



Polycystic Ovary Syndrome

Polycystic ovary syndrome (PCOS) is a disorder that affects as many as 5–10% of 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

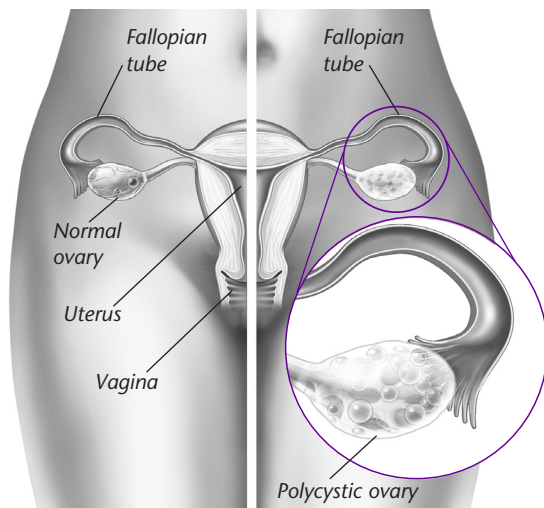
- signs and symptoms
- what causes PCOS
- health risks associated with PCOS
- diagnosis and treatment

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—Up to 80% of women with PCOS are obese.
- Excess hair growth on the face, chest, abdomen, or upper thighs—This condition, called **hirsutism**, affects more than 70% of 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.

Women with PCOS tend to have 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.

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

Metabolic Syndrome

Metabolic syndrome is a combination of factors that increases a person's risk of diabetes and cardiovascular disease. About 30% of 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)

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 overweight women, weight loss alone often regulates the menstrual cycle. Even a loss of 10 to 15 pounds can 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 helps make menstrual periods regular and more predictable.

Getting Pregnant

Successful ovulation is the first step toward pregnancy. For overweight women, weight loss often accomplishes this goal. Medications also may be used to cause ovulation. Clomiphene citrate is the most common drug used for this purpose. Adding a drug called metformin, an insulin-sensitizing drug, to clomiphene citrate may increase the likelihood of pregnancy, especially in women who are obese. When treatment with clomiphene does not work, drugs called

gonadotropins may be tried. Both gonadotropins and clomiphene 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 thickened, velvety, darkened skin; associated with insulin resistance.

Androgens: Steroid hormones, produced by the adrenal gland or by the ovaries, that promote 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; the building blocks for all parts of the body.

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

Cysts: Sacs or pouches filled with fluid.

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

Endometrial Hyperplasia: A condition in which the lining of the uterus grows too thick. A specific type of endometrial hyperplasia may lead to cancer.

Endometrium: The lining of the uterus.

Estrogen: A female hormone produced in the ovaries.

Follicle: The sac-like structure in which an egg develops inside the ovary.

Gene: A segment of DNA that contains instructions for the development of a person's physical traits and control of the processes in the body. It is the basic unit of heredity and can be passed down from parent to child.

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

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

Hormones: Substances made in the body by cells or organs that control the function of cells or organs. An example is estrogen, which controls the function of female reproductive organs.

Infertility: A condition in which a couple has been unable to get pregnant after 12 months without the use of any form of birth control.

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

Kidneys: Two organs that cleanse the blood, removing liquid wastes.

Metabolic Syndrome: A combination of factors, including elevated blood pressure, waist circumference of 35 inches or greater (in women), higher-than-normal blood glucose level, lower-than-normal levels of "good" cholesterol, and high levels of fats in the blood (triglycerides), that contribute to diabetes and heart disease.

Multiple Pregnancy: A pregnancy in which there are two or more fetuses.

Ovaries: The paired organs in the female reproductive system that contain the eggs released at ovulation and produce hormones.

Ovulation: The release of an egg from one of the ovaries.

Preterm: Born before 37 completed weeks of pregnancy.

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

Statins: Drugs used to treat high cholesterol levels.

Ultrasound Exam: A test in which sound waves are used to examine internal structures. During pregnancy, it can be used to examine the fetus.

This Patient Education Pamphlet was developed by the American College of Obstetricians and Gynecologists. Designed as an aid to patients, it sets forth current information and opinions on subjects related to women's health. The average readability level of the series, based on the Fry formula, is grade 6-8. The Suitability Assessment of Materials (SAM) instrument rates the pamphlets as "superior." To ensure the information is current and accurate, the pamphlets are reviewed every 18 months. The information in this pamphlet does not dictate an exclusive course of treatment or procedure to be followed and should not be construed as excluding other acceptable methods of practice. Variations, taking into account the needs of the individual patient, resources, and limitations unique to the institution or type of practice, may be appropriate.

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