Polycystic Ovarian Syndrome (PCOS) Mechanism

PCOS occurs in patients with insulin insensitivity. This causes increased levels of insulin to influence GnRH secretion, ultimately yielding increased LH and normal or slightly decreased FSH. Increased LH causes androgen production in theca cells, increasing testosterone. Increased testosterone decreases binding-globulins, leading to even more free testosterone, which is more physiologically active.



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Mechanism

Hyperinsulinemia Increases GnRH Pulse Frequency

Hiker-insect-syringe causing Up-arrow Gonad-gopher with Frequency-waves

PCOS begins with hyperinsulinemia in patients, typically those who are insulin- resistant. Through an unknown mechanism, the excess insulin leads to increased GnRH pulse frequency from the hypothalamus.

Large Increase in LH

Large Up-arrow Luge

Abnormal GnRH release in PCOS influences the anterior pituitary to release LH in large amounts.

Small Decrease in FSH

Small Down-arrow Fish

FSH levels stay normal or decrease by a small amount. These levels would normally increase, however there is LH over FSH dominance, which allows LH to increase in this disorder (estrogen inhibits FSH, but anovulation increases LH).

Increased Androgen Production From Theca-Lutein Cells

Up-arrow Android-genie Thinks-of-Loot

Due to increased levels of LH, theca-lutein cells begin to increase androgen production, (androstenedione). Through a few conversion steps, this is typically converted to estrogen. However, there is so much androgen production, that a large amount of it is not converted.

Decreased Steroid Hormone-Binding-Globulin (SHBG) Causes Increased Free Testosterone

Down-arrow Steroid-Stair Bound-Goblin with Up-arrow Testes-stereo

High levels of insulin and testosterone decrease levels of steroid hormone-binding globulin (SHBG). Typically, SHBG binds to testosterone, making it less active in the bloodstream. As these SHBGs decrease, testosterone becomes more physiologically active, as there is more free testosterone available.

Obese Patients Have Increased Estrogen

Obese-person with Up-arrow Easter-eggs

Due to aromatase in fat cells, patients who are obese also have increased estrogen levels. This occurs because aromatase converts androgens to estrogen.

Increased Risk of Endometrial Cancer

Up-arrow Risk of Tumor at Inner-layer of uterus

As these patients have ovarian cycle disorder, there is no cyclic secretion of estrogen and progesterone. Instead, these patients (the obese ones) have excess unopposed estrogen. This influences the endometrium to proliferate unchecked, and can lead to endometrial cancer.

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