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**Erica J. Graham\*** (ejgraham@brynmawr.edu) and **James F. Selgrade.** *Modeling ovulatory dysfunction through mechanisms of reproductive hormone regulation.*

Reproductive hormones belong to a tightly regulated system of feedback between the brain and ovaries. Cross-talk between different hormones set the stage for the oscillatory behavior characteristic of the menstrual cycle. In the case of polycystic ovary syndrome (PCOS), a common cause of infertility, increased ovarian androgen production can disrupt the cycle. Further, elevated insulin is an important cause of the change in androgens. We develop a deterministic model of ovarian steroid production coupled with hormone interactions during the ovulatory cycle. Steroid dynamics are central to follicle growth and maturation, as well as to regulation of essential hormones produced in the brain. We therefore focus on modeling mechanisms of intracellular steroid production as influenced by insulin. The model exhibits stable periodic behavior and provides a good fit to clinical data during a normal ovulatory cycle. We discuss model behavior under both physiological and pathological circumstances using simulation and bifurcation results. Finally, we discuss implications for ovulatory dysfunction in the context of PCOS. (Received September 21, 2015)