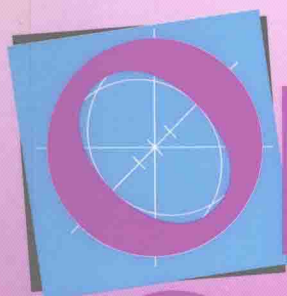


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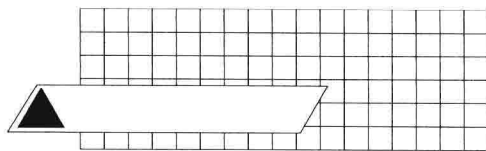
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Preface

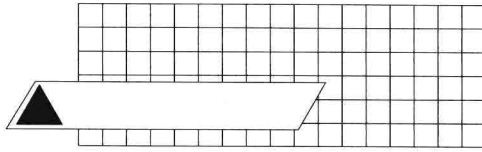
Fourth-year medical students, interns, and residents are chronically sleep deprived, have little time to study due to their clinical duties, and have a low tolerance for medical literature that is not clear and to the point. All too often as a medical student, and now as a resident, I have heard my colleagues bemoan the fact that there is no succinct, clinical text on each of the core subjects tested on the USMLE Steps 2 & 3. These trainees need review materials they can digest quickly, perhaps a subject in a weekend, which will enable them to answer correctly the majority of questions in each discipline. This attitude is especially evident for the USMLE Step 3, for example, where surgical residents are tested on pediatrics although they have not completed a clinical rotation in the discipline for two years.

Our goal in writing *Blueprints in Obstetrics and Gynecology* was to enable the reader to review the core material quickly and efficiently. The topics were chosen after analyzing over 2,000 review questions, which we believed were representative of the ob/gyn questions on the USMLE Steps 2 & 3 exams. This book is not meant to be comprehensive, but rather it is composed of the "high-yield" topics that consistently appear on these exams.

The questions on the USMLE Steps 2 & 3 are now crafted into clinical vignettes. To assist you in studying for this new format, the material in this book is presented either as the workup of a symptom or as a discussion of a particular disease or pathological process. Although this series is designed for the medical student or resident reviewing for the USMLE, we believe the books will be equally useful to all medical students during their clerkships or subinternships.

We hope that you find *Blueprints in Obstetrics and Gynecology* informative and useful. We welcome any feedback you may have about this text or any others in the Blueprints series.

Bradley S. Marino, MD, MPP
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Tamara L. Callahan, MD, MPP

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Aaron B. Caughey, MD, MPP

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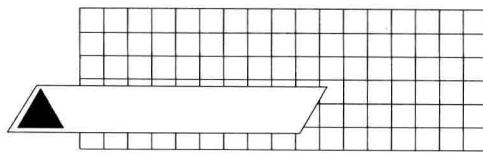
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- Figure 1-2. Gabbe SG, Niebyl JR, Simpson JL. *Obstetrics: Normal and Problem Pregnancies*. 2nd ed. New York: Churchill Livingstone, 1991:294.
- Figure 3-1. Benson RC, Pernoll ML. *Handbook of Obstetrics and Gynecology*. 9th ed. New York: McGraw-Hill, 1994:157.
- Figure 3-2. Hacker N, Moore JG. *Essentials of Obstetrics and Gynecology*. Philadelphia: Saunders, 1992:120.
- Figure 3-3. Creasy R. *Management of Labor and Delivery*. Cambridge: Blackwell Science, 1997.
- Figure 3-4. Repke JT. *Intrapartum Obstetrics*. New York: Churchill Livingstone, 1996:80-81.
- Figure 3-5. DeCherney A, Pernow M. *Current Obstetrics and Gynecologic Diagnosis and Treatment*. Norwalk, CT: Appleton & Lange, 1994:299.
- Figure 3-6. DeCherney A, Pernow M. *Current Obstetrics and Gynecologic Diagnosis and Treatment*. Norwalk, CT: Appleton & Lange, 1994:299.
- Figure 3-7. Hacker N, Moore JG. *Essentials of Obstetrics and Gynecology*. Philadelphia: Saunders, 1992:252.
- Figure 3-8. Hacker N, Moore JG. *Essentials of Obstetrics and Gynecology*. Philadelphia: Saunders, 1992:258.
- Figure 3-9. Beckman CC, et al. *Obstetrics and Gynecology for Medical Students*. 2nd ed. Baltimore: Williams & Wilkins, 1995:176.
- Figure 3-10. DeCherney A, Pernow M. *Current Obstetrics and Gynecologic Diagnosis and Treatment*. Norwalk, CT: Appleton & Lange, 1994:211.
- Figure 3-11. DeCherney A, Pernow M. *Current Obstetrics and Gynecologic Diagnosis and Treatment*. Norwalk, CT: Appleton & Lange, 1994:212.
- Figure 3-12. DeCherney A, Pernow M. *Current Obstetrics and Gynecologic Diagnosis and Treatment*. Norwalk, CT: Appleton & Lange, 1994:212.
- Figures 3-13, 3-14, and 3-15. Creasy R. *Management of Labor and Delivery*. Cambridge: Blackwell Science, 1997.
- Figure 3-16. Cunningham FG, et al. *Williams Obstetrics*. 19th ed. Norwalk, CT: Appleton and Lange, 1993:618.
- Figure 3-17. Benson RC, Pernoll ML. *Handbook of Obstetrics and Gynecology*. 9th ed. New York: McGraw-Hill, 1994:180.
- Figure 3-18A. Creasy R. *Management of Labor and Delivery*. Cambridge: Blackwell Science, 1997.
- Figure 3-18B. Cunningham FG, et al. *Williams Obstetrics*. 19th ed. Norwalk, CT: Appleton and Lange, 1993:391.
- Figure 3-19. Hacker N, Moore JG. *Essentials of Obstetrics and Gynecology*. Philadelphia: Saunders, 1992:142.
- Figure 4-1. Hacker N, Moore JG. *Essentials of Obstetrics and Gynecology*. Philadelphia: Saunders, 1992:156.
- Figure 4-2. DeCherney A, Pernow M. *Current Obstetrics and Gynecologic Diagnosis and Treatment*. Norwalk, CT: Appleton and Lange, 1994:400.
- Figure 5-1. Gabbe SG, Niebyl JR, Simpson JL. *Obstetrics: Normal and Problem Pregnancies*. 2nd ed. New York: Churchill Livingstone, 1991:844.
- Figure 5-2. DeCherney A, Pernow M. *Current Obstetrics and Gynecologic Diagnosis and Treatment*. Norwalk, CT: Appleton and Lange, 1994:204.
- Figure 5-3. Creasy R. *Management of Labor and Delivery*. Cambridge: Blackwell Science, 1997.
- Figure 5-4A. Cunningham FG, et al. *Williams Obstetrics*. 19th ed. Norwalk, CT: Appleton and Lange, 1993:502.
- Figure 5-4B. Chamberlain G. *Lecture Notes on Obstetrics*. 7th ed. Oxford: Blackwell Science, 1996:178.
- Figure 5-5. Chamberlain G. *Lecture Notes on Obstetrics*. 7th ed. Oxford: Blackwell Science, 1996:181.
- Figure 5-6. Cunningham FG, et al. *Williams Obstetrics*. 19th ed. Norwalk, CT: Appleton and Lange, 1993:506.
- Figure 5-7. Gabbe SG, Niebyl JR, Simpson JL. *Obstetrics: Normal and Problem Pregnancies*. 2nd ed. New York: Churchill Livingstone, 1991:566.
- Figure 5-8. Gabbe SG, Niebyl JR, Simpson JL. *Obstetrics: Normal and Problem Pregnancies*. 2nd ed. New York: Churchill Livingstone, 1991:568.
- Figure 5-9. Cunningham FG, et al. *Williams Obstetrics*. 19th ed. Norwalk, CT: Appleton and Lange, 1993:514.
- Figure 6-1. Beckman CC, et al. *Obstetrics and Gynecology for Medical Students*. 2nd ed. Baltimore: Williams & Wilkins, 1995:147.
- Figure 9-1. Clark SL, et al. *Critical Care Obstetrics*. 2nd ed. Cambridge: Blackwell Science, 1991:162.
- Figure 9-2. Clark SL, et al. *Critical Care Obstetrics*. 2nd ed. Cambridge: Blackwell Science, 1991:163.
- Figure 10-1. Gabbe SG, Niebyl JR, Simpson JL. *Obstetrics: Normal and Problem Pregnancies*. 2nd ed. New York: Churchill Livingstone, 1991:601.
- Figure 11-1. Champion RH. *Textbook of Dermatology*. 5th ed. Oxford: Blackwell Science, 1992, 2852.
- Figure 12-1. Hacker N, Moore JG. *Essentials of Obstetrics and Gynecology*. Philadelphia: Saunders, 1992:325.
- Figure 12-2. Beckman CC, Ling F. *Obstetrics and Gynecology for Medical Students*. Baltimore: Williams & Wilkins, 1992:398.
- Figure 12-3. Beckman CC, Ling F. *Obstetrics and Gynecology for Medical Students*. Baltimore: Williams & Wilkins, 1992:407.
- Figure 13-1. Beckman CC, Ling F. *Obstetrics and Gynecology for Medical Students*. Baltimore: Williams & Wilkins, 1992:306.
- Figure 14-1. Champion RH. *Textbook of Dermatology*. 5th ed. Oxford: Blackwell Science, 1992, 2852.

- Figure 14-2. Champion RH. Textbook of Dermatology. 5th ed. Oxford: Blackwell Science, 1992:2852.
- Figure 14-3. Blackwell RE. Women's Medicine. 1996:317.
- Figure 14-5. Clarke-Pearson DL, Dawood MY. Green's Gynecology. 4th ed. Boston: Little, Brown, 1990:280.
- Figure 14-6. Clarke-Pearson DL, Dawood MY. Green's Gynecology. 4th ed. Boston: Little, Brown, 1990:280.
- Figure 14-7. Crissey JT. Manual of Medical Mycology. Boston: Blackwell Science, 1995:90.
- Figure 14-8. Cox FEG. Modern Parasitology: A Textbook of Parasitology. 2nd ed. Oxford: Blackwell Science, 1993:9.
- Figure 15-1. Clarke-Pearson DL, Dawood MY. Green's Gynecology. 4th ed. Boston: Little, Brown, 1990:309.
- Figure 15-2. DeCherney A, Pernoll, M. Current Obstetric and Gynecologic Diagnosis and Treatment. Norwalk, CT: Appleton & Lange, 1994:755.
- Figure 16-1. Creasy R. Management of Labor and Delivery. Boston: Blackwell Science, 1997.
- Figure 16-2. Hacker N, Moore JG. Essentials of Obstetrics and Gynecology. Philadelphia: Saunders, 1992:397.
- Figure 16-3. DeCherney A, Pernoll, M. Current Obstetric and Gynecologic Diagnosis and Treatment. Norwalk, CT: Appleton & Lange, 1994:810.
- Figure 16-4. DeCherney A, Pernoll, M. Current Obstetric and Gynecologic Diagnosis and Treatment. Norwalk, CT: Appleton & Lange, 1994:814.
- Figure 16-5. Parsons L, Sommers SC. Gynecology. 2nd ed. Philadelphia: Saunders, 1978:1428.
- Figure 17-1. Retzky SS, Rogers RM. Clinical symposia: Urinary incontinence in Women. Summit: Ciba Geigy. 1995;47:4.
- Figure 17-2. Retzky SS, Rogers RM. Clinical symposia: Urinary incontinence in Women. Summit: Ciba Geigy. 1995;47:5.
- Figure 17-3. Whitfield CR. Dewhurst's Textbook of Obstetrics and Gynaecology for Postgraduates. 5th ed. Oxford: Blackwell Science, 1995:656.
- Figure 17-4. DeCherney A, Pernoll, M. Current Obstetric and Gynecologic Diagnosis and Treatment. Norwalk, CT: Appleton & Lange, 1994:833.
- Figure 17-5. Retzky SS, Rogers RM. Clinical symposia: Urinary incontinence in Women. Summit: Ciba Geigy. 1995;47:12.
- Figure 17-6. Retzky SS, Rogers RM. Clinical symposia: Urinary incontinence in Women. Summit: Ciba Geigy. 1995;47:15.
- Figure 17-7. Retzky SS, Rogers RM. Clinical symposia: Urinary incontinence in Women. Summit: Ciba Geigy. 1995;47:15.
- Figure 17-8. Retzky SS, Rogers RM. Clinical symposia: Urinary incontinence in Women. Summit: Ciba Geigy. 1995;47:15.
- Figure 18-1. Speroff L, Glass RH, Kase NG. Clinical Gynecologic Endocrinology and Infertility. 5th ed. Baltimore: Williams and Wilkins, 1994:370.
- Figure 18-2. Speroff L, Glass RH, Kase NG. Clinical Gynecologic Endocrinology and Infertility. 5th ed. Baltimore: Williams and Wilkins, 1994:378.
- Figure 18-3. Speroff L, Glass RH, Kase NG. Clinical Gynecologic Endocrinology and Infertility. 5th ed. Baltimore: Williams and Wilkins, 1994:379.
- Figure 18-4. Clarke-Pearson DL, Dawood MY. Green's Gynecology. 4th ed. Boston: Little, Brown, 1990:166.
- Figure 18-5. Sadler TW. Langman's Medical Embryology. 6th ed. Baltimore: Williams & Wilkins, 1990:21.
- Figure 18-6. Sadler TW. Langman's Medical Embryology. 6th ed. Baltimore: Williams & Wilkins, 1990:22.
- Figure 19-1. DeCherney A, Pernoll, M. Current Obstetric and Gynecologic Diagnosis and Treatment. Norwalk, CT: Appleton & Lange, 1994:1010.
- Figure 19-2. DeCherney A, Pernoll, M. Current Obstetric and Gynecologic Diagnosis and Treatment. Norwalk, CT: Appleton & Lange, 1994:1011.
- Figure 19-3. DeCherney A, Pernoll, M. Current Obstetric and Gynecologic Diagnosis and Treatment. Norwalk, CT: Appleton & Lange, 1994:1012.
- Figure 21-1. Mishell DR, et al. Infertility, Contraception, and Reproductive Endocrinology. 3rd ed. Cambridge: Blackwell Science, 1991.
- Figure 22-1. DeCherney A, Pernoll, M. Current Obstetric and Gynecologic Diagnosis and Treatment. Norwalk, CT: Appleton & Lange, 1994:674.
- Figure 22-3. Speroff L, Darney PA. A Clinical Guide for Contraception. 2nd ed. Baltimore: Williams & Wilkins, 1996:257.
- Figure 22-4. Kopenski S. Vaginal Contraception. New York: GK Hall.
- Figure 22-5. Speroff L, Darney PA. A Clinical Guide for Contraception. 2nd ed. Baltimore: Williams & Wilkins. 1996:247.
- Figure 22-6. Speroff L, Darney PA. A Clinical Guide for Contraception. 2nd ed. Baltimore: Williams & Wilkins, 1996:195.
- Figure 22-7. Speroff L, Darney PA. A Clinical Guide for Contraception. 2nd ed. Baltimore: Williams & Wilkins, 1996:680.
- Figure 22-8. Speroff L, Darney PA. A Clinical Guide for Contraception. 2nd ed. Baltimore: Williams & Wilkins. 1996:675.
- Figure 22-9. Speroff L, Darney PA. A Clinical Guide for Contraception. 2nd ed. Baltimore: Williams & Wilkins. 1996:675.
- Figure 22-10. Speroff L, Darney PA. A Clinical Guide for Contraception. 2nd ed. Baltimore: Williams & Wilkins. 1996:150.
- Figure 22-11. Hacker N, Moore JG. Essentials of Obstetrics and Gynecology. Philadelphia: Saunders, 1992:466.
- Figure 22-12. Hacker N, Moore JG. Essentials of Obstetrics and Gynecology. Philadelphia: Saunders, 1992:466.
- Figure 22-13. Hacker N, Moore JG. Essentials of Obstetrics and Gynecology. Philadelphia: Saunders, 1992:466.

- Figure 22-14. DeCherney A, Pernoll, M. Current Obstetric and Gynecologic Diagnosis and Treatment. Norwalk, CT: Appleton & Lange, 1994:897.
- Figure 23-1. DeCherney A, Pernoll, M. Current Obstetric and Gynecologic Diagnosis and Treatment. Norwalk, CT: Appleton & Lange, 1994:683.
- Figure 23-2. DeCherney A, Pernoll, M. Current Obstetric and Gynecologic Diagnosis and Treatment. Norwalk, CT: Appleton & Lange, 1994:684.
- Figure 25-1. Singer A. Lower Genital Tract Precancer: Colposcopy, Pathology, and Treatment. Oxford: Blackwell Science, 1994:181.
- Figure 26-1. DeCherney A, Pernoll, M. Current Obstetric and Gynecologic Diagnosis and Treatment. Norwalk, CT: Appleton & Lange, 1994:922.
- Figure 28-1. Robbins, Cotran R, Kumar V. Robbins Pathologic Basis of Disease. Philadelphia: Saunders, 1991:1165.
- Figure 28-2. Robbins, Cotran R, Kumar V. Robbins Pathologic Basis of Disease. Philadelphia: Saunders, 1991:1165.
- Figure 29-1. Szulman AE. J. Reprod. Med. 29:288, 1984.
- Figure 29-2. Chamberlain G. Lecture Notes on Obstetrics. 7th ed. Oxford: Blackwell Science, 1996.
- Figure 29-3. Hacker N, Moore JG. Essentials of Obstetrics and Gynecology. Philadelphia: Saunders, 1992:627.
- Figure 29-4. DeCherney A, Pernoll, M. Current Obstetric and Gynecologic Diagnosis and Treatment. Norwalk, CT: Appleton & Lange, 1994:974.
- Figure 29-5. Hacker N, Moore JG. Essentials of Obstetrics and Gynecology. Philadelphia: Saunders, 1992:631.

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Pregnancy and Prenatal Care

► PREGNANCY

Pregnancy is the state of having implanted an embryo in the uterus until such a time that the pregnancy is terminated by spontaneous or elective abortion or delivery. There are a myriad of physiologic changes that occur in a pregnant woman that include every organ system. As physicians, it is imperative to understand these changes and simultaneously incorporate this knowledge into the clinical arena.

Diagnosis

In a patient who has regular menstrual cycles and is sexually active, a period delayed by more than a few days to a week is indicative of pregnancy. Even at this early stage, patients may exhibit signs and symptoms of pregnancy. The classic finding of "morning sickness" can begin this early and often continues until 12 to 16 weeks. On physical examination, there are a variety of physical findings during pregnancy (Table 1-1).

There are many home pregnancy tests that have a high sensitivity and will be positive at or around the time of the missed menstrual cycle. These tests and the hospital laboratory assays test for the beta subunit of human chorionic gonadotropin (β -hCG). This hormone produced by the placenta will rise to a level of 100,000 by 10 weeks gestation and then level off to approximately 20,000 to 30,000 in the third trimester.

A viable pregnancy can be confirmed by ultrasound, which may show the gestational sac as early as 5 weeks, or at a β -hCG of 1,500 to 2,000, and the fetal heart as soon as 6 weeks, or a β -hCG of 5,000 to 6,000.

Terms and Definitions

From the time of fertilization until the pregnancy is 8 weeks old (10 weeks gestational age [GA]), the conceptus is called an embryo. After 8 weeks until the time of birth, it is a fetus. The term infant is used for the period between delivery and 1 year of age. Pregnancy is divided into trimesters. The first trimester lasts until 14 weeks GA, the second trimester from 14 until 28 weeks GA, and the third trimester from 28 weeks GA until delivery. An infant delivered before 24 weeks is considered to be pre-viable, from 24 to 37 weeks is considered preterm, and from 37 to 42 weeks

is term. (A pregnancy carried after 42 weeks is considered postdates or post-term.)

Gravidity refers to the number of times a woman has been pregnant and parity refers to the number of pregnancies that led to a birth after 20 weeks gestation or of a greater than 500-g infant. Parity is further subdivided into term and preterm deliveries, number of abortuses, and number of living children. A woman having given birth to one set of preterm twins, one term infant, and with two miscarriages would be a G4 P1-1-2-3. A multiple gestation is just one delivery but obviously may change the number living by more than one.

Dating of Pregnancy

The GA of a fetus is the age in days or weeks and is measured from the last menstrual period. Developmental age (DA) is the number of days or weeks since fertilization has occurred. Because fertilization usually occurs 2 weeks after the menstrual period, the GA is 2 weeks more than the DA.

Classically, Nagele's rule to calculate the estimated date of confinement (EDC) is to subtract 3 months from the last menstrual period (LMP) and add 7 days. Thus, a pregnancy with an LMP of 9/2/96 would have an EDC of 6/9/97. Exact dating uses an EDC calculated as 280 days after a certain LMP. If there is knowledge as to the date of ovulation, the EDC can be calculated by adding 266 days. This dating should be consistent with the initial examination of the uterus.

With an uncertain LMP, ultrasound is often used to determine the EDC. Ultrasound has a level of uncertainty that increases during the pregnancy. A safe rule of thumb is that the ultrasound is rarely off by more than 1 week in the first trimester, 2 weeks in the second trimester, and 3 weeks in the third trimester. The dating done with crown-rump length in the first half of the first trimester is probably even more accurate to within 3 to 5 days.

Other measures used to estimate gestational age include nonelectronic fetoscopy, which can hear the fetal heart (FH) at 20 weeks; Doppler ultrasound, which can appreciate the FH at 10 weeks; and maternal awareness of fetal movement, "quickening," which occurs between 16 and 20 weeks.

TABLE 1-1

Signs and Symptoms of Pregnancy

Signs

Chadwick's sign: Bluish discoloration of vagina and cervix

Goodell's sign: Softening and cyanosis of the cervix at or after 4 weeks

Ladin's sign: Softening of the uterus after 6 weeks

Breast swelling and tenderness

Development of the linea nigra from umbilicus to pubis

Telangiectasias

Palmar erythema

Symptoms

Amenorrhea

Nausea and vomiting

Breast pain

Quickening—fetal movement

Physiology

Cardiovascular

During pregnancy, cardiac output increases by 30 to 50%. Most increases occur during the first trimester, with the maximum being reached between 20 and 24 weeks gestation and maintained until delivery. Systemic vascular resistance decreases during pregnancy, resulting in a fall in arterial blood pressure. This decrease is most likely due to the elevated progesterone leading to smooth muscle relaxation. There is a decrease in systolic blood pressure of 5 to 10 mm Hg and in diastolic blood pressure of 10 to 15 mm Hg that nadirs at 24 weeks. Between 24 weeks gestation and term, blood pressure slowly returns to prepregnancy levels but should never exceed them.

Pulmonary

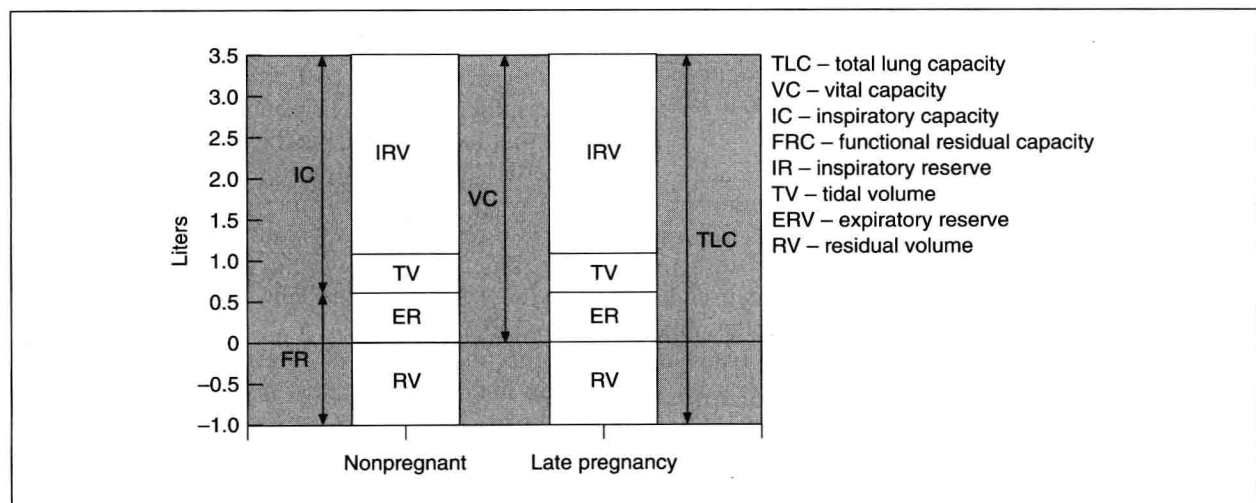
There is an increase of 30 to 40% in tidal volume (V_T) during pregnancy (Fig. 1-1) despite the fact that the total lung capacity is decreased by 5% due to the elevation of the diaphragm. This increase in V_T decreases the expiratory reserve volume by about 20%. The increase in V_T with a constant respiratory rate leads to an increase in minute ventilation of 30 to 40%. This leads to an increase in alveolar (PAO_2) and arterial (PaO_2) PO_2 levels and a decrease in $PACO_2$ and $Paco_2$ levels.

P_{aCO_2} decreases to approximately 30 mm Hg by 20 weeks gestation from 40 mm Hg prepregnancy. This change leads to an increased CO_2 gradient between mother and fetus and is likely caused by elevated progesterone levels that either increases the responsiveness to CO_2 of the respiratory center or acts as a primary stimulant. Dyspnea of pregnancy occurs in 60 to 70% of patients. It is likely secondary to decreased P_{aCO_2} levels, increased V_T , or possibly decreased total lung capacity (TLC).

Gastrointestinal

There is nausea and vomiting, termed "morning sickness," in greater than 70% of pregnancies. These symptoms are attributed to the elevation in estrogen, progesterone, and hCG. The nausea and vomiting should routinely resolve by 14 to 16 weeks gestation. During pregnancy, the stomach is noted to have increased gastric emptying times, and the gastroesophageal sphincter has decreased tone. These changes together lead to reflux and possibly combine with decreased esophageal tone to cause pyrosis, or spitting.

Figure 1-1 Lung volumes in nonpregnant and pregnant women.



during pregnancy. The large bowel also has decreased motility, which leads to increased water absorption and constipation.

Renal

The kidneys actually increase in size and the ureters dilate during pregnancy, which may lead to increased rates of pyelonephritis. The glomerular filtration rate (GFR) increases by 50% early in pregnancy and is maintained until delivery. As a result of increased GFR, blood urea nitrogen and creatinine decrease by about 25%. There is an increase in the renin-angiotensin system that leads to increased levels of aldosterone. This ultimately results in increased sodium resorption. This does not increase plasma levels of sodium, because there is a simultaneous increase in GFR.

Hematology

Although the plasma volume increases by 50% in pregnancy, the red blood cell volume increases by only 20 to 30%, which leads to a decrease in the hematocrit. The white blood count (WBC) increases during pregnancy to a mean of 10.5 million/mL with a range of 6 to 16. During labor, the WBC may rise due to the stress to over 20 million/mL. There is a slight decrease in the concentration of platelets, probably secondary to increased plasma volume and increase in peripheral destruction. Although a small percentage of patients may have platelets less than 150 million/mL, a drop in the platelet count over a short time is not normal and should be investigated.

Pregnancy is considered to be a hypercoagulable state, and the number of thromboembolic events increases. There are elevations in the levels of fibrinogen and factors VII through X. However, the actual clotting time and bleeding time does not change. The increased rate of thromboembolic events in pregnancy may be secondary to venous stasis and vessel endothelial damage.

Endocrine

Pregnancy is a hyperestrogenic state. Most estrogen is produced in the placenta with decreased production by the ovaries. Unlike estrogen production in the ovaries, where estrogen precursors are produced in ovarian theca cells and transferred to the ovarian granulosa cell, estrogen in the placenta is derived from circulating plasma-borne precursors produced by the maternal adrenal glands. Fetal well-being has been correlated with estrogen levels and low maternal estrogen levels have been associated with conditions such as fetal death and anencephaly.

hCG is composed of two dissimilar alpha and beta subunits. The alpha subunit of hCG is identical to the alpha subunit of luteinizing hormone, follicle-stimulating hormone, and thyroid stimulating hormone whereas the beta subunit differs. The placenta produces hCG, which acts to maintain progesterone production by the corpus luteum. Levels of hCG double approximately every 48 hours during early pregnancy, reaching a peak at approximately 10 to 12 weeks, thereafter declining and reaching steady state after week 15.

Human placental lactogen (hPL), also known as human chorionic somatomammotropin, is produced in the placenta and is important for ensuring a constant nutrient supply to the fetus. Lipolysis with a concomitant increase in circulating free fatty acids is caused by hPL. hPL also acts as an insulin antagonist, along with a variety of other placental hormones, thereby having a diabetogenic effect. This leads to increased levels of insulin and protein synthesis.

Progesterone is produced by the corpus luteum during early pregnancy, after which biosynthesis occurs primarily in the placenta. Progesterone precursors are derived from low-density-lipoprotein cholesterol. Levels of progesterone increase over the course of pregnancy. Progesterone causes relaxation of smooth muscle, which leads to multiple effects on the gastrointestinal, cardiovascular, and genitourinary systems.

High estrogen levels cause an increase in thyroid binding globulin. Placental hormones such as hCG may also have thyroid-stimulating properties, which lead to an elevation in total T3 and T4. Together, these changes lead to a relatively euthyroid state, although free T3 and T4 levels may decrease slightly in pregnancy. Levels of prolactin are markedly increased during pregnancy. Levels paradoxically decrease after delivery but later increase in response to suckling.

Musculoskeletal and Dermatologic

The obvious change in the center of gravity during pregnancy can lead to a shift in posture and lower back strain. There are numerous changes in the skin in pregnancy, including spider angiomas and palmar erythema secondary to increased estrogen levels and hyperpigmentation of the nipples, umbilicus, abdominal midline (the linea nigra), the perineum, and the face (melasma or chloasma) secondary to increased levels of alpha-melanocyte stimulating hormone and the steroid hormones.

Nutrition

During pregnancy and breastfeeding, the nutritional requirements increase. The average woman requires 2,000 to 2,500 kcal/day. The caloric requirement is increased by 300 kcal/day during pregnancy and by 500 kcal/day when breastfeeding. Most patients should gain between 20 and 30 pounds during pregnancy. Obese women are advised to gain less, between 15 and 20 pounds, and thin women are advised to gain slightly more, 25 to 35 pounds, during pregnancy.

In addition to the increased caloric requirements, there are increased nutritional requirements for protein, iron, folate, calcium, and other vitamins and minerals. The protein requirement increased from 60 g/day to 70 or 75 g/day. Recommended calcium intake is 1.5 g/day. Many patients develop iron deficiency anemia because of the increased demand of hematopoiesis by both the mother and the fetus. Folate requirements increase from 0.4 to 0.8 mg/day and are important in preventing neural tube defects.

All patients are advised to take prenatal vitamins during pregnancy. These are designed to compensate

for the increased nutritional demands of pregnancy. Furthermore, any patient whose hematocrit falls during the third trimester is advised to increase iron intake with supplementation (Table 1-2).

Key Points

- 1. A urine pregnancy test will often be positive at the time of the missed menstrual cycle.
- 2. Physiologic changes during pregnancy, mediated by the placental hormones, affect every organ system.
- 3. Cardiovascular changes include a 50% rise in blood volume and decrease in systemic vascular resistance.
- 4. Pulmonary changes include a >30% increase in V_T leading to a decrease in $Paco_2$ to 30 mm Hg and increase in blood pH to 7.45.

► PRENATAL CARE

Prenatal visits are designed to screen for a variety of complications of pregnancy while educating the patient

TABLE 1-2
Recommended Daily Dietary Allowances for Nonpregnant, Pregnant, and Lactating Women

	Nonpregnant Women (yr)					Pregnant Women	Lactating Women
	11-14	15-18	19-22	23-50	51+		
Energy (kcal)	2,400	2,100	2,100	2,000	1,800	+300	+500
Protein (g)	44	48	46	46	46	+30	+20
Fat-soluble vitamins							
Vitamin A activity (RE)	800	800	800	800	800	1,000	1,200
(IU)	4,000	4,000	4,000	4,000	4,000	5,000	6,000
Vitamin D (IU)	400	400	400	400	400
Vitamin E activity (IU)	12	12	12	12	12	15	15
Water-soluble vitamins							
Ascorbic acid (mg)	45	45	45	45	45	60	80
Folate (μg)	400	400	400	400	400	800	600
Niacin (mg)	16	14	14	13	12	+2	+4
Riboflavin (mg)	1.3	1.4	1.4	1.2	1.1	+0.3	+0.5
Thiamin (mg)	1.2	1.1	1.1	1	1	+0.3	+0.3
Vitamin B ₆ (mg)	1.6	2	2	2	2	2.5	2.5
Vitamin B ₁₂ (μg)	3	3	3	3	3	4	4
Minerals							
Calcium (mg)	1,200	1,200	800	800	800	1,200	1,200
Iodine (μg)	115	115	100	100	80	125	150
Iron (mg)	18	18	18	18	10	+18	18
Magnesium (mg)	300	300	300	300	300	450	450
Phosphorus (mg)	1,200	1,200	800	800	800	1,200	1,200
Zinc (mg)	15	15	15	15	15	20	25

From Gabbe SG, Niebyl JR, Simpsen JL. Obstetrics: normal and problem pregnancies. 2nd ed. New York: Churchill Livingstone, 1991:196.