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PHARMACOLOGY

PHS 204

ASSIGNMENT: I expect more on the physiology of lactation and details on the physiology of pregnancy in a normal woman.

PHYSIOLOGY OF PRGNANCY

PREGNANCY is the time from fertilization of an egg, also known as conception, to birth. Getting pregnant and growing a human from scratch is a very complicated biological process that takes a lot of resources. As a result, pregnancy can have a wide range of effects on the mother, both physically and emotionally.

Each egg that is released during a menstrual cycle travels to your uterus. However, unlike unfertilized eggs that proceed unaltered and then disintegrate when they get there, a fertilized egg develops into a tiny human embryo on the way. On reaching the uterus, the embryo implants itself in the uterine wall, develops into a fetus, and steadily grows, until about nine months later it is ready to emerge into the outside world as a newborn baby.

SIGNS AND SYMPTOMS

If you are fertile, sexually active, and become pregnant, the first thing you are likely to notice is a late or missing menstrual period. Fertilization of an egg triggers changes in the production of various hormones almost immediately, and hormone changes evolve and persist throughout your pregnancy to help you grow a healthy baby. Unfortunately, these changes may also cause unpleasant side effects. As a result, in addition to a missed period, many women experience tender, swollen breasts, fatigue, nausea and vomiting, or morning sickness during the first few weeks of becoming pregnant.

PHYSIOLOGICAL CHANGES THAT OCCUR DURING PREGNANCY

HORMONAL: The menstrual cycle refers to the normal changes in your ovaries and uterus that make an egg accessible for fertilization and prepare your uterus for pregnancy. It typically occurs once every 28 days. If you are ovulating normally, an egg, or ovum emerges from one or other of your ovaries, leaving behind a structure called the corpus luteum. This structure produces large amounts of progesterone and estrogen, hormones that help prepare your uterus for implantation of a fertilized egg. If the egg is not fertilized, the corpus luteum degenerates, causing progesterone and estrogen levels to drop, and menstruation to begin. If the ovum is fertilized, on the other hand, the corpus luteum remains intact and continues to maintain the hormone levels you need to keep your uterus baby-friendly. Eventually, the placenta develops the ability to secrete the necessary hormones itself, and the corpus luteum typically disappears after 3 to 4 months.

In addition to progesterone and estrogen, human chorionic gonadotropin also spikes in early pregnancy. The levels of this hormone double every two days in the first 10 weeks of pregnancy. Its primary role is to prevent any further menstruation, and to prepare the placenta - the organ that connects the fetus to the uterus. The placenta allows the fetus to be supplied with nutrients and oxygen, as well as providing a route for the removal of toxic waste products. Although many signs and symptoms of pregnancy are related to hormonal changes, there are also many that occur due to the growing fetus invading the spaces that were previously occupied by your other organs.

IMMUME TOLERANCE:

Your growing fetus is a foreign object, something that your immune system is normally programmed to attack and reject. In order to prevent this from happening, as soon as the embryo becomes implanted in the uterine wall, a key pathway that usually triggers the launch of an immune attack is turned off, making this part of your immune system dormant, and preventing immune cells from targeting the fetus or placenta. In addition to making it possible for you to grow your baby, there can be secondary benefits of pregnancy-related changes in immune function. In particular, women suffering from diseases caused by immune disorders, such as rheumatoid arthritis, multiple sclerosis, and psoriasis, may find relief from disease symptoms during pregnancy due to increased levels of anti-inflammatory steroids that occur naturally.

CARDIOVASCULAR: During pregnancy, your cardiac output - the amount of blood your heart pumps around your body per minute - increases to meet the needs of the developing fetus, and to provide the volume of blood necessary to fill the uteroplacental circulation.

RESPIRATORY:  Breathing exercises are often practiced by expectant mothers to use during labor and birth, but this isn’t the only way changes in respiration are helpful. As with your other organs, the growing uterus begins to invade the space normally reserved for your lungs, which restricts their expansion during normal breathing. Once again, progesterone, the multi-talented pregnancy hormone gets to work, triggering your lungs to increase the amount of air inhaled with each breath - the tidal volume - as well as the number of breaths per minute - the respiratory rate. This increases the oxygen supply required to meet the metabolic needs of the fetus, placenta and other organs.

METABOLIC: Changes in metabolism during pregnancy alter the distribution of body fat, as well as how you digest and process food. While accumulating fats and nutrients is necessary for the healthy growth of your baby, metabolic changes can also affect the way in which medications are processed. As such, it is important to know how your pregnant body may respond to any drugs or homeopathic remedies you may be taking, and whether or not this could have an effect on your growing baby.

BODY WEIGHT: Supporting the growth of a developing fetus takes a lot of energy, so it’s not surprising that more calories are required during pregnancy. In fact, after the first three months (trimester) your appetite generally increases so that you are consuming about 300 extra calories a day. Although in the first trimester you can expect to gain just a few pounds, it’s normal to gain about a pound per week for the rest of your pregnancy. In addition to weighing more, you can expect your breasts to grow around 1 to 2 cup sizes in preparation for breastfeeding.

GASTROINTESTINAL: As your uterus grows, it puts pressure on your digestive organs including your colon, gallbladder, liver, and stomach. This can impair their function, and lead to constipation, gallstones, reduced bile transport, as well as a general slowing of the digestive process that is related to lower levels of the hormone gastrin. Gastrin stimulates the secretion of stomach acid, which in turn leads to the production of pepsin, an enzyme that digests proteins in your food - less gastrin leads to slower digestion. In addition to this, elevated progesterone levels during pregnancy slacken the cardiac sphincter, the “door” between your esophagus and stomach, making it open more easily. It is very common to experience heartburn due to acid reflux into your esophagus during the third trimester, as the cardiac sphincter cannot withstand the pressure that builds up in your stomach as your uterus grows. It’s also worth noting that taking analgesics during pregnancy may not be for the best, as they can slow down gastric emptying even more, creating an even higher pressure that the cardiac sphincter must withstand.

MUSCULOSKELETAL: Numerous anatomical and physiological changes occur during pregnancy that strain the muscles and skeleton, particularly the pelvis, and which may lead to lower-back pain, leg cramps, and hip pain. One of the hormones responsible for musculoskeletal changes during pregnancy is relaxin, which softens your ligaments and cartilage tissues to help your body accommodate your growing baby. In addition to relaxin’s relaxing effects, the arrangement of the abdominal muscles themselves is particularly well adapted for childbearing. Unlike in men, where they form a “six pack”, women’s abdominal muscles are positioned to allow them to stretch around a baby-bump.

INTEGUMENTARY: The integumentary system consists of your skin, hair and nails, as well as underlying connective tissue that attaches your skin to your body and various glands including sweat and oil producing glands, and your mammary glands. As your pregnancy proceeds, your skin stretches to accommodate your growing uterus and breast tissue. Sometimes the stretching can tear the underlying connective tissue causing red or purple marks to appear on your abdomen, commonly known as stretch marks. In addition, increased estrogen levels during pregnancy increases the production of melanin, the pigment that gives human skin and hair its color. This often causes the ring of color around your nipples (areolae) to darken, and may create a line of pigment that typically runs from your navel to your pubic bone. It’s also possible you may develop patchy discoloration of your face and darkening of any moles and freckles. Other integumentary changes that may occur during pregnancy include accelerated nail growth and excessive hair growth in unusual places, while increased blood supply to your skin often leads to increased perspiration. Finally, while it’s commonly said that pregnancy makes your skin clear and radiant, it’s also possible for it to become oily and acne prone.

PHYSIOLOGY OF LACTATION

LACTATION : is the maternal physiological response whereby milk is secreted from the mammary glands to feed the infant. Secretion and yielding of milk by females after giving birth. The milk is produced by the mammary glands, which are contained within the breasts. The breasts, unlike most of the other [organs](https://www.britannica.com/science/organ-biology), continue to increase in size after [childbirth](https://www.britannica.com/science/birth). Although mammary growth begins during [pregnancy](https://www.britannica.com/science/pregnancy) under the influence of ovarian and placental [hormones](https://www.britannica.com/science/hormone), and some milk is formed, [copious](https://www.merriam-webster.com/dictionary/copious) milk secretion sets in only after delivery. Since lactation ensues after a [premature birth](https://www.britannica.com/science/premature-birth), it would appear that milk production is held back during pregnancy. The mechanism by which this inhibitory effect is brought about, or by which lactation is initiated at delivery, has long been the subject of an argument that revolves around the opposing actions of [estrogen](https://www.britannica.com/science/estrogen), [progesterone](https://www.britannica.com/science/progesterone), and [prolactin](https://www.britannica.com/science/prolactin), as studied in laboratory animals, goats, and cattle. During [pregnancy](https://www.britannica.com/science/pregnancy) the combination of [estrogen](https://www.britannica.com/science/estrogen) and progesterone circulating in the [blood](https://www.britannica.com/science/blood-biochemistry) appears to [inhibit](https://www.merriam-webster.com/dictionary/inhibit) milk secretion by blocking the release of [prolactin](https://www.britannica.com/science/prolactin) from the [pituitary gland](https://www.britannica.com/science/pituitary-gland) and by making the mammary gland cells unresponsive to this pituitary hormone. The blockade is removed at the end of pregnancy by the expulsion of the [placenta](https://www.britannica.com/science/placenta-human-and-animal) and the loss of its supply of hormones, as well as by the decline in hormone production by the [ovaries](https://www.britannica.com/science/ovary-animal-and-human), while sufficient estrogen remains in circulation to promote the secretion of prolactin by the pituitary gland and so favour lactation. The stimulus of nursing or [suckling](https://www.britannica.com/science/suckling) supports continued lactation. It acts in two ways: it promotes the secretion of prolactin (and possibly other pituitary hormones of value in milk formation), and it triggers the release of yet another hormone from the pituitary gland [oxytocin](https://www.britannica.com/science/oxytocin), which causes the contraction of special [muscle](https://www.britannica.com/science/muscle) cells around the alveoli in the breast and ensures the expulsion of milk. It is in this way that a baby’s sucking at one breast may cause an increase in milk flow from both, so that milk may drip from the unsuckled nipple. About 30 seconds elapse between the beginning of active suckling and the initiation of milk flow.