# PCOS (Polycystic Ovary Syndrome)

Polycystic ovary syndrome (PCOS) is always accompanied by insulin resistance. This is one of the major causes of the many manifestations associated with PCOS. PCOS is probably inherited through multiple genes. Insulin resistance alone is not sufficient to cause PCOS, but is necessary for its manifestation. Obesity frequently is seen with PCOS, but, again, is not necessary to make the diagnosis and in some ethnic groups is not present at all. The insulin resistance increases the risk for diabetes. Among Caucasian women who have PCOS and are obese, up to 30% will have either impaired glucose tolerance, impaired fasting glucose, or diabetes by the age of 30. PCOS is the most common endocrine cause of infertility in the u.s. Up to 6%-10% of women in their child-bearing years are affected by PCOS. Some of the biochemical abnormalities associated with it include:

- High adrogens (male hormones, especially testosterone) .Obesity
- Hirsutism (excessive facial or body hair)
- Low sex hormone binding globulin (SHBG)
- Abnormal levels of FSH and LH (follicle stimulating hormone and luteinizing hormone) which stimulate estrogen production and ovulation
- Irregular menstrual periods
- Acne
- High insulin levels relative to blood sugar levels (if not diabetic)
- Increased PAI-l and fibrinogen and other factors that increase likelihood of blood clots.

Cysts in ovaries are not necessary for the diagnosis of polycystic ovary syndrome. Prior to the discovery of and development of measuring techniques for biochemical abnormalities, the presence of multiple ovarian cysts was one of the ways that cases of PCOS were diagnosed. Since we can now measure the subtle hormonal abnormalities and thus make the diagnosis in milder cases and much earlier, we frequently see cases that have no ovarian cysts whatsoever.

PCOS has a familial tendency and heritability. It is often accompanied by an abnormal lipid panel (high triglycerides and low HDL's [high density lipoproteins or "good" cholesterol]), hypertension, and diabetes.

Anything that improves insulin sensitivity is likely to improve polycystic ovary syndrome. One medication that has been used for over 40 years in diabetics is metformin (Glucophage). This is generally well tolerated and frequently will restore normal menstrual cycling, ovulation, and allow pregnancy. , Another class of drugs that has been found useful is the thiazolidinediones. They have only been available for about three years and are far less familiar to most doctors and so are much less frequently used than metformin. Another drug that has been shown to be useful experimentally, though it is not available, is D-chiroinositol. All of these drugs are considered "insulin sensitizers".

Treatment with insulin sensitizers often reverses most of the hormonal abnormalities of PCOS, returning them toward normal and often restoring normal menstrual cycling, fertility, and glucose tolerance. If for some reason a woman cannot take insulin sensitizers, other treatments are available that can impact one or more of the manifestations of PCOS. They include oral contraceptives or cyclic estrogen and progesterone (depending upon whether the woman desires fertility at the time ), spironolactone (which blocks the effect of excess androgen at the hair follicle and skin, thus improving hirsutism and acne), or progesterone lotion or the new drug eflornithine hydrochloride 13.9% cream (vaniga) applied to skin to decrease facial hair growth, but none of these really address all of the hormonal abnormalities due to insulin resistance.

The table shows the abnormalities associated with PCOS and how each of the treatments affects various problems.

| Abnormality | In PCOS | Metformin | Troglitazone | D-Chiroinositol | Spiro-Lactose | Oral contraceptive or E/P |
|---|---|---|---|---|---|---|
| Androgens | ↑ | | | | | |
| Insulin Sensitivity | ↓ | ↑ | ↑ | ↑ | ←no effect→ | ←→/ ↑ |
| SHBG | ↓ | ↑ | | | ←→ | |
| Tg | ↑ | ↓ | ↓ | | ←→ | |
| HDL | ↓ | ↑ | Sl ↑ | | ←→ | |
| LH | ↑ | Normalize | normalize | | | |
| Ovulation | ↓ | ↑ | ↑ | | ←→ | ↓ or ↑ |
| Irreg periods | ↑ | ↓ | ↓ | | ←→ | ↓ |
| Hirsutism | ↑ | ↓ | | | ↓ | ←→ sl ↓ |
| Acne | ↑ | ↓ | | | | ←→ ↓ |
| Obesity | ↑ | ↓ | ←→ or ↑ | | ←→ | ←→ |
| Insulin level | ↑ | ↓ | ↓ | ↓ | | |