Food Intake is controlled primarily by the hypothalamus.

Control of food intake is primarily a function of the hypothalamus. Classically, the hypothalamus is considered to have a pair of centers, one in the ventromedial (ventral-midline) area. Satiety is the feeling of being full. The functions of these areas have been characterized by a series of experiments that involve either destruction or stimulation of these specific regions. Stimulation of the hypothalamus results in the suppression of eating. In contrast, stimulation of the area that controls satiety results in increased feeding behavior. It is this difference that allows one to eat even if previously deprived of food. As expected, destruction of this area produces the opposite effect—prolonged eating and obesity. Conversely, the stimulated animal reduces food intake to the point that the animal starves itself to death. In contrast, stimulation of the satiety centers results in satiety, or the feeling of having had enough to eat. Consequently, the stimulated animal refuses to eat even if previously deprived of food. As expected, destruction of this area produces the opposite effect—prolonged eating and obesity. Conversely, the stimulated animal reduces food intake to the point that it starves itself to death. In contrast, stimulation of the satiety centers results in satiety, or the feeling of having had enough to eat. Consequently, the stimulated animal refuses to eat even if previously deprived of food. As expected, destruction of this area produces the opposite effect—prolonged eating and obesity. Conversely, the stimulated animal reduces food intake to the point that it starves itself to death. However, there are body weight mechanisms that signal the body's nutritional status, such as how much fat is stored or how much glucose is available, in order to regulate food intake. Control of food intake does not depend on changes in a single signal but is determined by the integration of many inputs that provide information about the body's energy status. Multiple metabolic signals together ensure that feeding behavior is synchronized with the body's immediate and long-term energy needs. Some information is used for short-term regulation of food intake, helping to control meal size and frequency. Even so, over a 24-hour period, the energy intake matches energy expenditure for that day. The balance between total calorie intake and total energy output is very difficult, however, over long periods of time. As a result, the total energy content of the body and, consequently, body weight—remains relatively constant on a long-term basis. Thus, energy homeostasis, that is, energy balance, is carefully regulated. Based on current evidence, the following regulatory factors are among those that contribute to the control of food intake and maintenance of energy balance. (Figure 17-3).

The size of fat stores.

Our notion of fat cells (adipocytes) as adipose tissue as merely a storage space for triglycerides is false. It has undergone a dramatic change in the past decade with the discovery of their active role in energy homeostasis. Adipocytes secrete leptin, a hormone essential for normal body weight regulation (leptin metabolism...