

COMPARING AND CONTRASTING THE THEORIES OF AGING

PEARLS

- ❖ Hayflick and Moorhead conducted a landmark study that showed that in culture human fibroblasts have a limited life span.
- ❖ Neuroendocrine and hormonal theory regards functional decrements in neurons and their associated hormones as central to the aging process.
- ❖ According to the free radical theory, free radicals accumulate with age and cause destruction to important biological structures through an oxidative process.
- ❖ The caloric restriction theory prescribes that an individual gradually loses weight until a point of maximum metabolic efficiency is reached for maximum health and life span.
- ❖ The error theory specifies that any error in the process of making proteins will cascade into multiple effects.
- ❖ The somatic mutation theory hypothesizes that genetic damage will result from radiation and that radiometric agents accumulate and create functional failure and death of the organism.
- ❖ In the cross-linkage theory, cross-linkage of macromolecules is responsible for secondary and tertiary aging.

The search for the arcanum of that nemesis called old age has enticed many scientists to theorize and experiment with possible explanations for the mechanisms involved in the aging process. What determines how we age? Are there some biological prognosticators that determine how quickly and/or how well we age? Is aging programmed or unprogrammed in our genetic makeup? How do external factors affect our predisposed genetic makeup? The study of gerontology is a relatively new discipline, and the excitement of exploring its territory has seduced many scientific minds to explore potential explanations of how the human species ages. Several theories of aging have been proposed; the most prominent theories will be reviewed and compared in this chapter. With the decoding of the human genomes, many new theories are evolving related to the potential of correcting gene coding that potentiates disease in old age and the possibility of extending the length of life. This critical look at current theories will provide a basic framework for understanding and critically evaluating the subsequent chapters on

normal and pathological aging as well as clinical observations and strategies for managing the care of older individuals.

HISTORICAL PERSPECTIVE

The study of aging has a long history. Much of the research in the biology of aging has focused on prolongation studies rather than on the actual mechanisms of aging. Until recently, nonprogrammed theories of biological aging were popular because of the widespread perception that the evolution process could not support the development and retention of programmed aging in mammals. However, newer evolutionary mechanics theories including group selection, kin selection, and the evolvability theory support mammal programmed aging, and multiple programmed aging theories have been published based on the new mechanics. Some proponents of nonprogrammed aging still contend that their nonprogrammed theories are superior despite the new mechanics concepts. However, as