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# Introductory Chapter: Aging is a Preventable Disorder

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Additional information is available at the end of the chapter

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## 1. Introduction

People all over the world live longer anymore. Therefore, by improving living and health conditions, the elderly population is rapidly increasing worldwide. Life expectancy is increasing both in developed and developing countries. It is expected that 20% of the world population will be over 65 years of age by 2030 [1]. However, the increased life expectancy does not mean the healthy life expectancy. Continuously aging population consequently augmented the burden of chronic diseases to themselves and society. The dependencies in prolonged late life are real threats for personally low quality of life and socially burden on health care systems [1, 2]. For this reason the future medicine needs to be focused on productive healthy aging and thus it's provide prolonged healthy life.

## 2. What is aging?

According to the World Health Organization (WHO), aging is the decline ability to adapt the environmental factors [1]. Aging could be defined as accumulated damages in body as time goes. Molecular and cellular damages gradually increase over the years and lead to decrease in physical and mental capacity of the human body [3, 4]. Aging is characterized by functional decline in every organ due to several cellular, biological, and physiological changes over time. The cumulative effects of the years cause to overall deterioration of the body. As an accumulated result of various diseases in old age, the functional impairment cause to decrease of capability one's own needs [3–7]. A humorist writer defined aging as “hardening of soft tissues and softening of hard tissues in human body” [8]. The mechanism of aging generally expresses with the molecular and cellular damages [4–7]. Free radical accumulation in mitochondria in consequence of oxidative stress finally results on dysfunctional senescent cells [6]. The senescent cells can affect their microenvironment and lead to

intracellular alterations. An accumulation of dysfunctional cells disrupts tissue homeostasis and thus rises functional decline in organ system [9, 11–14]. Strehler stated that “my simple view is that aging is those things that go wrong when cells lose their ability to divide, if we could replace our cells as rapidly as they deteriorate, we could probably live very long, if not indefinitely” [10]. Several factors from telomere attrition, loss of proteostasis, mitochondrial dysfunction, cellular senescence to stem cell exhaustion have been identified in the mechanism of aging [4–7, 9, 11]. However, the causal mechanisms of aging are still substantially unknown.

### 3. How human aging healthy?

It is clearly known that aging and biological age were different conceptions. Despite the age-related changes are based on biological mechanisms, every person has different aging processes. It is well-defined that the negative environmental factors such as sedentary life, unhealthy eating, and stress accelerate aging process, supportive lifestyle, and healthy environment delay this period [1–3]. It has been shown that the simple interventions to lifestyle such as smoking cessation, moderate alcohol consumption, daily physical activity, healthy diet, quality sleep, intermittent fasting, and sustain of an optimal body mass index (BMI) (18.5–24.9 kg/m<sup>2</sup>) can increase lifespan more than a decade in both gender (14 years in women and 12.2 years in men) [15]. In the last years, antiaging medical checkups to prevent functional aging and rejuvenate the functional age was widely popular [16]. Unveiling of the human genome and grip better the genetic code has been provided for intervene in biological systems. The genetic engineering and antiaging scientific research such as DNA methylation, calorie restriction, and geroprotectors (rapamycin, metformin, resveratrol, and pterostilbene) have been studied for intervene in biological systems [12–16]. To achieve healthy lifespan in elderly people, we need to comprehend responsible molecular and cellular mechanism in aging process. Understanding the role of cellular processes will provide us a valuable insight into the fundamental biology of aging, and an insight into the global regulatory processes that control the cell’s health will lead to a greater comprehension of aging. This comprehension not only provides us to better treat and prevent aging-related degenerative diseases but also provides improving quality of life with age [17]. The clinical trials in gene therapy almost reached to stop and/or reverse human aging. The regenerative medicine could repair and reverse aging in all body cells. Thus, the body’s own repair mechanisms can struggle aging and age-related diseases from metabolic and autoimmune disorders to cancer [3, 4, 6, 11–18].

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