



## Reproductive Life Cycle

### *Reproductive Life Cycle 101*

### *Answer Key for Self-Study*

#### Contributors

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#### Learning Objectives:

1. Describe the phases of the menstrual cycle, including hormonal changes and their clinical impact
2. Describe the physiology of pregnancy from a biological perspective and identify those physiological changes that have the most relevance to perinatal psychiatric illness
3. Discuss the biological changes inherent in perimenopause/menopause and their potential clinical impact

#### Answers for Part 1: The Menstrual Cycle

1. What is the primary effect of FSH and LH in the menstrual cycle?

*Development of follicles in the ovaries*

2. What is the downstream effect of FSH/LH on estrogen?

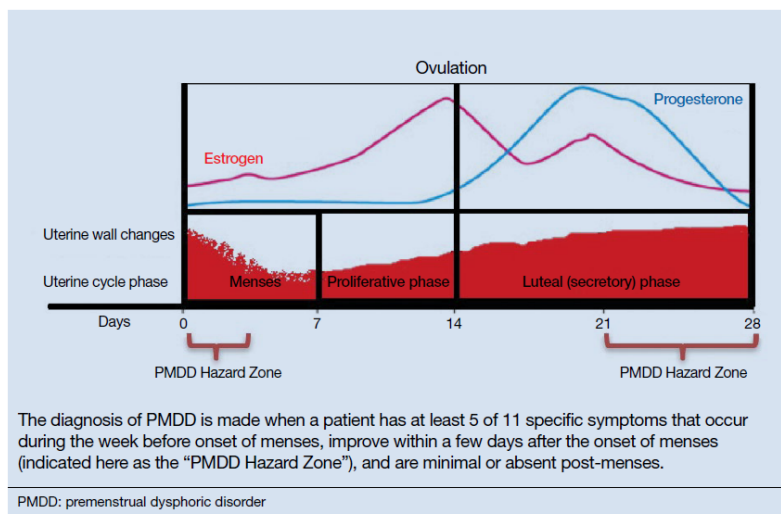
*Development of follicles -> increased production of estrogen (and then negative feedback on pituitary to downregulate FSH/LH production)*

3. What is the primary product of the corpus luteum, and what is its purpose?

*Progesterone; to prepare the uterine lining for pregnancy and relax uterine smooth muscle*

4. Describe the changes in the ovarian hormones that occur at the time of greatest risk for PMDD symptoms. You may use the graph below for reference.

**Figure 1**  
**The menstrual cycle and the 'PMDD Hazard Zone'**





## **Etiology of PMDD, Source: MGH Women's Mental Health Website**

*Symptoms correlate with rapid decreases in estrogen and progesterone levels in the late luteal phase, and resolve quickly as the levels of both begin to rise again (the "withdrawal theory" of PMDD).*

## **Answers for Part 2: Pregnancy**

1. What would you expect to be the pharmacokinetic consequences of the cardiovascular and hematologic changes in pregnancy? How would you predict these might affect prescribing?

*Significantly increased blood volume in second half of pregnancy leads to lower plasma concentration of medications. Although with antidepressants, blood levels do not always/generally correlate with efficacy, data does suggest that women require higher dose of antidepressants in the second half of pregnancy. (reference from PCC)*

2. How might the respiratory changes of pregnancy affect mood and anxiety?

*Decreased lung capacity/increased PCO<sub>2</sub> -> increased anxiety and risk of panic attack, particularly in pts with h/o panic disorder*

*(Wilhelm et al., Respiratory dysregulation in anxiety, functional cardiac, and pain disorders. Behav Modif. 2001 Sep;25(4):513-45.)*

3. What might be the psychiatric relevance of the known endocrinological changes of pregnancy?

**Thyroid:** *Under normal circumstances, pregnant women remain euthyroid, so no subsequent thyroid-related psychiatric changes would be expected. However, women with a history of thyroid disease (overrepresented among women with a history of mood/anxiety disorders) are at greater risk of pregnancy-related thyroid dysfunction, and need to be monitored closely. The incidence of thyroid dysfunction in all women postpartum, and correlates with increased risk of psychiatric illness.*

**Adrenals:** *Both increased (hair) and blunted (salivary) cortisol during pregnancy have been associated with perceived stress, depressed mood and adverse pregnancy outcomes (preterm birth, low birthweight) as well as with measures of infant salivary cortisol.*

*(Tarullo AR1, St John AM2, Meyer JS. Chronic stress in the mother-infant dyad: Maternal hair cortisol, infant salivary cortisol and interactional synchrony. Infant Behav Dev. 2017 May;47:92-102.*

*doi:10.1016/j.infbeh.2017.03.007. Epub 2017 Apr 6; Hoffman MC, Mazzoni SE, Wagner BD, Laudenslager ML, Ross RG. Measures of maternal stress and mood in relation to preterm birth. Obstet Gynecol. 2016 Mar;127(3):545-52. doi: 10.1097/AOG.0000000000001287.)*

**Pituitary:** *Increased prolactin levels in pregnancy have no known association with psychiatric dysfunction; in the postpartum, however, there is the potential for the development of Sheehan's syndrome, hypopituitarism caused by ischemic necrosis due to blood loss and hypovolemic shock during and after childbirth. Symptoms of Sheehan's, such as fatigue, cognitive impairment, weight gain, and irregular heartbeat, may be mistaken for mood symptoms.*



4. For each psychological stage of pregnancy, what specific psychiatric disorders or symptoms would you expect to be exacerbated, and why?

**First stage:**

*Anxiety: fear of miscarriage, anxiety re: impending parenthood, financial concerns, changes in identity/marriage/professional identity/sex life/social life*

*Depression: loss of independence/previous stage of life*

*Somatic symptoms (nausea, fatigue) may trigger symptoms in patients with h/o anxiety, panic or eating disorders.*

*Sleep deprivation, cognitive impairment and emotional lability may exacerbate depression or anxiety.*

**Second stage:**

*Continuation of the above adjustment to changes in identity, marriage, professional pursuits, etc.*

*Issues related to sleep and emotional lability decrease during this stage.*

*Increase in weight gain and visible body changes may lead to issues with body images and exacerbation of eating disorders.*

*Increasing physical discomforts, immunizations, and diabetes screenings may increase anxiety.*

**Third stage:**

*Continuation of the above adjustment to changes in identity, marriage, professional pursuits, etc.*

*Further increase in weight gain and visible body changes may lead to issues with body image and exacerbation of eating disorders.*

*Respiratory changes may exacerbate anxiety/panic disorders.*

*Sleep deprivation is once again worsened, with impact on mood and anxiety.*

*Anticipation of delivery raises issues of control and may exacerbate anxiety disorders.*

*Increasing OB visits and pelvic examinations throughout this stage may exacerbate trauma associated with past sexual abuse. In particular, the exposure, loss of control, and pain of labor and delivery may trigger patients with a history of sexual trauma.*

## **Answers for Part 3: Menopause**

1. Define menopause and perimenopause.

*Menopause: total cessation of periods for 12 months, in absence of pregnancy or other clinical cause.*

*Perimenopause: the period of time leading up to menopause in which menstruation becomes irregular and symptoms of estrogen decline become present. May last several years.*

2. Describe the major hormonal changes in perimenopause/menopause.

*Early changes: greater variability in FSH levels, generally rising, resulting in greater follicle recruitment and increased E2; decreasing number of follicles and inhibin B, leading to variable cycle length and more frequent anovulation*

*Late/post-menopause: FSH rising/E2 levels falling; then stabilizing and ultimately FSH declines as well.*

3. What are the predominant categories of somatic symptoms related to menopause for which women seek medical care? Describe the proposed physiology of each.

*Vasomotor sx (hot flashes, night sweats): changes in central thermoregulatory functioning as a result of decreased E2*



*Urogenital sx (vaginal dryness, increase in UTIs): decrease in E2 and progesterone in the urogenital tract*  
*Cardiovascular disease, metabolic syndromes, and osteopenia/osteoporosis: estrogen depletion*

4. List several psychological and physical factors that likely play a role in changes in sexual functioning in menopause.

*Hormonal changes leading to decreased libido*

*Hormonal changes leading to vaginal dryness and irritation*

*General physical changes and medical problems secondary to aging Self-image related to aging (including weight gain secondary to menopause) Loss of reproductive capacity*