

Introduction

Claude Lenfant

AGING is an unavoidable process that all species have to undergo, a process that begins at birth. From that moment on, we follow a path marked by myriad transformations. These transformations are under the influence of all domains—biological, environmental, and sociological. In general, the biological changes follow a predetermined course, but events are greatly affected by environmental and sociological forces.

Nearly all human populations experienced an increase in longevity during the last century. For example, in the United States, life expectancy grew by 30 years between 1900 and 2000. Although the increases were much more pronounced at the beginning of that century, they continue to occur; about 1.5 years were gained during the last decade. It is reasonable to assume that the foundation of our biology—that is, our genetic makeup—did not change significantly during those hundred years. Thus we can conclude that our increased longevity is the result of positive environmental and sociological influences and their impact on our biology. Undeniably, at least for the foreseeable future, our machinery, our biology, will remain programmed to wear out. What environmental and sociological factors do is to speed up, or slow down, this process. And, therein lies opportunity!

Today's genomic revolution has provided evidence that our genetic makeup can accelerate or decelerate the aging process, in much the same way that it alters our body's response to risk factors that are known to cause disease. We can easily foresee that someday genes will enable us to determine whether and when some pathological processes will progress or, even better, to explain our response or nonresponse to a specific medication. This is the promise of genomic medicine or, as some prefer to call it, personalized medicine.

With regard to aging, there is no doubt that one's genes, one's heredity, can give some idea of one's chance of living a long life. But, this is not a sure thing, and certainly no one should bank on it. We, ourselves, are in control of our future, not our parents or ancestors!

So, having said all this, let us pose the essential question: Can we control our aging? I believe that the answer is a resounding Yes—perhaps not in all aspects, but certainly in most. To be sure, some observers will react disbelievingly to such optimism. To them, I would respond that if it were not possible, the life expectancy of the American people would not have increased 30 years during the last century. And the United States is not unique in this regard. Nearly all of the countries have witnessed such a gain, and many have had much greater gains than the United States.

The prospects for the future are even better, as is acknowledged by many worldwide demographic projections: all show a substantial increase in longevity and, of course, a consequent increase in the number of elderly individuals in each country.

Although the biology of our aging is an integral part of our biology of living, of progressing from birth to the end of life, it is characterized by specific features that demand closer study. This publication presents state-of-art discussions of these unique aspects of aging. The importance and potential impact of such discussions are noteworthy, as many of the processes that transpire in the normal course of events can be stimulated or suppressed by exogenous interventions. For example, medications used in old age are the same as those used in youth and middle age, but their metabolism is different. In the absence of understanding the specific characteristics of drug metabolism in older people, we may unknowingly prescribe some drugs that may be detrimental, rather than beneficial. Likewise, the vascular system and cognitive functions differ in the elderly, but both can be supported and aided if we know the nature and magnitude of the impairment. And, the same can be said about many other aspects of our aging biology, as amply shown in this publication.

The science of aging is relatively new. In the United States, it was formalized by the creation of the National Institute on Aging in 1974. Since that time, a huge amount of science-based knowledge about aging has been developed and many of the myths about aging have been diminished, if not eliminated. Aging is not a disease, it is a part of our normal life, and developing a scientific perspective on it can only make coping with it easier.

The nonprofit foundation "Le Collège International de Recherche Servier" has rendered a great service to the scientific community and to the public by sponsoring this publication. In the end, it is the people coping with aging who will benefit from it. Aging is unavoidable, but it need not be quite so inexorable!

From the National Heart, Lung and Blood Institute, National Institutes of Health, Bethesda, MD.

Address reprint requests to Claude Lenfant, MD, Director, National Heart, Lung and Blood Institute, National Institutes of Health, Bethesda, MD 20892.

© 2003 Elsevier Inc. All rights reserved.

0026-0495/03/5210-2003\$30.00/0

doi:10.1053/S0026-0495(03)00293-2