

## **SEX DIFFERENCES IN BODY COMPOSITION**

- Sexual dimorphism in human body composition is evident from fetal life, but emerges primarily during puberty. At birth, males have a similar fat mass to females but are longer and have greater lean mass.
- Such differences remain detectable during childhood; however, females enter puberty earlier and undergo a more rapid pubertal transition, whereas boys have a substantially longer growth period. After adjusting for dimorphism in size (height), adult males have greater total lean body mass and mineral mass, and a lower fat mass than females.
- Males generally have larger lean body mass by a ratio of approximately 3:2 (for example, 61 kg or so versus 43 kg or so). This sex difference in lean body mass is reflected in the sex difference in basal energy requirements, in the caloric allowances set by the Food and Nutrition Board's (NB) Committee on Dietary Allowances (the Recommended Dietary Allowances—the RDAs) and in caloric intakes actually reported in major nutritional surveys (NHANES I and II, the Tecumseh Community Health Survey, and so on).
- These whole-body differences are complemented by major differences in tissue distribution. Adult males have greater arm muscle mass, larger and stronger bones, and reduced limb fat, but a similar degree of central abdominal fat. Females have a more peripheral distribution of fat in early adulthood; however, greater parity and the menopause both induce a more android fat distribution with increasing age. Moreover, the calcium content of the male skeleton is approximately 1,000 g and that of female skeleton is approximately 750 g.
- Differences in fat weight (FW) and percent fat (%F) - Females generally do have a thicker panniculus of outer fat is well known, but this is not always the case; some females have less outer fat than males do. When FW is measured, the two sexes are often quite similar, a fact that is not well appreciated. Yet percent fat (%F) is generally higher in females because FW may be the same, but total body weight (TBW) is considerably less. Even during pre-puberty, girls exhibited a significantly higher amount of body fat and a

significantly lower amount of lean body mass than their male counterparts. These gender differences are found throughout life.

- Sex differences in body composition are primarily attributable to the action of sex steroid hormones, which drive the dimorphisms during pubertal development. Estrogen is important not only in body fat distribution but also in the female pattern of bone development that predisposes to a greater female risk of osteoporosis in old age.
- Disorders of sex development are associated with significant abnormalities of body composition, attributable largely to their impact on mechanisms of hormonal regulation.