



## Polycystic Ovary Syndrome

**P**olycystic ovary syndrome (PCOS) is a disorder that affects as many as 7 in 100 women. PCOS has three key features: 1) high levels of **hormones** called **androgens**; 2) irregular **menstrual periods** or lack of periods; and (3) the presence of many fluid-filled sacs in the **ovaries**. Many women with PCOS have other signs and symptoms as well.

The cause of PCOS is not known, but it may be at least partly genetic (passed down through a person's **genes**). With proper diagnosis, the symptoms of PCOS can be treated successfully. Long-term treatment may be needed to prevent the health risks associated with the disease.

This pamphlet explains

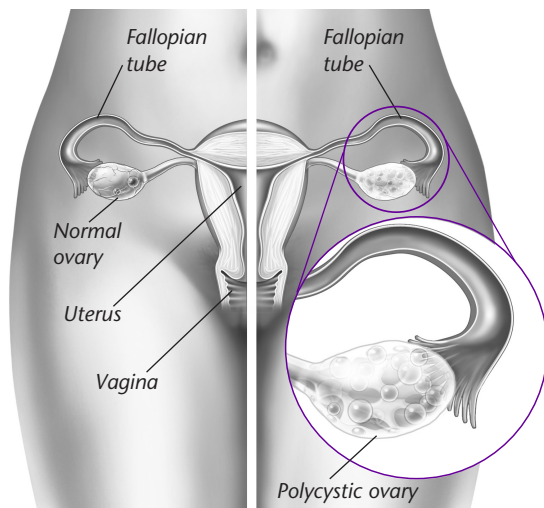
- signs and symptoms
- what causes PCOS
- health risks associated with PCOS
- diagnosis and treatment

### Signs and Symptoms

PCOS has many different signs and symptoms. Some women may not be aware that seemingly unrelated symptoms are actually those of PCOS. Common PCOS signs and symptoms include the following:

- Irregular menstrual periods—Menstrual disorders can include absent periods, periods that occur infrequently or too frequently, heavy periods, or unpredictable periods.
- **Infertility**—PCOS is one of the most common causes of female infertility.
- **Obesity**—As many as 4 in 5 women with PCOS are obese.
- Excess hair growth on the face, chest, abdomen, or upper thighs—This condition, called **hirsutism**, affects more than 7 in 10 women with PCOS.
- Severe acne or acne that occurs after adolescence and does not respond to usual treatments
- Oily skin
- Patches of thickened, velvety, darkened skin called **acanthosis nigricans**
- Multiple fluid-filled sacs in the ovaries

## How PCOS Affects the Female Reproductive System



Unlike women with normal ovaries (left), women with PCOS may have enlarged ovaries that contain many fluid-filled sacs (right).

Not all women with PCOS have all of these symptoms. Often women find out they have PCOS when they see a health care professional because of irregular menstrual periods or difficulty becoming pregnant.

### What Causes PCOS?

Although the cause of PCOS is not known, it appears that PCOS may be related to many different factors working together. These factors include **insulin** resistance, increased androgen levels, and an irregular menstrual cycle.

#### Insulin Resistance

Insulin resistance plays a key role in PCOS. Insulin is a hormone that helps move **glucose** from the bloodstream into the body's **cells** for the energy the body needs. If the body's cells do not respond to the effects of insulin, the level of glucose in the blood increases. Higher than normal blood glucose levels may eventually lead to **diabetes mellitus**, a health condition that can cause serious complications if it is not managed. Insulin resistance also may cause more insulin to be produced as the body tries to move glucose into cells. High insulin levels may cause the appetite to increase and lead to imbalances in other hormones. Insulin resistance also is associated with acanthosis nigricans.

#### High Androgen Levels

High levels of androgens are a hallmark of PCOS. Androgens are hormones made by the ovaries and adrenal glands (small glands that rest on top of the **kidneys**). All women produce a certain amount of these hormones. When higher than normal levels of androgens are produced, it can prevent the ovaries

from releasing an egg each month (a process called **ovulation**). High androgen levels also cause the unwanted hair growth and acne seen in many women with PCOS.

#### Irregular Menstrual Periods

Women with PCOS often have irregular menstrual periods. Some have infertility. These problems are caused by lack of regular ovulation. Women with PCOS may have more **follicles** in their ovaries than women without PCOS. Follicles are the fluid-filled sacs that enclose the eggs. These follicles give the appearance of multiple **cysts** in the ovaries, which may be how PCOS got its name.

#### Other Health Risks

PCOS affects all areas of the body, not just the reproductive system. It increases a woman's risk of serious conditions that may have lifelong consequences.

Insulin resistance increases the risk of type 2 diabetes mellitus and **cardiovascular disease**. Obesity, which often occurs with insulin resistance, also is associated with type 2 diabetes and heart disease. Another condition that is associated with PCOS is **metabolic syndrome** (see box). This syndrome contributes to both diabetes and heart disease.

Some women with PCOS develop a condition called **endometrial hyperplasia**, in which the lining of the uterus (the **endometrium**) becomes too thick. This condition increases the risk of **endometrial cancer**.

Women with PCOS also may be at higher risk of sleep disorders, such as **sleep apnea**. The risk of **depression** also is higher with PCOS.

#### Diagnosing PCOS

There is no one accepted definition of PCOS. PCOS is diagnosed when a woman has two of the three key features of PCOS:

1. Increased levels of androgens, either by measuring the levels of androgens in the blood or by noting the presence of unwanted hair growth

#### Metabolic Syndrome

Metabolic syndrome is a combination of factors that increases a person's risk of diabetes and cardiovascular disease. About 3 in 10 women with PCOS also have metabolic syndrome. Metabolic syndrome is diagnosed when a person has at least three of the following signs:

- Elevated blood pressure
- Waist measurement of 35 inches or more
- Higher than normal blood glucose level
- Lower than normal levels of "good" **cholesterol**
- High levels of fats in the blood (triglycerides)

2. Lack of menstrual periods or irregular menstruation
3. Ovaries with many fluid-filled sacs

If your health care professional thinks that you have PCOS, other conditions that might cause any of the three features first must be ruled out. The diagnosis is based on your medical history, a physical exam, and results of lab tests. The medical history will include information about your menstrual cycle and history of infertility. During the physical exam, your health care professional will look for patterns of excess hair growth, acne, or other signs of high androgen levels. A test may be done to check the level of androgens in your blood. An **ultrasound exam** may be done to look at your ovaries.

Because of the possibility of insulin resistance, the level of glucose in your blood may be measured to screen for diabetes. Your risk of cardiovascular disease may be assessed with a blood test to check cholesterol levels and measurements of your blood pressure, weight, waist, and hips.

## Treatment

Several treatments are available to address the problems of PCOS. Treatment is tailored to each woman according to symptoms, other health problems, and whether she wants to become pregnant.

### Treating Menstrual Problems

Combined hormonal birth control pills can be used for long-term treatment in women with PCOS who do not wish to become pregnant. Combined hormonal pills contain both **estrogen** and **progestin**. Birth control pills may help relieve several PCOS symptoms. They regulate the menstrual cycle and reduce hirsutism and acne by decreasing androgen levels. No specific type of combined hormonal birth control pill has been shown to be more effective than others in treating PCOS symptoms.

For women who are overweight, weight loss alone may regulate the menstrual cycle. Even a small loss of weight may be helpful in making menstrual periods more regular. Weight loss also has been found to improve cholesterol and insulin levels and relieve symptoms such as excess hair growth and acne.

Insulin-sensitizing drugs used to treat diabetes frequently are used in the treatment of PCOS. These drugs help the body respond to insulin. In women with PCOS, they are associated with a decrease in androgen levels and improved ovulation. Restoring ovulation may help make menstrual periods regular and more predictable.

### Getting Pregnant

Successful ovulation is the first step toward pregnancy. For women who are overweight, weight loss may accomplish this goal. Medications also may be used to cause ovulation. The medications used may increase the chance of **multiple pregnancy**. Multiple pregnancy can lead to pregnancy problems, including

an increased risk of **preterm** birth and high blood pressure during pregnancy.

Surgery on the ovaries has been used when other treatments do not work. However, the long-term effects of these procedures are not clear.

### Prevention of Diabetes and Cardiovascular Disease

Losing weight through a reduced-calorie diet combined with regular exercise is the best way to reduce the risk of diabetes in women with PCOS. Regular exercise and maintaining a healthy weight can help prevent heart disease as well.

**Statins** are drugs that lower cholesterol. An increasing amount of research shows that statins have good effects on cardiovascular health in women with PCOS. Metformin may be used in addition to lifestyle changes to improve the body's response to insulin and stabilize glucose levels.

### Treating Hirsutism and Skin Problems

For many women, hirsutism is one of the most disturbing symptoms of PCOS. There are many ways to manage this condition. A combination of treatments often works best.

Birth control pills may prevent growth of excess hair. If they do not, antiandrogen drugs may be added. These drugs prevent the body from making androgens or limit the effects of androgens. Women who may become pregnant should not take antiandrogens because they can cause birth defects.

A drawback of these medications is that they may take several months to work. While waiting for these drugs to take effect, many women with PCOS use shaving, plucking, waxing, and depilatory creams for hair removal. Laser treatment and electrolysis are noninvasive surgical methods for removing hair that can be effective. Repeat treatment might be necessary.

Retinoids (drugs that are related to vitamin A), antibacterial medications, and antibiotics are used to treat acne. Women who may become pregnant should not use retinoids because they can cause birth defects.

## Finally...

With proper treatment, PCOS can be managed, and you can expect relief from symptoms. Long-term preventive health care is important for a healthy future. Your health care professional can offer you many options, but a healthy diet and regular physical activity are lifestyle choices you can make for yourself that can play a large role in reducing the symptoms of PCOS.

## Glossary

**Acanthosis Nigricans:** Patches of skin that are thicker, darker, and like velvet. This condition is associated with diabetes or prediabetes.

**Androgens:** Hormones made by the body that cause male characteristics, such as a beard and deepening voice.

**Cardiovascular Disease:** Disease of the heart and blood vessels.

**Cells:** The smallest units of a structure in the body. Cells are the building blocks for all parts of the body.

**Cholesterol:** A natural substance that is a building block for cells and hormones. This substance helps carry fat through the blood vessels for use or storage in other parts of the body.

**Cysts:** A sac or pouch filled with fluid.

**Depression:** Feelings of sadness for periods of at least 2 weeks.

**Diabetes Mellitus:** A condition in which the levels of sugar in the blood are too high.

**Endometrial Cancer:** Cancer of the lining of the uterus.

**Endometrial Hyperplasia:** A condition in which the lining of the uterus grows too thick.

**Endometrium:** The lining of the uterus.

**Estrogen:** A female hormone produced in the ovaries.

**Follicles:** The sac-like structures in which an egg develops inside the ovary.

**Genes:** Segments of DNA that contain instructions for the development of a person's physical traits and control of the processes in the body. The gene is the basic unit of heredity and can be passed from parent to child.

**Glucose:** A sugar in the blood that is the body's main source of fuel.

**Hirsutism:** Excessive hair on the face, abdomen, and chest.

**Hormones:** Substances made in the body that control the function of cells or organs.

**Infertility:** The inability to get pregnant after 1 year of having regular sexual intercourse without the use of birth control.

**Insulin:** A hormone that lowers the levels of glucose (sugar) in the blood.

**Kidneys:** Organs that filter the blood to remove waste that becomes urine.

**Menstrual Periods:** The monthly shedding of blood and tissue from the uterus.

**Metabolic Syndrome:** A combination of problems that can lead to diabetes and heart disease. These problems include high blood pressure, waist size of 35 inches or more (in women), higher-than-normal blood sugar level, lower-than-normal levels of "good" cholesterol, and high levels of fats in the blood (triglycerides).

**Multiple Pregnancy:** A pregnancy where there are two or more fetuses.

**Obesity:** A condition characterized by excessive body fat.

**Ovaries:** The organs in women that contain the eggs necessary to get pregnant and make important hormones, such as estrogen, progesterone, and testosterone.

**Ovulation:** The time when an ovary releases an egg.

**Preterm:** Less than 37 weeks of pregnancy.

**Progestin:** A synthetic form of progesterone that is similar to the hormone made naturally by the body.

**Sleep Apnea:** A disorder that causes interruptions of breathing during sleep.

**Statins:** Drugs used to treat high cholesterol levels.

**Ultrasound Exam:** A test in which sound waves are used to examine inner parts of the body. During pregnancy, ultrasound can be used to check the fetus.

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