

## CHAPTER 19

# WOMEN AND HEART DISEASE

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## INTRODUCTION

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Heart disease in women is similar in many ways to heart disease in men. Like men, women can have high blood pressure and heart attacks. In fact, these are more prevalent in women than previously thought. Of the approximately 500,000 heart attack deaths each year, almost half occur in women, according to American Heart Association figures, and deaths from high blood pressure are at a similar ratio. Women can also suffer the same inborn (congenital) malformations, diseases of the heart valves, heart failure, and heart rhythm disorders as men,

Enough differences exist between male and female heart disease, however, to warrant consideration of the aspects that specifically apply to women. (See box, “Cardiovascular Disease in American Women.”) These aspects include both uniquely female experiences with diseases such as atherosclerosis (hardening of the arteries) and hypertension, which affect both men and women, and uniquely female life experiences, such as pregnancy, which produce profound cardiovascular changes. Women have often been excluded from research studies about atherosclerosis; the perception has been that heart attack is more a male phenomenon, and researchers have feared that female subjects might become pregnant,

which in the case of a drug study might cause injury to the unborn child. As a result, frequently cited facts about heart attack risk factors and treatments may apply more to men than women. The National Institutes of Health (NIH), however, has recently mandated that all researchers receiving NIH grants must now include women in their studies—or have a good reason for excluding them. The NIH has also created an office of Research on Women’s Health. Thus in the future, more specific data should be available.

### Cardiovascular Disease in American Women

- Between the ages of 45 and 64, one in nine women has some form of cardiovascular disease.
- One in three women above the age of 65 has some form of cardiovascular disease.
- Of the approximately 500,000 fatal heart attacks per year, almost half occur in women.
- Women who have a heart attack are twice as likely to die within the first two weeks as are men.
- Within the first year after a heart attack, 39 percent of women die compared with 31 percent of men.

### The American Heart Association's Check-up Checklist for Women: Items to Discuss with a Doctor

- Age
- Race
- Family history of heart disease, diabetes, cancer, other diseases
- Blood pressure
- Blood cholesterol, plus HDL and LDL cholesterol if appropriate
- Blood triglycerides
- Glucose tolerance (for people concerned about diabetes)
- Ideal weight for age, height, and body type
- Smoking behavior
- Alcohol consumption
- Response to stressful situations
- Satisfaction with work and family life
- Oral contraceptives
- Estrogen replacement therapy (for postmenopausal women)
- Dietary changes
- Exercise routines

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## WOMEN AND ATHEROSCLEROSIS (CORONARY HEART DISEASE)

Like men, women must consider heredity, age, race, blood pressure, blood cholesterol, and smoking as risk factors for coronary heart disease. (See Chapter 3.) However, women appear to be more affected by certain factors, such as smoking and diabetes, than are men. In addition, only women become pregnant, experience menopause, and are prescribed contraceptive pills and postmenopausal estrogens. These special considerations should be explored on an individual basis with a physician. (See box, "The American Heart Association's Check-up Checklist for Women: Items to Discuss with a Doctor.")

### MENOPAUSE

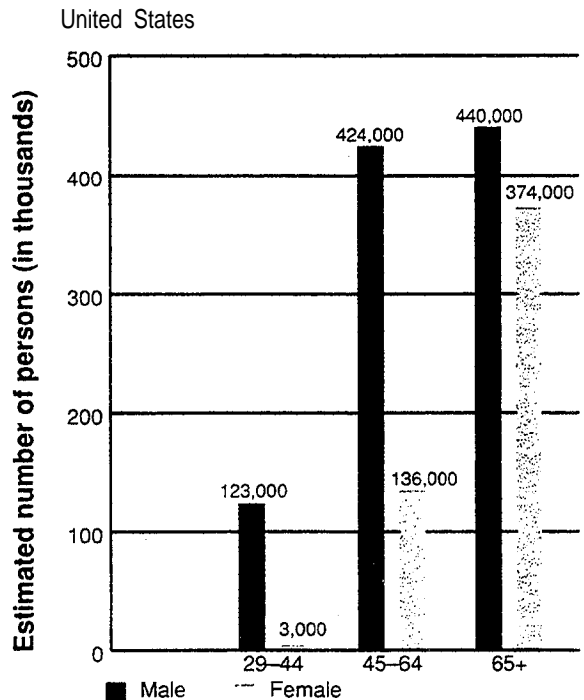
For both men and women, the older the person, the more likely he or she is to develop heart disease.

Women, however, develop cardiovascular disease about ten years later than men. Heart attack is almost unheard of in young women, and in the age group 45 to 54, six times as many men as women have heart attacks. This difference may contribute to the reluctance of researchers to include women in heart attack studies of middle-aged individuals; many more people would have to be studied to prove whether or not a particular treatment was effective in women. By about age 60, though, women begin to catch up to men. (See Table 19.1.)

For women, risk increases gradually in the five to ten years after the female hormone estrogen begins to dwindle, around age 50. Researchers believe that estrogen, which regulates menstruation, protects women against heart attack by increasing a substance in the blood called high-density lipoprotein (HDL), which prevents blockages in the arteries. HDL carries cholesterol away from the arteries and out of the body. Premenopausal women have much higher levels of HDL cholesterol than men the same age. (See Chapter 5.)

Through a chain reaction of body chemicals, estrogen also keeps blood vessels from constricting and reducing blood flow to the heart muscle. Such a reduction in blood flow may cause chest pain, shortness of breath, and heart attack. Findings suggest that prostaglandins, hormones secreted by the uterus in

Table 19.1  
Estimated Annual Number of Americans, by Age and Sex, Experiencing Heart Attack



Source: Based on the Framingham Heart Study, 26-year follow-up.

women of childbearing age, may also play a role in protecting women from heart disease. One of these substances helps to dilate blood vessels and prevents clotting.

When postmenopausal women take replacement estrogen, it seems to reduce their risk of heart attack by one-third to one-half. The majority of studies find that women who have never taken estrogen after menopause are at highest risk of heart attack; for women who have taken estrogen for the first ten years after menopause, the risk becomes moderate, and at lowest risk are women who have taken estrogen continuously since menopause. A Mayo Clinic research group estimates that giving estrogen to all women between the ages of 40 and 59 could reduce the number of women who experience heart attack by as much as 45 percent.

When menopause occurs naturally, the risk of a heart attack rises gradually; when it is caused by surgical removal of the ovaries (oophorectomy), heart attack risk rises more abruptly. One study showed that women who had an oophorectomy and had never taken replacement estrogen had about twice the risk of coronary heart disease as premenopausal women. After taking replacement estrogen, their risk returned to normal.

It is possible that estrogen will one day be a common preventive treatment for women at risk for heart attack, although doctors have to weigh this benefit against the possible increased risks of uterine and breast cancer associated with the use of this hormone. In addition, estrogen use among nonsmokers has been associated with an increased incidence of stroke. The results to date of several of these studies have been controversial; however, a very recent study, the Nurses' Health Study, suggests that the overall benefits of estrogen replacement therapy outweigh the risks. Yet, there is still a need for other well-controlled studies of progesterone (another female hormone) and/or estrogen therapy in postmenopausal women. (See box, "Pros and Cons of Estrogen Replacement Therapy.")

## ORAL CONTRACEPTIVES

Oral contraceptives (OCs) contain estrogens, but the high-dose birth control pills of the past appeared to increase a woman's risk of heart attack; this may be related to the type and dose of estrogen used. In some women, oral contraceptives increased low-density lipoprotein ("bad" cholesterol), decreased high-density lipoprotein ("good" cholesterol), raised blood pressure and blood sugar slightly, and possibly in-

## Pros and Cons of Estrogen Replacement Therapy

### Pros:

- Prevents thinning of bones (osteoporosis).
- Relieves distressing symptoms of menopause, particularly hot flashes and vaginal dryness.
- May protect against heart disease (addition of progesterone may negate this benefit).

### Cons:

- Increases risk of cancer of the lining of the uterus (endometrial cancer), except in women who have undergone a hysterectomy (addition of progesterone may decrease this risk).
- May accelerate growth of estrogen-dependent cancerous tumors; questionable effect on breast cancer.

### Who Should Not Take Estrogen:

- Anyone with known or suspected breast cancer; anyone with known or suspected estrogen-dependent cancerous tumor(s)
- Anyone who is or suspects being pregnant
- Anyone with a history of blood clots associated with prior use of estrogen (risk is smaller than when using oral contraceptives)
- Anyone with undiagnosed abnormal genital bleeding
- Anyone with a history of stroke or heart attack

### Possible Normal Side Effects (usually temporary):

- Breast tenderness
- Fluid retention
- Nausea
- Slight weight gain
- Vaginal bleeding

creased the ability of the blood to clot—especially in smokers. (See Chapter 6.)

Modern oral contraceptive formulations use lower doses and different forms of estrogen, and new studies hint that these oral contraceptives increase the risk of heart disease much less. In fact, some evidence indicates that lower doses of estrogen do not increase heart attack risk unless the woman smokes or has other risk factors. Similarly, a woman taking oral contraceptives is more likely to develop high blood pressure if she is overweight, has a family history of high blood pressure, or has mild kidney disease. (See Chapter 12.)

A woman on birth control pills should have her blood pressure checked about every six months, although her chances of developing high blood pressure as a result of using oral contraceptives are small. In a large study of oral contraceptive users, it was determined that although the average blood pressure rose somewhat (by 5 to 10 mm Hg), it remained within the normal range in the vast majority of women. In only a small percentage did it rise to levels of concern—above 140/90 mm Hg. Studies conflict as to whether the past use of a high-dose pill raises a woman's chance of cardiovascular disease.

Another reason that oral contraceptives may raise the risk of atherosclerotic heart disease is that they contain progestins, synthetic hormones that may raise LDL, lower HDL, and increase blood sugar. Some experts believe these changes are responsible for most of the risks.

## SMOKING

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Smoking is a major risk factor for heart disease in men, and it is probably the most significant risk factor in women, because it reduces a woman's two best protectors, estrogen and HDL. (See box, "Smoking as a Risk Factor for CHD in Women"; see also Chapter 6.) For every cigarette smoked, the risk of heart attack rises. Studies show that smoking one to four cigarettes a day doubles a woman's risk, and smoking more than 25 a day can raise it 5 to 15 times. Some researchers predict that if we ever have more women smokers than men smokers, heart attack will become a woman's disease—and that appears to be the direction in which our society is heading. Both men and women are quitting smoking, but women aren't quitting quite as fast as men. For the first time in the history of the Framingham Heart Study, more young women are smoking than young men. (The Framingham study is one of the few major epidemiologic studies examining coronary heart disease that has included women. It is a study of the entire community of Framingham, Massachusetts—several thousand people. The study began in 1939 and is still in progress.)

Fortunately, just as the risk of heart disease rises with every cigarette smoked, it falls with every cigarette left in the pack. As in men, the risk of heart attack is still higher in women who stopped smoking less than two years ago than in nonsmokers. By the time a woman has been an ex-smoker for two to three years, however, the increased chance of heart attack has dissipated. This is true even in women who have smoked for many years. Therefore, it is never too late

## Smoking as a Risk Factor for Coronary Heart Disease in Women

The Nurses' Health Study reported the following:

- The number of cigarettes smoked per day was positively associated with the risk of fatal coronary heart disease, nonfatal heart attack, and angina pectoris.
- Even smoking one to four cigarettes per day was associated with a doubling of the risk of fatal and nonfatal CHD, and smoking 5 to 14 per day tripled it.
- The absolute effect of smoking is substantially increased when added to other risk factors.

to stop. Insurance companies have recognized this fact and will give standard policies to ex-smokers.

For women, smoking heightens the dangers of other risk factors. In one study, heart attack rates were higher in estrogen users who smoked cigarettes than in those who did not. An elevated blood cholesterol level also seems to raise the risk in smokers; exactly how much is not known. If a woman who smokes is also using oral contraceptives, she is up to 40 times more likely to have a heart attack than a woman who does not use either. In smokers, oral contraceptives aggravate other risk factors such as high blood cholesterol and high blood pressure. This does not mean a woman smoker should necessarily stop using oral contraceptives. It makes more sense to quit smoking, because its risks are much higher.

## OBESITY

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It has been known for years that obesity and heart disease go hand in hand in men. An eight-year-long study from Brigham and Women's Hospital in Boston indicates that for women, being even mildly overweight can increase heart attack risk dramatically, perhaps more than in men. For example, a woman 5 feet 4½ inches tall who weighs 137 to 145 pounds increases her risk by 30 percent over a woman the same height who weighs less than 125 pounds. In women approximately 30 percent or more over ideal weight, 70 percent of all heart attacks could be traced to obesity. (Out of the 115,886 American women age 30 to 55 in the study group, there were 605 cases of some type of heart disease or heart attack, including 83 deaths.)

Researchers cannot explain exactly why obesity increases heart attack risk. A substantial portion of the risk is indirect—due to hypertension, diabetes, and other problems associated with obesity.

However, one subtlety that has been discerned is that a woman who follows the typical male weight gain pattern—heavy around the middle and shaped like an apple—has a higher risk of heart disease than a woman with a traditionally female pear shape. This is possibly because the sex hormones that influence blood fat levels also influence body fat distribution. It is believed that abdominal fat is more easily mobilized into cholesterol than fat from the hips or thighs. (A woman's waist measurement should be no more than 80 percent of her hip measurement.) Thus, "female-pattern" obesity may be a reflection of relatively higher female sex hormone levels, which, as noted earlier, may offer a degree of cardiovascular protection. Some of the risk associated with an "apple shape" may also be traced to cigarette smoking, which alters hormone levels and promotes male-pattern obesity.

#### CHOLESTEROL

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A high cholesterol level is a well-known risk factor for atherosclerotic heart disease. (See Chapter 4.) However, many studies have shown this relationship to be less distinct in women than in men. The reason for this is that the total cholesterol level is a combination of the HDL and LDL levels, and for any given total level, women are more likely to have a higher HDL ("good cholesterol) level than men. Many of these studies looked only at the total cholesterol level and not specifically at the amount of HDL cholesterol present.

#### TRIGLYCERIDES

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Triglyceride is the chemical form in which much of the body fat exists at some point in the cycle of fat metabolism. It is usually measured along with LDL and HDL cholesterol to give a "lipid profile." However, the relationship between high triglyceride levels and heart disease is less clear-cut than that between high cholesterol levels and atherosclerosis. The Framingham Heart Study found that high triglyceride levels are related to a higher risk of heart attack in women but not in men. The reason is uncertain; researchers know that someone who has high triglycerides in the blood may also have high LDL and lower HDL cholesterol. High triglyceride levels are most commonly noted in obese people and in persons with

diabetes—two conditions more common in women than in men, and having an association with atherosclerotic heart disease.

#### CORONARY ARTERY SPASM

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Factors relating to blood fats are usually the causes of atherosclerotic coronary artery disease; blockages are due to the buildup of fat deposits in the blood vessels. (See Chapter 11.) However, in the relatively few young women who have a heart attack or chest pains, other ailments such as coronary artery spasm, an abnormal contraction of the blood vessel that also causes reduced blood flow to the heart muscle, may be responsible for the damage.

#### DIABETES

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A higher percentage of women than men have diabetes. In both sexes, diabetes is a risk factor for heart disease because high blood sugar speeds up hardening of the arteries and, thus, the development of heart disease. However, researchers have noticed differences between male and female diabetics. Diabetic women have lower HDL levels than diabetic men, and diabetes increases the risk of a second heart attack in women, but not in men. Researchers are still investigating the reasons for this. In addition, diabetes increases the risk of kidney disease and disease of the blood vessels, which may complicate treatment of coronary artery disease.

#### STRESS

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As more and more women have entered the work force, researchers have wondered if the stress of working would harm their hearts. (See Chapter 8.) The Framingham study has shown that female clerical workers have a higher rate of heart attack than homemakers. The difference between these groups seems to be a psychological one: Clerical workers feel they have less control over their lives. This suggests that if women can work their way up the job ranks to managerial positions—which accord them more autonomy—they may maintain their lower heart disease rate. However, men under high pressure in these jobs may have a high heart attack rate. Unfortunately, upon reaching these jobs, women may also be more likely to eat high-calorie, high-cholesterol business dinners and perhaps to smoke, but they may be more likely to take advantage of company or insurance-covered physicals that will catch heart disease early.

## SPECIAL SITUATIONS

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Working women at all levels typically continue to have two jobs: their employment, and maintenance of a home and caring for children. Whether the stress related to these demands will have direct adverse effects is currently being investigated.

### RESPONSE TO TREATMENT

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Once a woman who is having a heart attack arrives at the hospital, she is slightly less likely to survive than a man. The differences are not great, however. About 1 percent fewer women than men survive balloon angioplasty, in which a small balloon is inflated inside the artery to crush a plaque; of those who do get through the procedure, more women than men have relogging of the arteries, subsequent angina, and other complications. (See Chapter 24.) Bypass surgery is also more risky for women—up to two times more dangerous. In addition, after leaving the hospital following a heart attack, a woman is more likely to die of a heart attack than is a man. (See Chapter 25.) Black women do worse than white women both in surviving to leave the hospital and in survival over the long term. (See Chapter 22.)

This higher mortality may have several causes. Women may be less likely to pursue symptoms themselves, and they may be less likely to be referred for evaluation of symptoms. Perhaps more important, when they do finally have heart problems or are referred for tests, they are likely to be older than men, to have more advanced heart disease—and to have other diseases as well. A Yale study showed that the women who had heart attacks were more likely to have diabetes and hypertension. In a group of bypass patients at one hospital, women were an average of 68 years old, men 62. As a result, a woman is more susceptible to complications of her heart attack or its treatment.

The statistical differences in heart attack survival between men and women may actually relate not so much to sex as to size. In one study, body surface area was the strongest predictor of operative risk for bypass surgery. Women survived surgery about as well as men who were the same size. Size may be a factor for the simple reason that it maybe harder to operate on a small artery than on a larger one.

Despite these facts, it is important to remember that overall, most women do well. According to the Minnesota Heart Survey, conducted in 1980, 92 percent of women with a heart attack survive hospitalization, 80 percent are still alive after one year, and 58 percent after four years.

## BODY SIZE AND HEART ATTACK

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Body size may also be a factor in why a heart attack occurs. One study found that a woman under 5 feet tall has a 50 percent greater chance of having a heart attack than a woman 5 feet 4 inches tall, although the total numbers in both groups of women were not great. Theories abound, the simplest being that a short woman's arteries clog more easily because they are small. Another is that shorter women may be more likely to carry their extra weight around the midriff, in the more risky "apple pattern." Finally, taller women have lower blood cholesterol than shorter women. This is not the case with men, and the reason for it is uncertain.

The idea that a small artery is likely to fill with plaque more quickly than a large one may also explain why more women than men (55 percent compared with 43 percent, in one study) complain of angina. It may explain, too, why each year thousands of women experience chest pain bad enough to lead them to coronary angiography, an X-ray of the heart and its vessels. (See Chapter 10.) However, one in five of these women is eventually told her arteries are perfectly normal and is referred to a gastroenterologist or psychiatrist, because some chest pain does relate to stomach acid, panic attacks, or anxiety. But researchers at the National Heart, Lung, and Blood Institute believe that in some women, vessels too small to be seen on a standard angiogram may be constricting or narrowing, causing their chest pain.

Most women with such microvascular (small-vessel) angina respond well to nitrates, medicines that dilate the blood vessels, and to calcium channel blockers, which prevent vascular spasm. (See Chapter 23.) These factors and the misconception that coronary artery disease is rare in women may also explain why women with chest pain and heart disease come to medical attention later than men.

### PREVENTION

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Stopping a heart attack before it ever starts is, of course, the treatment of choice. There are some measures that one can take before seeking medical help. (See box, "Self-Help in promoting Heart Health.") The American Heart Association suggests that even men and women with no symptoms of heart disease should also have a resting electrocardiogram (ECG) done at ages 20, 40, and 60. In this painless test, technicians attach electrodes to the skin of the chest and limbs to monitor the heart's electrical characteristics. (See Chapter 10.)

## Self-Help in Promoting Heart Health

- Quit smoking, and sit in no-smoking sections in public places.
- Exercise regularly.
- Maintain ideal weight.
- Cut the amount and kinds of fat and cholesterol in the diet.
- Have blood cholesterol checked at least once every five years.  
(Below 200 mg/dl is desirable, 200 to 239 mg/dl is borderline-high, and 240 mg/dl or higher is too high.)\*
- Monitor and control blood pressure.
- Take active steps to gain a sense of control in life.

\*May not be significant if HDL levels are high.

Some physicians suggest that people who work in physically stressful jobs or have two or more major risk factors for heart disease should have an exercise electrocardiogram, given while running on a treadmill or exercising on a bicycle. This is called a stress test because it measures the heart's performance under the stress of exercise. Others, however, believe that this is not necessary other than in specific instances where unusual pain may be present or some other heart problem seems to exist.

During such a test, a young woman is far more likely to have a false positive result—a false indication of trouble—than a man is. Because there is a lower prevalence of the disease in women, any positive result has a greater chance of being false. Additionally, women's breasts sometimes make it more difficult to position the monitoring leads correctly. For a young, healthy woman with no family history of heart disease, the cost of an exercise ECG combined with the potentially confusing and anxiety-producing results may outweigh the benefit. A woman with symptoms or major risk factors should, however, have routine ECGs and a stress test. She may get more accurate results from a stress test combined with the use of a small amount of a radioactive material called thallium, or an echocardiogram, a sound-wave test of the heart. Such stress tests give more specific information about blood flow to various segments of the heart muscle,

The "gold standard" to determine the presence of coronary artery disease is angiography, a test in

which dye is injected into the coronary arteries. The arteries' contours are then viewed via X-ray. Most patients, even some of those with chest pain, do not have to submit to all of these tests. (See Chapter 10.)

Studies on men have led experts to recommend that men at risk for heart attack or patients who have had a previous heart attack take aspirin every day to make a blood clot less likely. More recent studies examining aspirin's benefits in women have confirmed that the use of a baby aspirin or ½ a regular aspirin daily by women over age 50 is beneficial.

In women under age 50 with a strong family history of heart attacks at an early age, obesity, a smoking habit, or some other risk factor such as diabetes, it probably is a good idea to take one baby aspirin or one-half of a regular aspirin each day. This should not be done if blood pressure is high and uncontrolled or there is a history of stomach problems such as ulcers. The aspirin usually does no harm and may help prevent a heart attack, but each patient should check with her physician.

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## MITRAL VALVE PROLAPSE

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Mitral valve prolapse (MVP) occurs when the valve between the left atrium (the upper heart chamber on the left side) and the left ventricle (the lower heart chamber on that side) contains excess tissue, buckles backward, and may fail to close properly. People with mitral valve prolapse usually show distinctive signs that a doctor will discover when listening to the heart. They have single or multiple clicks that change characteristically with body position (while squatting, sitting, or standing, for example) and maybe associated with a heart murmur. The diagnosis can be confirmed by a simple sound-wave test—an ultrasound or echocardiogram.

This condition is more common in women than men by a ratio of at least two to one, but it is also more common in people with low body weight. So the increased prevalence in women maybe explained by the fact that they tend to be smaller than men. A younger woman is more likely than an older woman to have mitral valve prolapse. Among the women in the Framingham Heart Study, 17 percent of women 20 to 29 years old had mitral valve prolapse compared to only 1.4 percent of women over 80. This may be because, as the ventricle dilates because of heart disease in old age, the excess tissue of the valve and, thus, the prolapse becomes relatively less apparent.

In addition to sex and size, heredity seems to be a factor in some cases of mitral valve prolapse. This leads one to believe that race may also be an indication, but no good studies have yet examined this issue. Scoliosis, “straight back,” and other skeletal abnormalities and connective tissue diseases are also often linked with mitral valve prolapse. This is because in some patients with connective tissue disease, a weakness of the tissues may lead to stretching of the valve or disruption of the supporting tissues.

The majority of people with mitral valve prolapse have no symptoms and remain unaware of the condition, but other people report sticking chest pains, palpitations, awareness of irregular heartbeats, and panic attacks. The overall prognosis of mitral valve prolapse is excellent, and it is rarely fatal. However, mitral valve prolapse infrequently results in severe leakage of the valve and enlargement of the heart muscle (see Chapter 15), which requires valve replacement and, rarely, may cause a stroke. (Small blood clots that come from the abnormal valve may travel to the brain.)

Finally, endocarditis, an infection of the heart's inner lining or valves, occurs more often in people with mitral valve prolapse because infections can start more easily on a damaged valve. To reduce the risk of this complication, the mitral valve prolapse patient may need antibiotics before dental or surgical procedures or childbirth, especially if the valve is leaky.

Too often the patient with the “click syndrome” (MVP) is frightened by a physician and is led to believe that she has heart disease. It is important to emphasize that this finding occurs in normal healthy women who usually live long lives with no restrictions. If symptoms of palpitations or sticking chest pains are annoying, the use of small doses of beta blockers may alleviate them. (See Chapter 23.)

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## THE HEART AND PREGNANCY

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Pregnancy normally brings about major changes in the circulatory system. Largely as a result of the hormones produced during pregnancy, blood volume increases by as much as 40 percent. This requires increased work by the heart. In the normal woman, the heart has enough reserve to accommodate this increased burden easily, but the heart of someone with underlying heart disease may not have sufficient reserve.

Mechanical factors are also important. When a pregnant woman lies on her back, her enlarged uterus can prevent return of blood from the legs—by compressing the vena cava—and thus reduce blood flow to the heart and the aorta, the major vessel that carries blood to the brain, abdomen, legs, and the rest of the body. This may cause light-headedness. The pressure is relieved when the woman lies on her side rather than on her back. In addition, as the baby grows, it needs more and more oxygen and nutrients, and the mother's heart works harder to meet this demand until about ten weeks before delivery, when the demand diminishes a little. Before labor and delivery, the demand increases again.

During labor, heart rate rises with each uterine contraction and falls when the contraction subsides. In labor as in pregnancy, a woman can reduce the demand placed on her heart by lying on her side rather than on her back. As part of the increased demand is due to pain, anesthesia at the time of delivery can help as well. Local anesthetics such as the commonly used spinal anesthesia tend to reduce demand on the heart. With delivery and reduction of the large mass of the pregnant uterus, there is a sudden infusion of blood volume into the circulation, which may stress a weakened heart. This maybe balanced by peripheral blood loss. It may take more than a week for the circulation to return completely to normal.

For a healthy woman, pregnancy and giving birth are of no more consequence to the heart than a bout of mild exercise. For a woman who has heart disease, however, they may be more of a challenge, and she should consult with her obstetrician and cardiologist before becoming pregnant. These experts can help her assess whether pregnancy is a good idea, because changes in pregnancy may be more dangerous in some conditions than in others. Today, most women who have heart problems can, with appropriate medical supervision, have safe pregnancies and healthy children.

Women with hypertension will have little trouble with pregnancy unless their blood pressure is very high—above 160/100—or if they have kidney trouble as well. Many physicians ask their hypertensive patients to monitor their own blood pressure at home. Blood pressure medication to be taken during pregnancy and before delivery will be carefully chosen. A woman with very high blood pressure may have to be hospitalized for a period during her pregnancy and will certainly receive antihypertensive and perhaps diuretic medication. A hypertensive woman

## Common Heart Drugs: How Safe for the Pregnant Woman?

The list that follows represents the best information available at this time. Drugs that are considered safe may still produce some side effects. In all cases, the risks of medication must be weighed against the benefits, and all medications should be checked with your physician.

Ethacrynic acid (Edecrin)	Probably safe
Furosemide (Lasix)	Probably safe
Hydrochlorothiazide (Esidrix, Hydro-diuril, Oretic)	If used before pregnancy, may be continued
Metolazone (Zaroxolyn)	If used before pregnancy, may be continued

### Anticoagulants (drugs to prevent clotting):

Acetylsalicylic acid (aspirin)	Not safe
Dipyridamole (Persantine)	Not safe
Heparin (Panheprin, Calciparine, Lipoheprin, Liquaemin)	Considered safe but must be adjusted near term
Warfarin (Coumadin)	Not safe

### Nitrates (for angina):

Isosorbide dinitrate, sublingual and oral tablets (Isordil, Sorbitrate)	Probably safe
Nitroglycerin ointment (Nitro-Bid Paste, Nitrol)	Probably safe
Nitroglycerin patches (Transderm-Nitro, Nitro-Dur, Nitro-Disc)	Probably safe
Nitroglycerin sublingual tablets (Nitrostat)	Probably safe

### Antihypertensives:

Atenolol (Tenormin)	Considered safe
Captopril (Capoten)	Not safe
Clonidine (Catapres)	Limited experience
Diazoxide (Hyperstat)	Limited experience
Diltiazem (Cardizem)	Relatively safe
Enalapril (Vasotec)	Not safe
Hydralazine (Apresoline)	Considered safe
Labetalol (Normodyne, Trandate)	Probably safe
Magnesium sulfate	Considered safe
Methyldopa (Aldomet)	Considered safe
Metoprolol (Lopressor)	Considered safe
Nadolol (Corgard)	Probably safe
Nifedipine (Procardia)	Relatively safe
Pindolol (Visken)	Probably safe
Prazosin (Minipress)	Limited experience
Propranolol (Inderal)	Considered safe
Spironolactone (Aldactone)	Limited experience
Timolol (Blocadren)	Probably safe
Verapamil (Isoptin, Calan)	Probably safe

### Cholesterol- and triglyceride-lowering drugs:

Cholestyramine (Questran)	Considered safe
Colestipol (Colestid)	Considered safe
Gemfibrozil (Lopid)	Limited experience
Lovastatin (Mevacor)	Not safe
Nicotinic acid (also known as niacin)	Limited experience

### Antiarrhythmic drugs<sup>1</sup>:

Amiodarone (Cordarone)	Limited experience
Digoxin (Lanoxin)	Considered safe
Disopyramide (Norpac)	Probably safe
Flecainide (Tambocor)	Limited experience
Mexiletine (Mexitil)	Limited experience
Phenytoin (Dilantin)	Not safe
Procainamide (Pronestyl, Procan SR)	Considered safe
Propranolol (Inderal and others)	Considered safe
Quinidine (Quinaglute)	Considered safe
Tocainide (Tonocard)	Limited experience
Xylocaine (Lidocaine)	Considered safe

### Diuretics:

Chlorthalidone (Hygroton)	If used before pregnancy, may be continued
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<sup>1</sup>If used before pregnancy, may need to be continued. Most are not prescribed frequently in young women.

## SPECIAL SITUATIONS

should never stop taking medication before consulting with her physician. (See Chapters 12 and 23.)

A cardiologist will also help a mother-to-be with heart disease decide whether she will need extra medication, should stay at the same dosage, or should decrease her current medication or stop it altogether. A woman with heart trouble may need to go on a regimen of new medication—for example, digitalis products, heart-strengthening medication, or diuretics. For some women with heart conditions, it may be better to go off a medication such as the blood thinner warfarin (Coumadin), as some medications are not recommended during pregnancy. Any woman taking heart medications should speak with her physician if possible prior to becoming pregnant. (See box, “Common Heart Drugs: How Safe for the Pregnant Woman?”) In every case, doctors must weigh any negative effects of taking a medication against the concept that a healthy, stable mother will produce a healthier baby. Unfortunately, because most women do not need heart medications during pregnancy, experience with any given medication may be limited.

Many drugs are excreted in breast milk, and, as in pregnancy, it may be better to avoid drug therapy while nursing if possible. If it is not possible to discontinue medication, a woman should use the safest drug—for example, acetaminophen rather than aspirin, which can cause metabolic changes or a rash in the baby and can affect blood clotting in both mother and baby.

The cardiovascular changes and work of labor will be lessened if the baby is delivered by cesarean section before labor begins, but this must be weighed against the risks of surgery and the maturity of the baby. If labor has already begun, spinal and epidural anesthesia should stabilize heart output and blood pressure. Pregnant women with heart disease should be followed and, if possible, managed at centers with “high-risk pregnancy” programs in which obstetricians, obstetric anesthesiologists, cardiologists, and neonatologists can work together to achieve the best possible outcome for both mother and child.

## PREGNANCY-INDUCED HEART DISEASE

Pregnancy can trigger a number of heart-related conditions. The normal circulatory and hormonal changes of pregnancy may cause women to become hypertensive for the first time, especially in the last three months. The hypertension usually disappears after delivery. When it does not, women should be sure to keep their blood pressure under control with medication, if necessary. At this time, a physician may also decide to look for secondary causes of the hypertension such as kidney disease.

When blood pressure rises during the last three months of pregnancy and is accompanied by swelling of the legs or the presence of protein in the urine, the condition is called toxemia *of pregnancy*. (See Chapter 12.) It is usually divided into two phases, *preeclampsia* and *eclampsia*. If the process is not controlled, eclampsia, or seizures, may result. Fortunately, this is extremely rare. Obstetricians routinely take blood pressure at every prenatal appointment and aggressively treat high readings.

It should be noted that because of dilated blood vessels in pregnancy, the blood pressure is lower during the first three months—about 100-110/65-80 mm Hg. If it rises above 130/85 in the second or third part of the pregnancy, this may actually represent a higher than normal pressure.

A condition that can result from childbirth is bacterial endocarditis. This is rare. It can occur in women with heart valve defects such as mitral valve disease (from rheumatic fever or mitral valve prolapse) and gets started when bacteria enter the bloodstream through bleeding sites that may occur during delivery. To prevent bacterial endocarditis, cardiologists often prescribe antibiotics at the time of delivery.

Another condition that can crop up near the time of delivery or soon after is *perinatal cardiomyopathy*—that is, heart muscle disease occurring around the time of birth. This abnormality of heart muscle function is also rare, and its cause is poorly understood. (See Chapter 15.) It may result in congestive heart failure and the buildup of fluid in the body.