation carriers: the PROSE Study Group. *J Clin Oncol*. 2004;22:1055-1062.



- 48 Vogel VG, Costantino JP, Wickerham DL, et al. Effects of tamoxifen vs raloxifene on the risk of developing invasive breast cancer and other disease outcomes: the NSABP Study of Tamoxifen and Raloxifene (STAR) P-2 trial. *JAMA*. 2006;295:2727-2741.
- 49 Fisher B, Costantino JP, Wickerham DL, et al. Tamoxifen for prevention of breast cancer: Report of the National Surgical Adjuvant Breast and Bowel Project P-1 Study. *J Natl Cancer Inst*. 1998;90:1371-1388.
- 50 American Cancer Society. *Cancer Facts & Figures, 2007*. Atlanta: American Cancer Society; 2007.
- 51 National Cancer Institute. Breast Cancer (PDQ): Screening. Last updated: April 16, 2007. Available at: www.cancer.gov/cancertopics/pdq/screening/breast/healthprofessional. Accessed August 6, 2007.
- 52 Screening for breast cancer: recommendations and rationale. *Ann Intern Med*. 2002;137(5 Part 1):344-346.
- 53 Saslow D, Boetes C, Burke W, et al, for the American Cancer Society Breast Cancer Advisory Group. American Cancer Society guidelines for breast screening with MRI as an adjunct to mammography. *CA Cancer J Clin*. 2007;57:75-89.
- 54 Brogi E, Robson M, Panageas KS, Casadio C, Ljung BM, Montgomery L. Ductal lavage in patients undergoing mastectomy for mammary carcinoma: a correlative study. *Cancer*. 2003;98(10):2170-2176.
- 55 Kösters JP, Götzsche PC. Regular self-examination or clinical examination for early detection of breast cancer. *Cochrane Database of Systematic Reviews* 2007, Issue 4. Art. No.: CD003373. DOI: 10.1002/14651858.CD003373.
- 56 McDonald S, Saslow D, Alciati MH. Performance and reporting of clinical breast examination: a review of the literature. *CA Cancer J Clin*. 2004;54:345-361.
- 57 Barlow WE, Chi C, Carney PA, et al. Accuracy of screening mammography interpretation by characteristics of radiologists. *J Natl Cancer Inst*. 2004;96(24):1840-1850.
- 58 National Cancer Institute. Digital vs. Film Mammography in the Digital Mammographic Imaging Screening Trial (DMIST): Questions and Answers. Available at: <http://www.cancer.gov/cancertopics/factsheet/DMISTQandA>. Accessed November 15, 2007.
- 59 Pisano ED, Gatsonis C, Hendrick E, et al. Diagnostic performance of digital versus film mammography for breast-cancer screening. *N Engl J Med*. 2005;353(17):1773-1783.
- 60 Division of Cancer Prevention and Control. National Breast and Cervical Cancer Early Detection Program: 2006/2007. Available at: http://www.cdc.gov/cancer/NBCCEDP/bccpdfs/0607_nbccedp_fs.pdf. Accessed August 6, 2008.
- 61 Giordano SH, Buzdar AU, Smith TL, Kau SW, Yang Y, Hortobagyi GN. Is breast cancer survival improving? *Cancer*. 2004;100(1):44-52.



**National Women's
Health Resource Center**
www.healthywomen.org

learn.  .commit.