



chapter 11

# Maternal Adaptation During Pregnancy

## Key TERMS

ballottement  
Braxton Hicks contractions  
Chadwick's sign  
Goodell's sign  
Hegar's sign  
linea nigra  
physiologic anemia of pregnancy  
quickening  
trimester

## Learning OBJECTIVES

*After studying the chapter content, the student should be able to accomplish the following:*

1. Define the key terms.
2. Discuss maternal physiologic changes that occur during pregnancy.
3. Differentiate between subjective (presumptive), objective (probable), and diagnostic (positive) signs of pregnancy.
4. Explain the emotional and psychological changes that occur during pregnancy.



## WOW

*When a woman discovers that she is pregnant she must remember to protect and nourish the fetus by making wise choices.*

**P**regnancy is a normal life event that involves considerable physical and psychological adjustments for the mother. A pregnancy is described within specific time frames. A **trimester** is a division of pregnancy into three equal parts of 13 weeks each (Lowdermilk & Perry, 2004). Within each time frame or trimester, numerous adaptations take place that facilitate the growth of the fetus. The most obvious are physical changes to accommodate the growing fetus. However, pregnant women also undergo psychological changes as they prepare for parenthood.

## Signs and Symptoms of Pregnancy

Traditionally, signs and symptoms of pregnancy have been grouped into the following categories: presumptive, probable, and positive (Table 11-1). The only signs that can determine a positive pregnancy with 100% accuracy, however, are positive signs.

### Subjective (Presumptive) Signs

Presumptive signs are those signs experienced by the woman herself. The most obvious presumptive sign of pregnancy is the absence of menstruation. However, just being late or even skipping a period is not a reliable sign

of pregnancy. But if it is accompanied by consistent nausea, fatigue, breast tenderness, and urinary frequency, pregnancy would seem very likely. Presumptive changes are the least reliable indicators of pregnancy because any one of them can be caused by conditions other than pregnancy (Murray et al., 2006).

For example, amenorrhea can be caused by early menopause, endocrine dysfunction, malnutrition, anemia, diabetes mellitus, long-distance running, cancer, or stress. Nausea and vomiting can also have alternative causes such as gastrointestinal disorders, food poisoning, acute infections, or eating disorders. Fatigue could be caused by anemia, stress, or viral infections. Breast tenderness may result from chronic cystic mastitis, premenstrual changes, or the use of oral contraceptives. Lastly, urinary frequency could have a variety of causes outside of pregnancy, such as infection, cystocele, structural disorders, pelvic tumors, or emotional tension (Olds et al., 2004).

### Objective (Probable) Signs

Probable signs of pregnancy are those that are apparent on physical examination by a healthcare professional. Common probable signs of pregnancy include softening of the lower uterine segment or isthmus (**Hegar's sign**), softening of the cervix (**Goodell's sign**), and a bluish-purple coloration of the vaginal mucosa and cervix

**Table 11-1** Signs and Symptoms of Pregnancy

Presumptive (Time of Occurrence)	Probable (Time of Occurrence)	Positive (Time of Occurrence)
Fatigue (12 wk)	Braxton Hicks contractions (16–28 wk)	Ultrasound verification of embryo or fetus (4–6 wk)
Breast tenderness (3–4 wk)	Positive pregnancy test (4–12 wk)	Fetal movement felt by experienced clinician (20 wk)
Nausea and vomiting (4–14 wk)	Abdominal enlargement (14 wk)	Auscultation of fetal heart tones via Doppler (10–12 wk)
Amenorrhea (4 wk)	<b>Ballottement</b> (16–28 wk)	
Urinary frequency (6–12 wk)	Goodell's sign (5 wk)	
Hyperpigmentation of the skin (16 wk)	Chadwick's sign (6–8 wk)	
Fetal movements (quickening; 16–20 wk)	Hegar's sign (6–12 wk)	
Uterine enlargement (7–12 wk)		
Breast enlargement (6 wk)		

Sources: Pillitteri (2003), Matteson (2001), Murray et al. (2006), Wong et al. (2002), and Youngkin & Davis (2004).

(**Chadwick's sign**). Other probable signs include changes in the shape and size of the uterus, abdominal enlargement, and **Braxton Hicks contractions**.

Along with these physical signs, pregnancy tests are also considered a probable sign of pregnancy. Several pregnancy tests are available (Table 11-2). The tests vary in sensitivity, specificity, and accuracy, influenced by the length of gestation, specimen concentration, presence of blood, and some drugs (Youngkin & Davis, 2004).

Human chorionic gonadotropin (hCG) is the earliest biochemical marker for pregnancy, and many pregnancy tests are based on the recognition of hCG or a beta subunit of hCG (Lowdermilk & Perry, 2004). hCG levels in normal pregnancy usually double every 48 to 72 hours until they reach a peak at approximately 60 to 70 days after fertilization, then decrease to a plateau at 100 to 130 days of pregnancy (Youngkin & Davis, 2004). This elevation of hCG corresponds to the morning sickness period of approximately 6 to 12 weeks during early pregnancy.

Home pregnancy tests are available over the counter and have become quite popular since their introduction in 1975. These tests are very sensitive, cost-effective, and faster than traditional laboratory pregnancy tests. Enzyme-linked immunosorbent assay (ELISA) technology is the basis for most home pregnancy tests. More than 20 brands have become available. Many manufacturers claim that the tests are accurate more than 99% of the time, but recent research has not validated their claims (Cole et al., 2004). Therefore, clients are advised to have their pregnancy test repeated and confirmed by their health care provider.

Although probable signs suggest pregnancy and are more reliable than presumptive signs, they still are not 100% reliable in confirming a pregnancy. For example, uterine tumors, polyps, infection, and pelvic congestion can cause changes to uterine shape, size, and consistency. And, although pregnancy tests are used to establish the diagnosis of pregnancy when the physical signs are still inconclusive, they are not completely reliable, because conditions other than pregnancy (e.g., ovarian cancer, choriocarcinoma, hydatidiform mole) can also elevate hCG levels.

**Consider THIS!**

Jim and I decided to start our family so I stopped taking the pill 3 months ago. One morning when I got out of bed to take the dog out, I felt queasy and light-headed. I sure hoped I wasn't coming down with the flu. By the end of the week, I was feeling really tired and started taking naps in the afternoon. In addition, I seemed to be going to the bathroom frequently, despite not drinking much fluid. When my breasts started to tingle and ache, I decided to make an appointment with my doctor to see what "illness" I had contracted.

After listening to my list of physical complaints, the office nurse asked me if there would be a chance that I might be pregnant. My eyes opened wide and I somehow thought I had missed the link between my symptoms with pregnancy. I started to think about when my last period was and it had been 2 months ago. The office ran a pregnancy test and much to my surprise—it was positive!

**Table 11-2** Selected Pregnancy Tests

Type	Specimen	Example	Remarks
Agglutination inhibition tests	Urine	Pregnosticon, Gravindex	If hCG is present in urine, agglutination does not occur, which is positive for pregnancy; reliable 14–21 days after conception; 95% accuracy in diagnosing pregnancy
Radioimmunoassay (RIA)	Blood serum	Hospital laboratories	Uses radioisotopes to detect beta subunit of hCG; reliable 1 week after conception; 99% accuracy in diagnosing pregnancy
Radioreceptor assay	Blood serum	Biocept-G	Measures ability of blood sample to inhibit the binding of radiolabeled hCG to receptors; reliable 6–8 days after conception; 99% accuracy in diagnosing pregnancy
Enzyme-linked immunosorbent assay	Blood serum or urine	Over-the-counter home/office pregnancy tests; Precise	Uses an enzyme to bond with hCG in the urine if present; reliable 4 days after implantation; 99% accuracy if hCG specific

Sources: Hatcher et al. (2004), Cunningham et al. (2005), Pagana & Pagana (2003), and Schnell et al. (2003).

**Thoughts:** Many women stop contraceptives in an attempt to achieve pregnancy, but miss the early signs. This woman was experiencing several signs of early pregnancy—urinary frequency, fatigue, morning nausea, and breast tenderness. What advice can the nurse give this woman to ease these symptoms? What additional education related to her pregnancy would be appropriate at this time?

## Positive Signs

Usually within 2 weeks after a missed period, enough subjective symptoms are present so that a woman can be reasonably sure she is pregnant. However, an experienced healthcare professional can confirm her suspicions by identifying positive signs of pregnancy. The positive signs of pregnancy confirm that a fetus is growing in the uterus. Visualizing the fetus by ultrasound, palpating for fetal movements, and hearing a fetal heartbeat are all signs that make the diagnosis of pregnancy a certainty.

Once pregnancy is confirmed, the healthcare professional will set up a schedule of prenatal visits to assess the woman and her fetus throughout the entire pregnancy. Beginning with the initial visit, the process of assessment and education then continues throughout the pregnancy (see Chapter 13).

## Physiologic Adaptations During Pregnancy

Every system of a woman's body changes during pregnancy, with startling rapidity to accommodate the needs of the growing fetus. The physical aspects of pregnancy occur within a variable time frame and are sometimes uncomfortable. In addition, every woman reacts uniquely to the myriad changes that occur.

### Reproductive System Adaptations

#### Uterus

During the first few months of pregnancy, estrogen stimulates uterine growth, with the uterus undergoing a tremendous increase in size throughout pregnancy. At full term, the uterus weighs 2 lb, is about five to six times larger than the nonpregnant uterus, and has increased its capacity by 2000 times to accommodate the developing fetus (Sloan, 2002). To put this growth into perspective, please note the following:

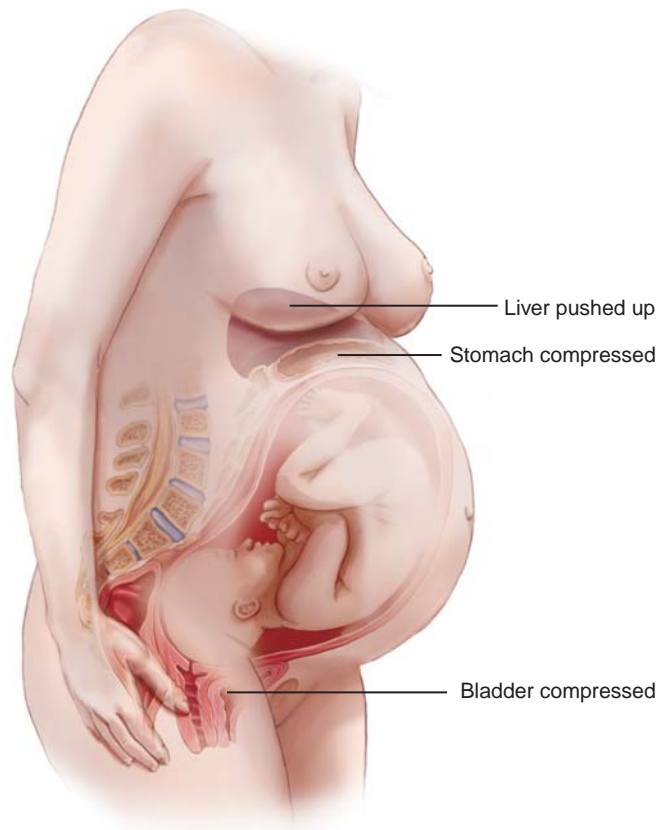
- Size has increased 20 times that of nonpregnant size
- Walls thin to 1.5 cm or less from a solid globe to a hollow vessel
- Weight increases from 2 oz to approximately 2 lb at term
- Volume capacity increases from 2 tsp to 1 gal (Mattson & Smith, 2004)

Uterine growth occurs as a result of both hyperplasia and hypertrophy of the myometrial cells, which do not increase much in number but do increase in size. Blood vessels elongate, enlarge, dilate, and sprout new branches to support and nourish the growing muscle tissue, and the increase in uterine weight is accompanied by a large increase in uterine blood flow necessary to perfuse the uterine muscle and accommodate the growing fetus (Matteson, 2001).

Uterine contractility is evidently enhanced as well. Spontaneous, irregular, and painless contractions, called Braxton Hicks contractions, begin during the first trimester. These contractions continue throughout pregnancy, becoming especially noticeable during the last month, when they function in thinning out or effacing the cervix before birth (see Chapter 13 for more information).

Changes in the uterus occurring during the first 6 to 8 weeks of gestation produce some of the typical findings, including a positive Hegar's sign. This softening and compressibility of the lower uterine segment results in exaggerated uterine anteversion during the early months of pregnancy, which adds to urinary frequency (Lowdermilk & Perry, 2004).

The uterus remains in the pelvic cavity for the first 3 months of pregnancy, after which it progressively ascends into the abdomen (Fig. 11-1). As the uterus grows, it



● Figure 11-1 The growing uterus in the abdomen.

presses on the urinary bladder and causes the increased frequency of urination experienced during early pregnancy.

Uterine enlargement occurs in a linear fashion (1 cm/week), and the uterus remains globular and ovoid in shape (Youngkin & Davis, 2004). By 20 weeks' gestation, the fundus, or top of the uterus, is at the level of the umbilicus and measures 20 cm. A monthly measurement of the height of the top of the uterus in centimeters, which corresponds to the number of gestational weeks, is commonly used to date the pregnancy. After 36 weeks' gestation, this measurement is no longer reliable because of the beginning of fetal descent.

The fundus reaches its highest level at the xiphoid process at approximately 36 weeks. Between 38 to 40 weeks, fundal height drops as the fetus begins to descend and engage into the pelvis. Because it pushes against the diaphragm, many women experience shortness of breath. By 40 weeks, the fetal head begins to descend and engage in the pelvis, which is termed *lightening*. For the woman who is pregnant for the first time, lightening usually occurs at approximately 2 weeks before the onset of labor; for the woman who is experiencing her second or subsequent pregnancy, this usually occurs at the onset of labor. Although breathing becomes easier because of this descent, the pressure on the urinary bladder now increases, and women experience urinary frequency again.

### Cervix

Between weeks 6 and 8 of pregnancy, the cervix begins to soften (Goodell's sign) due to vasocongestion. Along with the softening, the endocervical glands increase in size and number, and produce more cervical mucus. Under the influence of progesterone, a thick mucous plug is formed that blocks the cervical os and protects the opening from bacterial invasion. At about the same time, increased vascularization of the cervix causes Chadwick's sign.

### Vagina

During pregnancy, there is increased vascularity because of estrogen influences, resulting in pelvic congestion and hypertrophy of the vagina in preparation for the distention needed for birth. The vaginal mucosa thickens, the connective tissue begins to loosen, the smooth muscle begins to hypertrophy, and the vaginal vault begins to lengthen (Lowdermilk & Perry, 2004).

Vaginal secretions become more acidic, white, and thick. Most women experience an increase in a whitish vaginal discharge, called *leukorrhoea*, during pregnancy. This is normal except when it is accompanied by itching and irritation, possibly suggesting *Candida albicans*, a monilial vaginitis, which is a very common occurrence in this glycogen-rich environment (Murray et al., 2006). Monilial vaginitis is a benign fungal condition that is uncomfortable for women, but it can be transmitted from an infected mother to her newborn at birth. Neonates develop an oral infection known as thrush, which presents as white

patches on the mucus membranes of their mouths. It is self-limiting and is treated with local antifungal agents.

### Ovaries

The increased blood supply to the ovaries causes them to enlarge until approximately the 12th to 14th week of gestation. The ovaries are not palpable after that time because the uterus fills the pelvic cavity. Ovulation ceases during pregnancy because of the elevated levels of estrogen and progesterone, which block secretion of FSH and luteinizing hormone (LH) from the anterior pituitary. The ovaries are very active in hormone production to support the pregnancy until about weeks 6 to 7, when the corpus luteum regresses and the placenta takes over the major production of progesterone.

### Breasts

The breasts increase in fullness, become tender, and grow larger throughout pregnancy under the influence of estrogen and progesterone. The breasts become highly vascular, and veins become visible under the skin. The nipples will become larger and more erect. Both the nipples and surrounding areola become deeply pigmented, and sebaceous glands become prominent. These sebaceous glands keep the nipples lubricated for breast-feeding.

Changes that occur in the connective tissue of the breasts, along with the tremendous growth, can lead to striae (stretch marks) in approximately half of all pregnant women (Littleton & Engebretson, 2005). Initially they appear as pink-to-purple lines on the skin and eventually fade to a silver color. Although they become less conspicuous in time, they never completely disappear.

Creamy, yellowish breast fluid called *colostrum* can be expressed by the third trimester. This fluid provides nourishment for the breast-feeding newborn during the first few days of life (see Chapters 15 and 16 for more information).

## General Body System Adaptations

In addition to changes in the reproductive system, the pregnant woman also experiences changes in virtually every other body system in response to the growing fetus.

### Gastrointestinal System

The gastrointestinal (GI) system begins in the oral cavity and ends at the rectum. During pregnancy, the gums become hyperemic, swollen, and friable with a tendency to bleed easily. This change is influenced by estrogen and increased proliferation of blood vessels and circulation to the mouth. In addition, the saliva produced in the mouth becomes more acidic. Some women complain about excessive salivation, termed *ptyalism*, which may be caused by the decrease in unconscious swallowing by the woman when nauseated (Cunningham et al., 2005).

Smooth muscle relaxation and decreased peristalsis occur related to the progesterone influence. Elevated

progesterone levels cause smooth muscle relaxation, which results in delayed gastric emptying and decreased peristalsis. Transition time of food throughout the GI tract may be so much slower that more water than normal is reabsorbed, leading to bloating and constipation. Constipation can also result from low-fiber food choices, reduced fluid intake, use of iron supplements, decreased activity level, and intestinal displacement secondary to a growing uterus. Constipation, increased venous pressure, and the pressure of the gravid uterus contribute to the formation of hemorrhoids.

The slowed gastric emptying combined with relaxation of the cardiac sphincter allows reflux, which causes heartburn. Acid indigestion or heartburn (*pyrosis*) seems to be a universal problem for most pregnant women. It is caused by regurgitation of the stomach contents into the upper esophagus and may be associated with the generalized relaxation of the entire digestive system. Over-the-counter antacids will usually relieve the symptoms. They should be taken with the healthcare provider's awareness and only as directed.

The emptying time of the gallbladder is prolonged secondary to the smooth muscle relaxation from progesterone. Hypercholesterolemia can follow, increasing the risk of gallstone formation (Olds et al., 2004).

Nausea and vomiting, better known as *morning sickness*, plagues about 50 to 80% of pregnant women (Sloan, 2002). Although it occurs most often in the morning, the nauseated feeling can last all day in some women. The highest incidence of morning sickness is between 6 to 12 weeks. The physiologic basis for morning sickness is still debatable. It has been linked to the high levels of hCG, high levels of circulating estrogens, reduced stomach acidity, and the lowered tone and motility of the digestive tract (Condon, 2004).

## Cardiovascular System

Cardiovascular changes occur early during pregnancy to meet the demands of the enlarging uterus and the placenta for more blood and more oxygen. Perhaps the most striking cardiac alteration occurring during pregnancy is the increase in blood volume.

### Blood Volume

Blood volume increases by approximately 1500 mL, or 40 to 50% above nonpregnant levels (Cunningham et al., 2005). The increase is made up of 1000 mL plasma plus 450 mL red blood cells (RBCs). It begins at weeks 10 to 12, peaks at weeks 32 to 34, and decreases slightly at week 40.

The increase in blood volume is needed to provide adequate hydration of fetal and maternal tissues, to supply blood flow to perfuse the enlarging uterus, and to provide a reserve to compensate for blood loss at birth and during postpartum (Hockenberry, 2005). Additionally, this increase is necessary to meet the increased metabolic needs

of the mother and to meet the need for increased perfusion of other organs, especially the woman's kidneys, because she is excreting waste products for herself and the fetus.

### Cardiac Output and Heart Rate

Cardiac output is the product of stroke volume and heart rate. It increases from 30 to 50% over the nonpregnant rate by the 32nd week of pregnancy and declines to about a 20% increase at 40 weeks' gestation (Lowdermilk & Perry, 2004). Heart rate increases by 10 to 15 bpm between 14 and 20 weeks of gestation and persists to term. There is slight hypertrophy or enlargement of the heart during pregnancy. This is probably to accommodate the increase in blood volume and cardiac output. The heart works harder and pumps more blood to supply the oxygen needs of the fetus as well as those of the mother. A woman with preexisting heart disease may become symptomatic and begin to decompensate during the time the blood volume peaks. She warrants close monitoring during 28 to 35 weeks' gestation.

### Blood Pressure

Blood pressure declines slightly during pregnancy as a result of peripheral vasodilation caused by progesterone, reaching a low point at 22 weeks' gestation, and thereafter increasing to prepregnant levels until term (Sloan, 2002). During the first trimester, blood pressure typically remains at the prepregnancy level. During the second trimester, the blood pressure decreases 5 to 10 mmHg and thereafter returns to first trimester levels (Hockenberry, 2005).

When the pregnant woman assumes a supine position, most commonly during the third trimester, the expanding uterus exerts pressure on the inferior vena cava, causing a reduction in blood flow to the heart. Called *supine hypotension syndrome*, the woman experiences dizziness, clamminess, and a marked decrease in blood pressure. Placing the woman in the left lateral recumbent position will correct this syndrome and optimize cardiac output and uterine perfusion.

### Blood Components

The number of RBCs also increases about 30%, depending on the amount of iron available. This increase is necessary to transport the additional oxygen required during pregnancy. Although there is an increase in RBCs, there is a greater increase in the plasma volume as a result of hormonal factors and sodium and water retention. Because the plasma increase exceeds the increase of RBC production, normal hemoglobin and hematocrit values decrease. This state of hemodilution is referred to as **physiologic anemia of pregnancy** (Lowdermilk & Perry, 2004).

Iron requirements during pregnancy increase because of the demands of the growing fetus and increase in maternal blood volume. The fetal tissues take predominance over the mother's tissues with respect to use of iron stores. With the accelerated production of RBCs, iron is necessary for hemoglobin formation, the oxygen-carrying

component of RBCs. Many women enter pregnancy in a depleted iron state and thus need supplementation to meet the extra demands of their growth state.

Both fibrin and plasma fibrinogen levels increase, along with various blood-clotting factors. These factors make pregnancy a hypercoagulable state. These changes, coupled with venous stasis secondary to venous pooling, which occurs during late pregnancy after long periods of standing in the upright position with the pressure exerted by the uterus on the large pelvic veins, contribute to slowed venous return, pooling, and dependent edema. These factors also increase the woman's risk for venous thrombosis (Ladewig, London, & Davidson, 2006).

### Respiratory System

The growing uterus and the increased production of the hormone progesterone cause the lungs to function differently during pregnancy. During the course of the pregnancy, the length of space available to house the lungs decreases as the uterus puts pressure on the diaphragm and causes it to shift upward. The growing uterus does change the size and shape of the thoracic cavity, but diaphragmatic excursion increases, chest circumference increases by 2 to 3 in, and the transverse diameter increases by an inch, allowing a larger tidal volume, as evidenced by deeper breathing (Littleton & Engebretson, 2005). Tidal volume or the volume of air inhaled increases gradually by 30 to 40% as the pregnancy progresses. As a result of these changes, the women's breathing becomes more diaphragmatic than abdominal (Matteson, 2001).

A pregnant woman breathes faster and more deeply because more oxygen is needed for herself and the fetus. Changes in the structures of the respiratory system take place to prepare the body for the enlarging uterus and increased lung volume (Mattson & Smith, 2004). All these structural alterations are temporary and revert back to their prepregnant state at the conclusion of the pregnancy.

Increased vascularity of the respiratory tract is influenced by increased estrogen levels, leading to congestion. This congestion gives rise to nasal and sinus stuffiness, epistaxis (nosebleed), and changes in the tone and quality of the woman's voice (Youngkin & Davis, 2004).

### Renal/Urinary System

Changes in renal structure occur from hormonal influences of estrogen and progesterone, pressure from an enlarging uterus, and an increase in maternal blood volume. Like the heart, the kidneys work harder throughout the pregnancy. Changes in kidney function occur to accommodate a heavier workload while maintaining a stable electrolyte balance and blood pressure. As more blood flows to the kidneys, the glomerular filtration rate (GFR) increases, leading to an increase in urine flow and volume, substances delivered to the kidneys, and filtration and excretion of water and solutes (Littleton & Engebretson, 2005).

Anatomically, the kidneys enlarge during pregnancy. Each kidney increases in length and weight as a result of

hormonal effects that cause increased tone and decreased motility of the smooth muscle. The renal pelvis becomes dilated. The ureters (especially the right ureter) elongate, widen, and become more curved above the pelvic rim as early as the 10th gestational week (Ladewig, London, & Davidson, 2006). Progesterone is thought to cause both these changes because of its relaxing influence on smooth muscle.

Blood flow to the kidneys increases by 35 to 60% as a result of the increase in cardiac output. This in turn leads to an increase in the GFR by as much as 50% starting during the second trimester. This elevation continues until birth (Littleton & Engebretson, 2005).

The activity of the kidneys normally increases when a person lies down and decreases on standing. This difference is amplified during pregnancy, which is one reason a pregnant woman feels the need to urinate frequently while trying to sleep. Late in the pregnancy, the increase in kidney activity is even greater when a pregnant woman lies on her side rather than her back. Lying on the side relieves the pressure that the enlarged uterus puts on the vena cava carrying blood from the legs. Subsequently, venous return to the heart increases, leading to increased cardiac output. Increased cardiac output results in increased renal perfusion and glomerular filtration (Mattson & Smith, 2004).

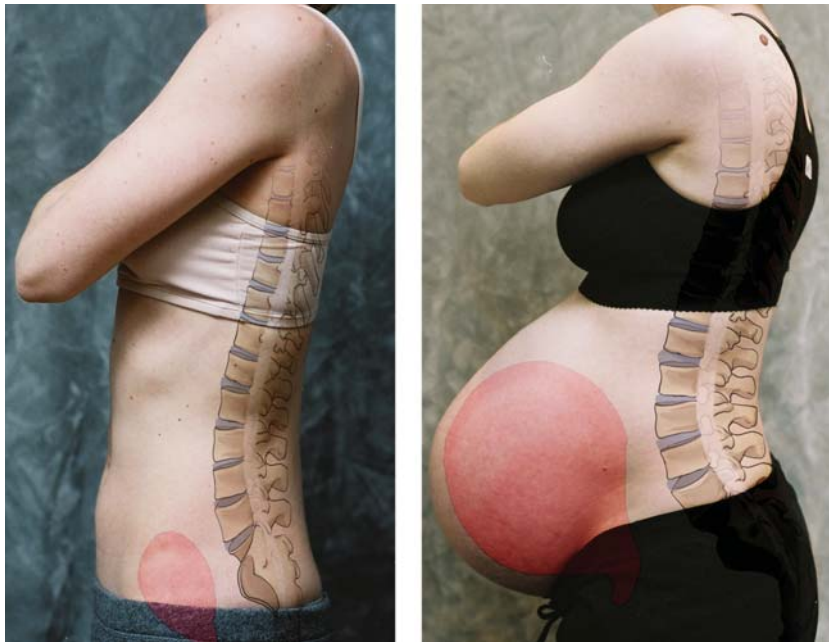
### Musculoskeletal System

Changes in the musculoskeletal system are progressive, resulting from the influence of hormones, fetal growth, and maternal weight gain. By the 10th to 12th week of pregnancy, the ligaments that hold the sacroiliac joints and the pubis symphysis in place begin to soften and stretch, and the articulations between the joints widen and become more movable (Sloan, 2002). The relaxation of the joints maximizes by the beginning of the third trimester. The purpose of these changes is to increase the size of the pelvic cavity and to make delivery easier.

The postural changes of pregnancy—an increased swayback and an upper spine extension to compensate for the enlarging abdomen—coupled with the loosening of the sacroiliac joints may result in lower back pain. The woman's center of gravity shifts forward, requiring a realignment of the spinal curvatures. An increase in the normal lumbosacral curve (lordosis) occurs and a compensatory curvature in the cervicodorsal area develops to assist her in maintaining her balance (Fig. 11-2). In addition, relaxation and increased mobility of joints occur because of the hormones progesterone and relaxin, which lead to the characteristic “waddle gait” that pregnant women demonstrate toward term. Increased weight gain can add to this discomfort by further accentuating the lumbar and dorsal curves (Lowdermilk & Perry, 2004).

### Integumentary System

The skin of pregnant women undergoes hyperpigmentation primarily as a result of estrogen, progesterone, and



A. Early pregnancy

B. Late pregnancy

● Figure 11-2 Postural changes during (A) the first trimester and (B) the third trimester.

melanocyte-stimulating hormone levels. These changes are mainly seen on the nipples, areolae, umbilicus, perineum, and axillae. Although many integumentary changes disappear after giving birth, some only fade. Many pregnant women express concern about stretch marks, skin color changes, and their hair falling out. Unfortunately, little is known about how to avoid these changes.

Complexion changes are not unusual. The increased pigmentation that occurs on the breasts and genitalia also develops on the face to form the “mask of pregnancy,” or facial melasma. This is a blotchy, brownish pigment that covers the forehead and cheeks in dark-haired women. Fortunately most fade as the hormones subside at the end of the pregnancy, but some may linger beyond the pregnancy. The skin in the middle of the abdomen may develop a pigmented line called **linea nigra**, which extends from the umbilicus to the pubic area (Fig. 11-3).

Striae gravidarum, or stretch marks, are irregular reddish streaks that may appear on the abdomen, breasts, and buttocks in about half of pregnant women after month 5 of gestation. They result from reduced connective tissue strength resulting from the elevated adrenal steroid levels and stretching of the structures secondary to growth (Ladewig, London, & Davidson, 2006).

Another skin manifestation, believed to be secondary to high estrogen levels, is the appearance of small, spiderlike blood vessels called *vascular spiders*. They may appear in the skin, usually above the waist and on the neck, thorax, face, and arms. They are especially obvious in white women and typically disappear after childbirth (Sloan, 2002). Palmar erythema is a well-delineated pinkish area on the palmar surface of the hands. This integu-

mentary change is also related to elevated estrogen levels (Lowdermilk & Perry, 2004).

Some women also notice a decline in hair growth during pregnancy. The hair follicles normally undergo a growing and resting phase. The resting phase is followed by a loss of hairs, which is then replaced by new ones. During pregnancy, fewer hair follicles go into the resting phase. After delivery, the body catches up with subsequent hair loss for several months (Ladewig, London, & Davidson, 2006).

### Endocrine System

The endocrine system undergoes many changes during pregnancy, because hormonal changes are essential in meeting the needs of the growing fetus. Hormonal changes play a major role in controlling the supplies of maternal glucose, amino acids, and lipids to the fetus. Although estro-



● Figure 11-3 Linea nigra.



gen and progesterone are the main hormones involved in pregnancy changes, other endocrine glands and hormones change during pregnancy.

### Thyroid Gland

The thyroid gland enlarges slightly and becomes more active during pregnancy as a result of increased vascularity and hyperplasia. Increased gland activity results in an increase in thyroid hormone secretion starting during the first trimester and tapering off within a few weeks after birth to return to normal limits (Ladewig, London, & Davidson, 2006). With an increase in the secretion of thyroid hormones, the basal metabolic rate (BMR; the amount of oxygen consumed by the body over a unit of time in milliliters per minute) progressively increases by 25% along with heart rate and cardiac output (Littleton & Engebretson, 2005).

### Pituitary Gland

The pituitary gland, also known as the *hypophysis*, is a small, oval gland about the size of a pea that is connected to the hypothalamus by a stalk called the *infundibulum*. During pregnancy, the pituitary gland enlarges and returns to normal size after birth.

The anterior lobe of the pituitary is glandular tissue and produces multiple hormones. The release of these hormones is regulated by releasing and inhibiting hormones produced by the hypothalamus.

Some of these anterior pituitary hormones induce other glands to secrete their hormones. The increase in blood levels of the hormones produced by the final target glands (e.g., the ovary or thyroid) inhibits the release of anterior pituitary hormones as follows:

- FSH and LH secretion are inhibited during pregnancy, probably as a result of hCG produced by the placenta and corpus luteum, and the increased secretion of prolactin by the anterior pituitary gland. They remain decreased until after delivery.
- Thyroid-stimulating hormone (TSH) is reduced during the first trimester but usually returns to normal for the remainder of the pregnancy. Decreased TSH is thought to be one of the factors, along with elevated hCG levels, associated with morning sickness, nausea, and vomiting during the first trimester.
- Growth hormone (GH) is an anabolic hormone that promotes protein synthesis. It stimulates most body cells to grow in size and divide, facilitating the use of fats for fuel and conserving glucose. During pregnancy, there is a decrease in the number of GH-producing cells and a corresponding decrease in GH blood levels. The action of human placental lactogen (hPL) is thought to decrease the need for and use of GH.
- During pregnancy, an increase in the number of prolactin-secreting cells (lactotrophs) and a significant increase in the blood level of this hormone occur. Prolactin stimulates the glandular production of colostrum.

During pregnancy, the ability of prolactin to produce milk is opposed by progesterone. As soon as the placenta is delivered, the opposition is removed, and lactation can begin. Levels of prolactin decrease after delivery, even in the lactating mother. Prolactin is produced in spurts, in response to the infant's sucking (Cunningham et al., 2005).

- Melanocyte-stimulating hormone (MSH), another anterior pituitary hormone, increases during pregnancy. For many years, its increase was thought to be responsible for many of the skin changes of pregnancy, particularly changes in skin pigmentation (e.g., darkening of the areola, melasma, and linea nigra). However, current belief attributes the skin changes to estrogen (and possibly progesterone) as well as the increase in MSH.

The two hormones oxytocin and antidiuretic hormone (ADH) released by the posterior pituitary are actually synthesized in the hypothalamus. They migrate along nerve fibers to the posterior pituitary and are stored until stimulated to be released into the general circulation.

Oxytocin is released by the posterior pituitary gland, and its production gradually increases as the fetus matures (Mattson & Smith, 2004). Oxytocin is responsible for uterine contractions, both before and after delivery. The muscle layers of the uterus (myometrium) become more sensitive to oxytocin near term. Toward the end of a term pregnancy, levels of progesterone decline and contractions that were previously suppressed by progesterone begin to occur more frequently and with stronger intensity. This change in the hormonal levels is believed to be one of the initiators of labor.

Oxytocin is responsible for stimulating uterine contractions that bring about delivery. Contractions lead to cervical thinning and dilation. They also exert pressure, helping the fetus to descend in the pelvis for eventual delivery. After delivery, oxytocin secretion continues, causing the myometrium to contract and helping to constrict the uterine blood vessels, decreasing the amount of vaginal bleeding after delivery.

Oxytocin is also responsible for milk ejection during breast-feeding. Stimulation of the breasts through sucking or touching stimulates the secretion of oxytocin from the posterior pituitary gland. Oxytocin causes contraction of the myoepithelial cells in the lactating mammary gland. With breast-feeding, uterine cramping often occurs, which signals that oxytocin is being released.

Vasopressin (ADH) functions to inhibit or prevent the formation of urine via vasoconstriction, which results in increased blood pressure. Vasopressin also exhibits an antidiuretic effect and plays an important role in the regulation of water balance (Olds et al., 2004).

### Pancreas

The pancreas is an exocrine organ, supplying digestive enzymes and buffers, and an endocrine organ. The endo-

crine pancreas consists of islets of Langerhans, which are groups of cells scattered throughout, each containing four cell types. One of the cell types is the beta cell, which produces insulin. Insulin lowers blood glucose by increasing the rate of glucose uptake and utilization by most body cells. The growing fetus has large needs for glucose, amino acids, and lipids. Even during early pregnancy the fetus makes demands on the maternal glucose stores. Ideally, hormonal changes of pregnancy help meet fetal needs without putting the mother's metabolism out of balance.

Women's insulin secretion works on a "supply-versus-demand" mode. As the demand to meet the needs of pregnancy increase, more insulin is secreted. Maternal insulin does not cross the placenta, so the fetus must produce his or her own supply to maintain glucose control (see Box 11-1 for information about pregnancy, glucose, and insulin).

During the first half of pregnancy, much of the maternal glucose is diverted to the growing fetus and thus the mother's glucose levels are low. hPL and other hormonal antagonists increase during the second half of pregnancy.

#### BOX 11-1

#### PREGNANCY, INSULIN, AND GLUCOSE

- During early pregnancy, there is a decrease in maternal glucose levels because of the heavy fetal demand for glucose. The fetus is also drawing amino acids and lipids from the mother, decreasing the mother's ability to synthesize glucose. Maternal glucose is diverted across the placenta to assist the growing embryo/fetus during early pregnancy, and thus levels decline in the mother. As a result, maternal glucose concentrations decline to a level that would be considered "hypoglycemic" in a nonpregnant woman. During early pregnancy there is also a decrease in maternal insulin production and insulin levels.
- The pancreas is responsible for the production of insulin, which facilitates entry of glucose into cells. Although glucose and other nutrients easily cross the placenta to the fetus, *insulin does not*. Therefore, the fetus must produce its own insulin to facilitate the entry of glucose into its own cells.
- After the first trimester, hPL from the placenta and steroids (cortisol) from the adrenal cortex act against insulin. hPL acts as an antagonist against maternal insulin, and thus more insulin must be secreted to counteract the increasing levels of hPL and cortisol during the last half of pregnancy.
- Prolactin, estrogen, and progesterone are also thought to oppose insulin. As a result, glucose is less likely to enter the mother's cells and is more likely to cross over the placenta to the fetus (Cunningham et al., 2005).

Therefore, the mother must produce more insulin to overcome the resistance by these hormones.

If the mother has normal beta cells of the islets of Langerhans, there is usually no problem meeting the demands for extra insulin. However, if a woman has inadequate numbers of beta cells, she may be unable to produce enough insulin and will develop glucose intolerance during pregnancy. If the woman has glucose intolerance, she is not able to meet the increasing demands and her blood glucose level increases.

#### Adrenal Glands

Pregnancy does not cause much change in the size of the adrenal glands themselves, but there are changes in some secretions and activity. One of the key changes is the marked increase in cortisol secretion, which regulates carbohydrate and protein metabolism and is helpful in times of stress. Although pregnancy is considered a normal condition, it is a time of stress for a woman's body. Cortisol increases in response to increased estrogen levels throughout pregnancy and returns to normal levels within 6 weeks postpartum (Ladewig, London, & Davidson, 2006).

During the stress of pregnancy, cortisol

- Helps keep up the level of glucose in the plasma by breaking down noncarbohydrate sources, such as amino and fatty acids, to make glycogen. Glycogen, stored in the liver, is easily broken down to glucose when needed so that glucose is available in times of stress.
- Breaks down proteins to repair tissues and manufacture enzymes
- Has anti-insulin, anti-inflammatory, and antiallergic actions
- Is needed to make the precursors of adrenaline, which the adrenal medulla produces and secretes (Cunningham et al., 2005)

Aldosterone, also secreted by the adrenal glands, is increased during pregnancy. It normally regulates absorption of sodium from the distal tubules of the kidney. During pregnancy, progesterone allows salt to be "wasted" (or lost) in the urine. Aldosterone is produced in increased amounts by the adrenal glands as early as 15 weeks of pregnancy (Dickey, 2003).

#### Prostaglandin Secretion During Pregnancy

Prostaglandins are not protein or steroid hormones; they are chemical mediators, or "local" hormones. Although hormones circulate in the blood to influence distant tissues, prostaglandins act locally on adjacent cells. The fetal membranes of the amniotic sac—the amnion and chorion—are both believed to be involved in the production of prostaglandins. Various maternal and fetal tissues, as well as the amniotic fluid itself, are considered to be sources of prostaglandins, but details about their composition and sources are limited. It is widely believed that prostaglandins play a part in softening the cervix, initiating and/or maintaining labor, but the exact mechanism is unclear.

## Placental Secretion

The placenta is a unique kind of endocrine gland; it has a feature possessed by no other endocrine organ—the ability to form protein and steroid hormones. Very early during pregnancy, the placenta begins to produce hormones:

- hCG
- hPL
- Relaxin
- Progesterone
- Estrogen

Table 11-3 summarizes the role of these hormones.

## Immune System

During pregnancy, the immune system also undergoes changes. These changes include

- Decreased resistance to infection resulting from the depressed leukocyte function
- Improvement in certain autoimmune conditions resulting from the depressed leukocyte function
- Decreased maternal immunoglobulin G (IgG) levels secondary to cross-placental transfer to the fetus starting at about 16 weeks' gestation
- Stable maternal IgA and IgM levels (Mattson & Smith, 2004)

**Table 11-3** Placental Hormones

Hormone	Description
hCG	<ul style="list-style-type: none"> <li>• Responsible for maintaining the maternal corpus luteum, which secretes progesterone and estrogens, with synthesis occurring before implantation</li> <li>• Production by fetal trophoblast cells until the placenta is developed sufficiently to take over that function</li> <li>• Basis for early pregnancy tests because it appears in the maternal bloodstream soon after implantation</li> <li>• Production peaking at 8 weeks and then gradually declining</li> </ul>
hPL (also known as human chorionic somatomammotropin (hCS))	<ul style="list-style-type: none"> <li>• Preparation of mammary glands for lactation and involvement in the process of making glucose available for fetal growth by altering maternal carbohydrate, fat, and protein metabolism</li> <li>• Antagonist of insulin because it decreases tissue sensitivity or alters the ability to use insulin</li> <li>• Increase in the amount of circulating free fatty acids for maternal metabolic needs and decrease in maternal metabolism of glucose to facilitate fetal growth</li> </ul>
Relaxin	<ul style="list-style-type: none"> <li>• Secretion by the placenta as well as the corpus luteum during pregnancy</li> <li>• Thought to act synergistically with progesterone to maintain pregnancy</li> <li>• Increase in flexibility of the pubic symphysis, permitting the pelvis to expand during delivery</li> <li>• Dilation of the cervix, making it easier for the fetus to enter the vaginal canal; thought that it suppresses the release of oxytocin by the hypothalamus, thus delaying the onset of labor contractions (Ladewig, London, &amp; Davidson, 2006)</li> </ul>
Progesterone	<ul style="list-style-type: none"> <li>• Often called <i>the hormone of pregnancy</i> because of the critical role it plays in supporting the endometrium of the uterus</li> <li>• Support of the endometrium to provide an environment conducive to fetal survival</li> <li>• Production by the corpus luteum during the first few weeks of pregnancy and then by the placenta until term</li> <li>• Initially, thickening of the uterine lining in anticipation of implantation of the fertilized ovum. From then on, it maintains the endometrium, inhibits uterine contractility, and assists in the development of the breasts for lactation (Matteson, 2001).</li> </ul>
Estrogen	<ul style="list-style-type: none"> <li>• Promotion of the enlargement of the genitals, uterus, and breasts, and increased vascularity, causing vasodilatation.</li> <li>• Relaxation of pelvic ligaments and joints (Lowdermilk &amp; Perry, 2004)</li> <li>• Association with hyperpigmentation, vascular changes in the skin, increased activity of the salivary glands, and hyperemia of the gums and nasal mucous membranes (Murray et al., 2006)</li> <li>• Aid in developing the ductal system of the breasts in preparation for lactation (Ladewig, London, &amp; Davidson, 2006)</li> </ul>

## Psychosocial Adaptations During Pregnancy

Pregnancy is a unique time in a woman's life. It is a time of dramatic alterations in her body and her appearance, as well as a time of change in her social status. All these changes occur simultaneously. Concurrent with her physiologic changes within her body systems are psychosocial changes within the mother and family members as they face significant role and lifestyle changes.

### Maternal Emotional Responses

Motherhood, perhaps more than any role in society, has acquired a special significance for women: Women should find fulfillment and satisfaction in the role of the “ever-bountiful, ever-giving, self-sacrificing mother” (Kruger, 2003). With such high expectations, many pregnant women experience various emotions throughout their pregnancy. The woman's approach to these emotions is influenced by her emotional makeup, her sociologic and cultural background, her acceptance or rejection of the pregnancy, and her support network (Olds et al., 2004).

Despite the wide-ranging emotions associated with the pregnancy, many women experience similar responses. These responses commonly include ambivalence, introversion, acceptance, mood swings, and changes in body image.

### Ambivalence

The realization of a pregnancy can lead to fluctuating responses, possibly at the opposite ends of the spectrum. For example, regardless of whether the pregnancy was planned, the woman may feel proud and excited at her achievement while at the same time fearful and anxious of the implications. The reactions are influenced by several factors, including the way the woman was raised by her family, her current family situation, the quality of the relationship with the expectant father, and her hopes for the future. Some women express concern over the timing of the pregnancy, wishing that goals and life objectives had been met before becoming pregnant. Other women may question how a newborn or infant will affect their career or their relationships with friends and family. These feelings can cause conflict and confusion about the impending pregnancy.

Ambivalence, or having conflicting feelings at the same time, is a universal feeling and is considered normal when preparing for a lifestyle change and new role. Pregnant women commonly experience ambivalence during the first trimester. Usually ambivalence evolves into acceptance by the second trimester, when fetal movement is felt. The woman's personality, her ability to adapt to changing circumstances, and the reactions of her partner will affect her adjustment to being pregnant and her acceptance of impending motherhood.

### Introversion

Introversion, or focusing on oneself, is common during the early part of pregnancy. The woman may withdraw and become increasingly preoccupied with herself and her fetus. As a result, her participation with the outside world may be less, and she will appear passive to her family and friends.

This introspective behavior is a normal psychological adaptation to motherhood for most women. Introversion seems to heighten during the first and third trimesters when the woman's focus is on behaviors that will ensure a safe and health pregnancy outcome. Couples need to be aware of this behavior and be informed about measures to maintain and support the focus on the family.

### Acceptance

During the second trimester, as the pregnancy progresses, the physical changes of the growing fetus with an enlarging abdomen and fetal movement bring reality and validity to the pregnancy. There are many tangible signs that someone separate from herself is present. The pregnant woman feels fetal movement and may hear the heartbeat. She may see the fetal image on an ultrasound screen and feel distinct parts, recognizing independent sleep and awake patterns. She becomes able to identify the fetus as a separate individual and accepts this.

Many women will verbalize positive feelings of the pregnancy and will conceptualize the fetus. The woman may accept her new body image and talk about the new life within. Generating a discussion about the woman's feelings and offering support and validation at prenatal visits are important.

### Mood Swings

Emotional lability is characteristic throughout most pregnancies. One moment a woman can feel great joy, and within a short time span feel shock and disbelief. Frequently, pregnant women will start to cry without any apparent cause. To some, they feel as though they are riding an “emotional roller-coaster.” These extremes in emotion can make it difficult for partners and family members to communicate with the pregnant woman without placing blame on themselves for their mood changes. Clear explanations about mood swings as common during pregnancy are key.

### Change in Body Image

The way in which pregnancy affects a woman's body image varies greatly from person to person. Some women feel as if they have never been more beautiful, whereas others spend their pregnancy feeling overweight and uncomfortable. For some women pregnancy is a relief from worrying about weight, whereas for others it only exacerbates their fears of weight gain. Changes in body image are normal but can be very stressful for the pregnant woman. Offering a thorough explanation and initi-

ating discussion of the expected bodily changes may be helpful in assisting the family to cope with them.

## Maternal Role Tasks

Reva Rubin (1984) identified maternal tasks that a woman must accomplish to incorporate the maternal role successfully into her personality. Accomplishment of these tasks helps the expectant mother develop her self-concept as a mother. They form a mutually gratifying relationship with her infant. These tasks include

- Ensuring safe passage throughout pregnancy and birth
  - Primary focus of the woman's attention
  - First trimester: woman focusing on herself, not on the fetus
  - Second trimester: woman developing attachment of great value to her fetus
  - Third trimester: woman having concern for herself and her fetus as a unit
- Participation in positive self-care activities related to diet, exercise, and overall well-being
- Seeking acceptance of infant by others
  - First trimester: acceptance of pregnancy by herself and others
  - Second trimester: family needing to relate to the fetus as member
  - Third trimester: unconditional acceptance without rejection
- Seeking acceptance of self in maternal role to infant ("binding in")
  - First trimester: mother accepting idea of pregnancy, but not of infant
  - Second trimester: with sensation of fetal movement (**quickening**), mother acknowledging fetus as a separate entity within her
  - Third trimester: mother longing to hold infant and becoming tired of being pregnant
- Learning to give of oneself
  - First trimester: identification of what must be given up to assume new role
  - Second trimester: identification with infant, learning how to delay own desires
  - Third trimester: questioning her ability to become a good mother to infant (Rubin, 1984)

## Pregnancy and Sexuality

The way a pregnant woman feels and experiences her body during pregnancy can affect her sexuality. The woman's changing shape, emotional status, fetal activity, changes in breast size, pressure on the bladder, and other discomforts of pregnancy result in increased physical and emotional demands. These can produce stress on the sexual relationship between the pregnant woman and her partner. As the changes of pregnancy ensue, many partners become confused, anxious, and fearful of how the relationship may be affected.

Sexual desire of pregnant women may change throughout the pregnancy. During the first trimester, the woman may be less interested in sex because of fatigue, nausea, and fear of disturbing the early embryonic development. During the second trimester, her interest may increase because of the stability of the pregnancy. During the third trimester, her enlarging size may produce discomfort during sexual activity (Littleton & Engebretson, 2005).

A woman's sexual health is intimately linked to her own self-image. Sexual positions to increase comfort as the pregnancy progresses as well as alternative noncoital modes of sexual expression, such as cuddling, caressing, and holding, should be discussed. Giving permission to talk about and then normalizing sexuality can help enhance the sexual experience during pregnancy and, ultimately, the couple's relationship. If avenues of communication are open regarding sexuality during pregnancy, any fears and myths the couple may have can be dispelled.

## Pregnancy and the Partner

Reactions to pregnancy and to the psychological and physical changes by the woman's partner varies vary greatly. Some enjoy the role of being the nurturer, whereas others experience alienation and may seek comfort or companionship elsewhere. Some expectant fathers may view pregnancy as proof of their masculinity and assume the dominant role, whereas others see their role as minimal, leaving the pregnancy up to the woman entirely. Each expectant partner reacts uniquely.

Emotionally and psychologically, expectant partners may undergo less visible changes than women, but most remain unexpressed and unappreciated (Buist et al., 2003). Expectant partners too experience a multitude of adjustments and concerns. Physically, they may gain weight around the middle and experience nausea and other GI disturbances, indicative of what is termed *couvade syndrome*—a sympathetic response to their partner's pregnancy. They also experience ambivalence during early pregnancy, with extremes of emotions (e.g., pride and joy versus an overwhelming sense of impending responsibility).

During the second trimester of pregnancy, partners go through acceptance of their role of breadwinner, caretaker, and support person. They come to accept the reality of the fetus when movement is felt and they experience confusion when dealing with the woman's mood swings and introspection.

During the third trimester, the expectant partner prepares for the reality of this new role and negotiates what the role will be during the labor and birthing process. Many may express their concern about being the primary support person during labor and birth, and how they will react when faced with their loved one in pain. Expectant partners share many of the same anxieties as their pregnant partners. However, revealing these anxieties to the pregnant partner or health care professionals is uncommon.

## Pregnancy and Siblings

A sibling's reaction to pregnancy is age dependent. Some children might express excitement and anticipation, whereas others might verbalize negative reactions. The introduction of a new infant into the family is often the beginning of sibling rivalry, which results from the child's fear of change in the security of their relationships with their parents (Olds et al., 2004).

Preparation of the siblings for the anticipated birth is imperative and must be designed according to the age and life experiences of the sibling at home. Constant reinforcement of love and caring will help to reduce their fear of change and possible replacement by the new family member.

If possible, parents are urged to include siblings at home in this event and make them feel part of preparing for the new infant (Fig. 11-4). Sibling preparation is important, but parents' focus must also continue on the older sibling after the birth to reduce regressive or aggressive behavior that might manifest toward the newborn.

### KEY CONCEPTS

- Pregnancy is a normal life event that involves considerable physical, psychosocial, emotional, and relationship adjustments.
- The sign and symptoms of pregnancy have been grouped into those that are subjective (*presumptive*) and experienced by the woman herself, those that are objective (*probable*) and observed by the health-care professional, and those that are the *positive, beyond-the-shadow-of-a-doubt* signs.
- Physiologically, almost every system of a woman's body changes during pregnancy with startling rapidity to accommodate the needs of the growing fetus. A majority of the changes are influenced by hormonal changes.



● Figure 11-4 Parents preparing sibling for the birth of a new baby.

- The placenta is a unique kind of endocrine gland; it has a feature possessed by no other endocrine organ—the ability to form protein and steroid hormones.
- Occurring in conjunction with the physiologic changes in the woman's body systems are psychosocial changes occurring within the mother and family members as they face significant role and lifestyle changes.
- Commonly experienced emotional responses to pregnancy in the woman include ambivalence, introversion, acceptance, mood swings, and changes in body image.
- Reactions of expectant partners to pregnancy and to the physical and psychological changes in the woman vary greatly.
- A sibling's reaction to pregnancy is age dependent. The introduction of a new infant to the family is often the beginning of sibling rivalry, which results from the established child's fear of change in security of their relationships with their parents. Therefore, preparation of the siblings for the anticipated birth is imperative.

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## Web Resources

- American College of Nurse Midwives, 202-347-5445, [www.acnm.org](http://www.acnm.org)
- American College of Obstetricians and Gynecologists, [www.acog.com](http://www.acog.com)
- Association of Women's Health, Obstetrics & Neonatal Nurses, [www.awhonn.org](http://www.awhonn.org)
- International Childbirth Education Association, [www.icea.org](http://www.icea.org)
- March of Dimes, [www.modimes.org](http://www.modimes.org)
- Mayo Clinic Pregnancy Center, [www.mayoclinic.org](http://www.mayoclinic.org)
- National Center for Education in Maternal and Child Health, [www.ncemch.org](http://www.ncemch.org)

## Chapter WORKSHEET

### ● MULTIPLE CHOICE QUESTIONS

1. When teaching a client about hormones, which would the nurse identify as responsible for calming the uterus and preventing contractions during early pregnancy?
  - a. Estrogen
  - b. Progesterone
  - c. Oxytocin
  - d. Prolactin
2. When assessing a client, which of the following would the nurse identify as a presumptive sign or symptom of pregnancy?
  - a. Restlessness
  - b. Elevated mood
  - c. Urinary frequency
  - d. Low backache
3. When obtaining a blood test for pregnancy, which hormone would the nurse expect the test to measure?
  - a. hCG
  - b. hPL
  - c. FSH
  - d. LH
4. A universal feeling expressed by most women upon learning they are pregnant is
  - a. Acceptance
  - b. Depression
  - c. Jealousy
  - d. Ambivalence
5. Reva Rubin identified four major tasks that the pregnant woman undertakes to form the basis for a mutually gratifying relationship with her infant. Which one describes binding in?
  - a. Ensuring safe passage through pregnancy, labor, and birth
  - b. Seeking of acceptance of this infant by others
  - c. Seeking acceptance of self as mother to the infant
  - d. Learning to give of oneself on behalf of one's infant

### ● CRITICAL THINKING EXERCISES

1. When interviewing a woman at her first prenatal visit, the nurse asks about her feelings. The woman replies, "I am frightened and confused. I don't know whether I want to be pregnant or not. Being pregnant means changing our whole life, and now having somebody to care for all the time. I'm not sure I would be a good mother. Plus I'm a bit afraid of all the changes that would happen to my body. Is this normal? Am I okay?"
  - a. How should the nurse answer her question?
  - b. What specific information is needed to support the client during this pregnancy?
2. Sally, age 23, is 9 weeks pregnant. At her clinic visit she says, "I'm so tired that I can barely make it home from work. Then once I'm home, I don't have the energy to make dinner." Sally's current lab work is within normal limits.
  - a. What explanation can the nurse offer Sally regarding her fatigue?
  - b. What interventions can the nurse offer to Sally?
3. Bringing a new infant into the family affects the siblings.
  - a. What strategies can a nurse discuss with a concerned mother when she asks how to deal with this?



## ● STUDY ACTIVITIES

1. Go to your local health department's maternity clinic and interview several women regarding their feelings and bodily changes that have taken place since their acknowledgment of pregnancy. Based on your findings, place them into appropriate trimesters of their pregnancy.
2. Complete a Web search for information regarding psychological changes occurring during pregnancy and share your Web sites with your clinical group.
3. During pregnancy, the plasma volume increases by 50% and the RBC volume only increases by 18 to 30%. This disproportion is manifested as \_\_\_\_\_.
4. When a pregnant woman in her third trimester lies on her back and experiences dizziness and light-headedness, the underlying cause of this is \_\_\_\_\_.

