

# Age-Related Changes in Anatomy, Physiology, and Function

Aging is a progressive and cumulative process involving a number of biological, anatomical, physiological, and functional changes that occur over time. Some of these changes that were once thought to be “normal” aging have turned out to be the result of disease. The longer we live, the greater the chances of acquiring some disease that will impact normal functioning. Recent research clearly shows that activity, proper nutrition and hydration, a positive attitude, and reduction of stress results in a longer and healthier life.<sup>1</sup>

Most of the changes that occur with aging have no impact on normal functioning, although they become apparent when the body is placed under stress, such as an acute illness or physical exertion. For example, the maximum heart rate achievable by older adults is lower than that of younger adults; the resting pulse, however, would not show this change.<sup>2</sup>

It is important to be able to recognize the changes of normal aging vs the effects of disease or inactivity. Untreated disease can result in excess disability and reduce the quality of life of individuals. In this chapter, the changes in the body that occur with aging will be identified and described. Healthy aging is an issue of increasing importance as the size of the older population continues to grow. Poor health in later life is not inevitable.<sup>3</sup> Much of the illness and disability associated with aging is related to inactivity and other modifiable lifestyle factors that are present throughout life.

Although we have more wrinkles, more gray hair, and stiffer arteries, the normal changes of aging are unlikely to kill us. No one dies only of old age per se; infections

or other diseases, most of which might not be life threatening in youth, are the usual cause of death in old age. This chapter covers changes in anatomy, physiology, and function that occur with aging. It reviews each body system and discusses the consequences of what is considered *normal aging*, the wearing and slowing of systems with the passage of time.

## AGING: FUNCTIONAL RESULTS

While the process of aging is very complex, this survey of the body's systems will be based on the functional changes that the physical therapist assistant (PTA) is likely to see in the clinic. Some changes in function go hand in hand with anatomical or structural changes. Skeletal muscle is one such example; while muscle mass decreases as muscle fibers are lost, the remaining muscle mass is capable of maintaining and actually increasing muscle strength and stability. In some aging processes there are no anatomic losses, but rather a reduction in physiological efficiency. For example, although the structural integrity of the nerves is maintained, there is a reduced conduction velocity in aging nerve fibers that results in slower reactions when balance is lost.

### *Homeostasis and Aging*

Normal changes of aging reduce the capacity to regain *homeostasis*, a concept describing the body's