NTIL the early 20th century, physical activity during pregnancy was discouraged, primarily on the basis of theoretical concerns about exercise-induced injury and adverse fetal and maternal outcomes. Some experts considered women “indisposed” for the entire 9 months before the birth of their children. Following the delivery, women were advised to recuperate by lying in bed for many more months.

In recent years, guidelines for exercise and health behaviors in the prenatal period have evolved as more reliable research has emerged. Multiple changes to the guidelines and recommendations over the last 30 years have addressed weight gain, appropriate activity modes, intensity and duration of activity. These changes have led to confusion among practitioners and pregnant women regarding which activities are appropriate. As more data emerge regarding the physiologic processes that are involved in prenatal exercise, the importance of an appropriately-designed exercise program is becoming clear. Athletic trainers and therapists (ATs) should understand the physiologic processes, capabilities, and limitations associated with pregnancy to properly meet the unique needs of the pregnant athlete. ATs should understand current recommendations to optimize the level of training during pregnancy, decrease legal liability, decrease the duration of postpartum recovery, and decrease the risk of maternal and fetal injury during the prenatal period.

The impact of pregnancy on athletics is difficult to assess, due to limited research concerning the rate of pregnancy among athletes. One of few such studies was performed by Miller et al., who surveyed a nationally representative sample of public and private high school students. They found that 4.8% of 2,080 female athletes reported having been pregnant. Additionally, 5.5% of 2,941 male athletes reported having impregnated someone. The NCAA estimated that a college athletic program with 300 female and male students could reasonably expect 30-45 student-athletes to be affected by a pregnancy each year.

The role of the AT in the care of a pregnant student athlete is extremely important. According to the NCAA, “the certified athletic trainer or team physician is often the first to recognize that a student-athlete is pregnant...
or the first person approached in confidence within the athletics department. The AT should be aware of the institution’s pregnancy policies and should be able to readily access resources. Care should begin at the initial stages of pregnancy and continue until the athlete returns to full and unrestricted activity.”

**Classifications and Definitions**

Pregnancy (or parturition) involves a series of stages and substages, each of which is characterized by anatomic and physiologic changes. The prenatal period encompasses the period from conception to birth. The postpartum period begins after birth and is generally defined as the 6-week period that follows.7 The duration of pregnancy averages 266 days (38 weeks) after ovulation, or 280 days (40 weeks) after the first day of the last menstrual cycle. This period equals 10 lunar months, or just over 9 calendar months.7 The entire process is then subdivided into three relatively equal trimesters.

**Anatomic and Physiologic Changes**

**Endocrine System**

During pregnancy, there is an increase in the release of specific hormones that mediate the process of fetal development and sustain essential functions for both the mother and fetus.8 During the early part of pregnancy (first 6-8 weeks of gestation), the main source of pregnancy-sustaining hormones is the corpus luteum, which is a mass of cells that forms on the ovaries.3 Later in pregnancy, this role is primarily assumed by the placenta. Hormone-induced changes include the following:

**Estrogen:** The estrogens include estrone (E1), estradiol, and estriol (E3). The functions of estrogen in pregnancy include stimulation of glandular tissue and ducts in the breast and an increase in prostaglandin and oxytocin production.7

**Progesterone:** In nonpregnant women progesterone is produced by the ovaries. During the early stages of pregnancy, the primary site for progesterone production is the corpus luteum.7 Progesterone mediates a number of vital physiologic functions during pregnancy, including increased mobility of the joints.7

**Relaxin:** Relaxin is primarily released by the corpus luteum during pregnancy but is also released by the ovaries, uterus, and placenta. Relaxin levels are the greatest during the first trimester, but remain detectable in the maternal circulation throughout gestation.9 It works synergistically with progesterone to decrease uterine activity during pregnancy and to suppress oxytocin release. Like progesterone, relaxin affects the connective tissue of in a manner that increases the mobility of joints.9

**Gestational Weight Gain**

A number of cross-sectional studies have documented that weight gain during pregnancy typically ranges from 22 to 35 pounds.3,10,11 Typically, the weight gain is attributed to the growth of the abdomen and changes to the uterus, which alters the position of the center of gravity (COG). Enlargement of the breasts also contributes to the change in the COG position (approximately 500 grams at full term). Predictors of gestational weight gain include age, body mass index (BMI), prepregnancy

**Table 1. Recommendations for Total and Rate of Weight Gain During Pregnancy, by Prepregnancy BMI**

<table>
<thead>
<tr>
<th>Pre-pregnancy Category</th>
<th>BMI (kg/m²)</th>
<th>Total weight gain range (lbs)</th>
<th>Rate of weight gain in 2nd and 3rd trimester (range in lbs/week)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>&lt; 18.5</td>
<td>28-40</td>
<td>1 (1-1.3)</td>
</tr>
<tr>
<td>Normal weight</td>
<td>18.5-24.9</td>
<td>25-35</td>
<td>1 (0.8-1)</td>
</tr>
<tr>
<td>Overweight</td>
<td>25.0-29.9</td>
<td>15-25</td>
<td>0.6 (0.5-0.6)</td>
</tr>
<tr>
<td>Obese</td>
<td>≥ 30.0</td>
<td>11-20</td>
<td>0.5 (0.4-0.6)</td>
</tr>
</tbody>
</table>