

Georgia Hormones P.C.

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P.C.O.S.

Definition: A syndrome is a group of signs and symptoms often seen together. This is as opposed to a disease, which has a single specific cause. Poly Cystic Ovary Syndrome is the most common reason for irregular periods in reproductive age women. It is often associated with infertility, hormone imbalance, irregular or skipped periods, heavy bleeding, glucose and insulin imbalance, metabolic syndrome, excess weight, excess body hair, male pattern baldness, high levels of male hormones, acne, and, of course, ovarian cysts.

What is the cause: There are several starting points, several different problems, which can lead to PCOS. Not every woman has all the symptoms and the individual's issues often depend on her own personal starting point. We will look at several different ways a woman can develop PCOS and how she can best deal with her own individual issues.

How the menstrual cycle works: Situated at the base of the brain above the eyes, the **Hypothalamus and Pituitary Gland** (the master gland) direct the ovaries and their hormone output. The pituitary sends two signaling hormones to the ovaries. Follicle Stimulating Hormone, **FSH**, directs **Oocytes** (egg cells) to grow. FSH also tells the **Granulosa Cells** in the ovaries to make **Estrogen**. Luteinizing Hormone, **LH**, directs the **Theca Cells** in the ovaries to make two male hormones (Androgens) called **Androstenedione and Testosterone**. The Granulosa Cells take those androgens and turn them into Estrogen. At the start of the cycle, after the beginning of menstrual bleeding, **FSH is usually higher than LH. Virtually all the androgens made by the Theca cells are turned by the Granulosa cells into Estrogen.** Only a small amount of Testosterone is released into the blood. When the egg is fully ripe and ready to be released, the Pituitary Gland sends out a huge surge of LH and FSH lasting a few hours. This signals the launch of the egg and also signals the Granulosa cells to make **Progesterone** in addition to estrogen. **Progesterone is only released into the blood if an egg has been successfully produced.**

Estrogen, Testosterone and Progesterone have effects all over the body:

Estrogen stimulates the growth of tissue inside the uterus, stimulates breast growth, encourages salt and water retention, improves verbal thinking, stimulates the brain, encourages desire to eat carbohydrates and the deposit of abdominal fat, raises good cholesterol, lowers bad cholesterol, and reduces bone loss. **Estrogen raises LH. Progesterone** matures the tissue in the uterus, matures breast tissue, removes excess water and salt, calms the brain, reduces desire to eat carbohydrates and gain weight, is neutral on cholesterol and stimulates bone strength. **Progesterone lowers LH.**

Testosterone stimulates muscle growth, male pattern body hair, male pattern hair loss on the head, acne, and stimulates bone strength. **Testosterone blocks the full maturation of eggs, preventing ovulation.**

High LH Type PCOS: In some women, pituitary output is unusual. LH levels are higher than FSH. (Some researchers think this may be due to exposure to higher than usual maternal Testosterone levels while a female baby is still a fetus.) This causes over stimulation of the Theca cells inside the ovary and excess output of Androgens. With **excess Androgen** inside the ovary, the Granulosa cells can turn a lot of it into Estrogen and cause **excess Estrogen**. The extra Androgens inside the ovary can prevent the full maturation of egg cells. The eggs grow to a certain point but don't launch or disappear either. These partially enlarged eggs build up and

form a row of small cysts. This is where the name **Poly Cystic Ovary Syndrome** comes from. Few or no mature eggs are produced, so pregnancy is rare. This causes **Infertility**. With no egg launched, no Progesterone is produced and the lining of the uterus just builds and builds. There is no Progesterone to prevent the lining from being over stimulated by this **Unopposed Estrogen**. The excessively thickened lining bleeds irregularly. **There is no Progesterone to bring the high LH levels back down**. In some women, excess Testosterone leaks out of the ovary into the blood. This can cause male type effects of **Acne, Excess Body and Facial Hair, and Male Pattern Baldness**.

Insulin Resistance Type PCOS: Insulin is a hormone produced by the Pancreas and used by the body to control levels of **Glucose** (sugar) in the blood. It forces glucose into fat and muscle cells. Some women are **resistant to the effects of Insulin**. This causes their Insulin levels to be unusually high and results in sugar being turned into fat, especially in the abdomen. **Abdominal fat can turn Testosterone into Estrogen**. In addition, **insulin stimulates the ovary to make extra Estrogen**. Extra estrogen stimulates the desire to eat more sugar and starch, which causes a rise in Glucose. This stimulates even more Insulin production. The **extra Estrogen over stimulates LH production**; causing extra Androgens to be made by the Theca cells, inhibiting ovulation and so no Progesterone is made. **Over the years these women become more obese, have excess body and facial hair, irregular periods, excess Unopposed Estrogen, can't get pregnant because they don't or rarely produce eggs, and are at risk of getting Diabetes. There is no Progesterone to bring high LH levels back down.**

Combined States: If, for any reason, a woman fails to ovulate (make an egg) for long enough, the absence of Progesterone will cause a rise in LH and progress toward PCOS. This leads to Estrogen excess and weight gain, which can cause insulin resistance. Thus, high LH type PCOS can turn into Insulin Resistance type. From the other side, chronic Insulin Resistance causes high estrogen levels leading to excess LH. **The two starting points tend to move toward each other in the spectrum of PCOS**. Americans today consume much larger quantities of carbohydrates and sugar in the form of soft drinks, breads, pasta and pastries, than in the past. This elevates insulin levels and Insulin Resistance increasing the number of PCOS young women.

Pre-menopause: As a woman ages, so do all of her eggs. Over the age of 35, many eggs do not function. A non-functioning egg may not ovulate, and so women have many months with **no Progesterone production**. **This leads to a PCOS pattern.**

Therapy:

Irregular, heavy periods and Estrogen Excess: The primary problem here is lack of **Progesterone**. Progesterone can be given in a cyclic fashion from day 10 through day 26 of the cycle. This helps to reduce heavy bleeding, thins the lining of the uterus, **suppresses the excess LH production** and thus also **reduces Androgen production**. **Birth control pills** work by suppressing FSH and LH and turn the ovaries off. They will do many of the same things as Progesterone and also prevent pregnancy, if that is desired.

Insulin Resistance: There are several medications used for adult onset diabetes that lower insulin resistance. Metformin (Glucophage) is the most popular. When combined with a low carbohydrate diet and exercise, Metformin can restore ovulation and normal cycles.

Androgen Excess: The above therapies help in reducing male hormone levels. In addition, several medications help with **acne, facial hair, body hair and hair loss**. Electrolysis can be used to remove excess hair.

Infertility: Clomiphene Citrate has been used for many years to suppress LH, raise FSH and promote ovulation and pregnancy. In more difficult cases, infertility specialists have many techniques for controlling reproduction. In general, these therapies are more complex and expensive and are not needed for simple regulation of cycles in women not desirous of a pregnancy.

Pre-menopause: **Treatment with Progesterone will often correct the problem, correcting abnormal bleeding, slowing the growth of fibroids, and markedly reducing the need for surgery.**