

CONTENTS

INTRODUCTION	5
CHAPTER 1. Aging And Youth	9
CHAPTER 2. Genetics	35
CHAPTER 3. Epigenetics	43
CHAPTER 4. Body	52
CHAPTER 5. Brain and nervous system	61
CHAPTER 6. The Endocrine System	90
CHAPTER 7. Feelings And Emotions	119
CHAPTER 8. Immune System	132
CHAPTER 9. Metabolism	143
CHAPTER 10. Nutrition	157
CHAPTER 11. Microbiome	174
CHAPTER 12. Micronutrients	193
CHAPTER 13. Respiration	202
CHAPTER 14. Heart	218
CHAPTER 15. Skin	230
CHAPTER 16. Sex	237
CHAPTER 17. Hormesis And Hormetins	240
CHAPTER 18. Consciousness	244
CHAPTER 19. Subconsciousness	259
CHAPTER 20. Placebo	268

CHAPTER 21. Awareness, Responsibility, Morality	277
CHAPTER 22. Autosuggestion, Power Of Faith, And Willpower . .	289
CHAPTER 23. Positive Thinking	296
CHAPTER 24. Visualization	312
CHAPTER 25. Three Axes: You, Surrounding People, And The Environment	325
CHAPTER 26. Social Psychology	347
CHAPTER 27. Digital medicine	360
CHAPTER 28. Biophysics	383
CHAPTER 29. Science	397
CHAPTER 30. Complementary Medicine	406
CHAPTER 31. Medicines	428
CHAPTER 32. Color, Light, And Sounds.	450
CHAPTER 33. ASMR	461
CHAPTER 34. Quantum world	465
CHAPTER 35. Mathematics	473
CHAPTER 36. Time	486
CHAPTER 37. Evolution	494
AFTERWORD	518
REFERENCES	521
APPENDIX	569

INTRODUCTION

IS IT POSSIBLE TO LIVE 100 YEARS? MANY WOULD ANSWER THAT IT'S GOOD ENOUGH TO REACH AT LEAST THE AGE OF 80, BUT TO LIVE A CENTURY IS RATHER AN EXCEPTION TO THE RULE AND A CHANCE THAT ONLY LUCKY ONES GET.

But what if it is far from that? There is a more optimistic scenario, which extrapolates: living to 100 or more and staying healthy and active is a real possibility for everyone.

It is almost everyone's biggest dream to live a long life. But various age-related problems, manifested in the form of physical weakness, mental decline, developing diseases, and other pathological changes, can block the path to this dream. Usually, all the average person can do to avoid it is to start exercising, quit using harmful substances, change their diet to include more healthy products, and try to avoid contact with infections. This is certainly important. But is it enough?

There is a lot of information nowadays about different ways to delay aging and prolong life. Theories, reviews, perspectives, and research findings we receive from paper and digital sources are varied, not all of them congruent, but often contradictory. There are lots of opinions on whether fasting is good for the body, what diet is the most effective, how much exercise we need, whether we should take vitamin supplements, how much time we should spare to get a daytime sleep, etc. Search engines "answer" these and other questions with millions of links.

But what if it comes to the prolongation of life and youth? Some specialists would say that if you want to live a long life, you need to strictly follow the laws of a healthy lifestyle; others would say that it is necessary to take as many geroprotectors¹ as possible; still,

¹ Geroprotectors is the name given to a group of certain substances or therapeutic methods that help to increase longevity. Read more: Fomenko A. N., Proshkina E. N., Fedintsev A. Yu., Tsvetkov V. O., Shaposhnikov M. V., Moskalev A. A. "Potential geroprotectors." – *Ed. note.*

others would insist on continuous monitoring of health outcomes: measure physiological data and take regular tests. When it comes to our health, how not to get lost in the informational flow and ignore the unnecessary? What should we rely on?

Existing approaches to the problem of aging and prolongation of life are often flawed and rather one-sided. We should keep in mind that the problem is larger than it appears, so we need to consider it more broadly and consider many views. There are many ways to live a long life, and we will find out which of them are the most effective.

This book is a kind of “encyclopedia of aging”—it contains all the most important things you need to know about this process, as well as ways to prolong life and youth. Here you will find all the information about aging mechanisms, how to slow it down, how to prevent age-related diseases, and the lifestyle and mindset of long-livers.

After reading this book, you will gain the knowledge to acquire extra years of life, and you will learn how to apply them in practice, i.e., turn them into skills to control and even manage all physiological changes to achieve better health and longevity.

The knowledge gathered here comes from years of work on the VSH25¹ project. Its goal is not just to prolong life, but to preserve youth and stop aging with an experimental biological program.

There are a lot of long-living animals and plants in the world, from turtles and sharks that live hundreds of years to baobabs and sequoias that live thousands of years. Some do not age at all. The attention of biologists and gerontologists has been drawn to naked mole rats for decades: these small rodents live an unusually long time compared to their relatives, and at the same time practically do not age or get sick. Another phenomenon is the jellyfish *Turritopsis dohrnii*: it can live forever. At maturity or under adverse conditions, this animal can “go back to childhood”—to the very first stage of the life cycle, which makes the jellyfish immortal.

¹VSH25 is a project to prolong life and preserve health. Read more at vsh25.net. — *Ed. note.*

Humans do not live that long compared to the record-breakers of wildlife. Before the twentieth century, the average life expectancy was about 40 years. However, this figure was almost doubled, and now, according to official data, it is about 73 years old. This happened not only due to medical advances, but also because the consciousness of mankind is gradually shifting, and the idea of life prolongation is more and more actively embodied in life. In the XXI century, new futuristic projections suggest a life expectancy of 150 and even 200 years.

Science and medicine have taken a great step towards understanding mechanisms underlying longevity, and so many discoveries lie ahead! Future breakthroughs in rejuvenation, gene therapy, stem cells, regenerative medicine, and organ replacement will one day allow people not to age or have a finite lifespan.

Living as long as possible is a goal that humanity shall give top priority. At the same time, each needs to remain motivated to maintain their health and prolong life: to learn about new medical advances, to read more on these topics, including materials on various scientific areas—even those, not obvious ones, such as mathematics and physics. Because knowing such universal concepts as brain, body, consciousness, time, evolution, death, and immortality will help to look at the problem of life prolongation from a completely different angle and to think about other scenarios for human development.

It is important to prolong not only life but youth—even if a third of the people on the planet do it, the world will change for the better. It is not a fantasy or an elusive goal. There is no need for lots of energy-consuming efforts or expensive means. All you need is to realize the responsibility for yourself and your life, understand how to “turn on” the body’s defenses, and maintain the desire to live long, learning about new advances in the world of science and medicine.

SCIENTISTS HAVE PROVED

1. EXPECTATION OF LIFE PROLONGATION IS ALREADY PROLONGING LIFE.
2. OPTIMISTIC PEOPLE LIVE LONGER AND ARE LESS LIKELY TO SUFFER FROM PAIN. SADNESS AND DISSATISFACTION WITH LIFE CAN SHORTEN IT BY 13 YEARS (AS WELL AS SERIOUS HEALTH ISSUES).
3. MEANINGFUL EXISTENCE PROLONGS LIFE.
4. A SUBJECTIVE FEELING OF OUR AGE PROLONGS LIFE.
5. THERE ARE CURRENTLY NO PROVEN OR APPROVED ANTI-AGING DRUGS IN THE WORLD.
6. PLACEBO WORKS EVEN WHEN A PERSON KNOWS IT IS A PLACEBO.
7. THE EFFECTIVENESS OF A PLACEBO COMPARED TO MEDICATIONS IS INCREASING.
8. THE EFFECTIVENESS OF A PLACEBO IS INCREASING IN DEVELOPED COUNTRIES.
9. MANY MEDICATIONS HAVE ALMOST THE SAME EFFECT AS A PLACEBO, BUT ALSO CREATE SIDE EFFECTS.
10. EXPECTATION TO FEEL BETTER AFFECTS THE SYMPTOMS OF A DISEASE.
11. WE CAN "TURN ON" THE NECESSARY GENES AND "TURN OFF" THE UNNECESSARY ONES.
12. 95% OF DISEASES CAN BE AFFECTED BY THE PERSON.
13. SPIRITUAL PRACTICES HELP US FEEL HAPPY AND HEALTHY.
14. THE QUANTITY AND QUALITY OF SOCIAL TIES AFFECT LIFE SPAN.
15. CONCENTRATION OF ATTENTION IS AN IMPORTANT SKILL TO ACHIEVE ANY GOAL, INCLUDING PROLONGATION OF LIFE AND YOUTH.
16. HABITS AFFECT OUR LIVES AND OUR PHYSICAL AND MENTAL CONDITION.
17. MOST THINGS WE DO UNCONSCIOUSLY. THEREFORE, THE FORMATION OF USEFUL HABITS AFFECTS 90% OF OUR ACTIONS AND LEADS TO A QUALITATIVE CHANGE IN ALL LIFE.
18. PASSION FOR ART HELPS PROLONG LIFE BY 30%.
19. CONSCIENTIOUS PEOPLE LIVE LONGER SINCE THEIR IMMUNE SYSTEM WORKS BETTER (DUE TO LOW LEVELS OF B-CELL STIMULATORY FACTOR 2).
20. THE THOMAS THEOREM SAYS: "IF MEN DEFINE SITUATIONS AS REAL, THEY ARE REAL IN THEIR CONSEQUENCES."

CHAPTER 1

AGING AND YOUTH

THE DREAM OF A LONG LIFE IS MEANINGLESS WITHOUT RESOLVING THE AGING PROBLEM—MEMORY IMPAIRMENT (OR COMPLETE MEMORY LOSS), WORSENING FRAILTY, NEED FOR CONTINUOUS CARE, A BUNCH OF AGE-RELATED DISEASES, HUGE NUMBER OF MEDICATIONS TO SUPPORT A FADING BODY, ETC.

Such prospects do not please anybody. At the same time, we can look at aging from essentially different points of view. You can resign yourself, and take age-related decline and diseases as an inevitability and part of human destiny. However, there is another point of view. Just look at people who live longer than others having a healthy, strong body, a clear mind, and a zest for life. We might wonder how they do it. To find the answer, it is very important to get onto aging, and scientific views about the nature of this phenomenon. And then to learn about studies revealing mechanisms of preserving youth and increasing longevity.

WHAT BODY CHANGES ARE CAUSED DUE TO AGING?

As a person grows older, their appearance, health, and the function of most organs change. The set of these metamorphoses, which manifest both externally and internally, is called aging. Here are some signs characteristic of aging.

- Hearing impairment: children can hear high-frequency sounds (above 20 Hz)—this ability is usually lost by the end of adolescence. After age 75, more than half of older adults hearing gets worse so much that it prevents normal communication.
- Vision problems: after the age of 35, the tone of the ciliary muscle, responsible for accommodation¹ (change in the

¹ Accommodation of the eye is its ability to focus on objects at different distances by changing the refractive properties of the lens. — *Ed. note.*

curvature of the lens) decreases. As a result, farsightedness (presbyopia) develops and progresses after the age of 40—a deterioration in the ability to see near objects. In addition, over the years, the risk of cataracts (clouding of the lens) increases.

- Change in skin tone: due to lower production of hyaluronic acid, collagen, and elastin fibers over the years, the skin loses elasticity, which leads to wrinkles.
- Over the years, the function of cells producing melanin, the substance that determines hair color, suffers, and graying comes with this process. In addition, as we age, our hair begins to fall out more actively, and the risk of alopecia (hair loss) increases.
- As we age, we lose muscle mass and strength, and muscle's ability to regenerate deteriorates.
- After the age of 25, fertility (ability to conceive) in women starts to decline. At the age of 44 to 55 years, (there can be deviations in either direction) menopause occurs, and loss of the ability to childbirth. Men's sexual function also deteriorates over the years, increases the risk of erectile dysfunction, and decreases the fecundating ability.
- Cognitive function often deteriorates over the years: learning and memory deficit, the risk of dementia, including Alzheimer's and Parkinson's disease, increases.
- There is a higher risk for several diseases: osteoporosis (brittleness of the bones), osteoarthritis, atherosclerosis, hypertension, obesity, diabetes, coronary heart disease, cerebrovascular disease, cancer, immune deficiency, etc.

In addition to symptoms of aging, changes at the cellular and molecular levels develop with age, and it has an impact on our bodies. Scientists from the Department of Biochemistry and Molecular Biology at the University of Oviedo (Spain) state that aging is based on the following biological processes [1].

- Accumulation of mutations in cells (genomic instability), which increases the risk of developing diseases and malignant tumors.

- Shortening of telomeres, end sections of chromosomes, that protect genetic material from damage. It also causes errors in the genome, protein production, and dysfunction of cell and organ function.
- Accumulation of so-called senescent cells, incapable of division or apoptosis (planned cell death leading to tissue renewal). Such cells do not die, but partially or completely lose their functions, leading to organ malfunction.
- Decreased sensitivity of cells to “positive” growth factors, and hormones, activating energy exchange in cells, which stimulate regeneration. At the same time, the sensitivity of cells to the action of damaging factors, such as radiation, toxic substances, antibiotics, etc., increases with age.
- Depletion of stem cells, which are “samples” for functional cells of various organs.
- Deterioration of intercellular communication, signaling between cells, which ensures a coordinated work of the body.

There is such a concept as biomarkers of aging—a set of physiological and biochemical indicators, that allow us to judge the biological age of a person. A table listing the basic biomarkers of aging is given at the end of the chapter.

THEORIES OF AGING

Although since antiquity, humans have tried to understand what biological aging is and how to prevent it, scientists have not yet come to a common understanding of the nature of aging. Today there are many theories explaining the reasons for the physical and mental decline that occurs with age. All these theories can be divided into two large categories: damage theories and evolutionary theories—theories of programmed aging [2].

AGING AS A PROCESS PROGRAMMED BY NATURE

Evolutionary theories of aging imply that aging is the result of the organism following a biological “schedule” regulating the main stages of human life: birth, growth and development, growth impairment, stagnation, biodegradation, and death. In the view of advocates of this approach, aging gives an advantage in the survival of a particular population and is evolutionary “beneficial” for species. In the first place, it is about resource allocation: individuals who have lost their reproduction capability shall age and die in order not to compete for resources with the younger generation.

There are some examples of the evolutionary theories of aging.

- Theory of programmed longevity. Throughout life, certain genes are “turned on” and others are “turned off” by nature, i.e., regulation of aging processes is embedded at the DNA level.
- Neuroendocrine theory. It suggests that aging is an impaired hormonal balance. This theory appeared in the XIX century, and in the early XX century experiments on transplanting various endocrine glands (ovaries and testicles, adrenal glands, basal glands) from young animals to elderly ones became popular. Today, some scientists associate aging with changes in insulin and insulin-like growth factor (IGF) signaling [3].
- Immunologic theory of aging. It views aging as a consequence of an evolutionarily programmed process of “immunological decline” that occurs with age. The efficiency of immunity peaks during adolescence. The ability to resist infections, destroy harmful microbes, identify mutated cells, and respond to vaccines, decreases over the which makes the body vulnerable to the negative joint action of external and internal factors, leading to disease and death. One of the key aspects underlying immunologic aging is the immunosenescence¹—age-related changes in the thymus gland responsible for training immune cells [4].

¹ Immunosenescence begins at 5–7 years and completes by puberty, but small fragments of active glandular tissue persist throughout a human’s life. — *Ed. note.*

AGING AS A RESULT OF DAMAGE (ERRORS) ACCUMULATION

While supporters of “programmed aging” theories view age-adverse changes as the result of an inevitable evolutionary program, followers of “damage theory” do not consider aging a “genetic doom.” They believe that the body accumulates many “breakdowns” with age due to the influence of external factors, stress, etc. A gradual accumulation of such damages leads to the development of age-related diseases and, eventually, to death.

There are examples of damage accumulation theories.

- DNA damage theory. During cell division and copying of DNA molecules, there is always a risk of genetic errors (mutations) that accumulate with age and result in age-related diseases, primarily malignant tumors. In addition, adverse mutations, accumulating with age, can occur under the influence of factors external to the cell: ultraviolet radiation, virus entry, inserting their genome into hereditary material, etc. [5].
- Genetic instability theory. It is not about mutations associated with damage, but rather about various changes in the genome occurring in the chromosome division. For example, such things as aneuploidy, the presence of an abnormal number of chromosomes in a cell, are identified in the fetal brain at all stages of intrauterine development. After birth, the number of such neurons decreases significantly, but some of them remain and can cause brain cancer [6].
- Free radical theory. Supporters of this theory affirm that free radicals (particles, containing oxygen with one missing electron) are the cause of cellular malfunction. They are needed for many biochemical processes and are constantly formed in the body during breathing. By leaving the place where they needed, they sort of “take” an electron from the body, and this is called an oxidative reaction. Free radicals are a serious threat to cell activity because they damage proteins and lipids [7].

Among the numerous theories of aging today, the following concepts are also emphasized.

- Apoptosis theory. Body tissues are constantly updated: “worn-out” cells whose function is deteriorating, as well as cells damaged by infection, having genetic mutations, regularly commit “suicide.” Programmed cellular self-destruction is called apoptosis. In Greek, *ἀπόπτωσης* means “leaf fall”: old cells die, like autumn leaves, to make way for the younger generation. There is an apoptosis gene in the DNA of each cell that triggers cellular self-destruction in response to molecular signals. The problem is that over the years, the sensitivity of cells to signals, activating their “suicide,” decreases, leading to an accumulation of damaged, low-functioning cells. The aging process is based on the decreased ability of tissues to remove aged cells [8].
- Elevational (ontogenetic) theory of aging. In the mid-twentieth century, the Soviet gerontologist V. M. Dilman related aging and ontogeny¹ (individual development) of the homeostatic systems of the organism. The scientist named an elevation in the hypothalamus sensitivity threshold—the “conductor” of an endocrine system—to homeostatic signals as the key mechanism of aging. In a series of experiments, it was proved that this mechanism is based on the adverse changes in the reproductive, hypothalamic-pituitary-adrenal axis, which provides the necessary number of glucocorticoids in the blood (the so-called stress hormones) and increases their secretion under stress, which eventually leads to hyperadaptation, i.e., a condition of excessive body adaptation to stress. The same mechanism in the metabolic homeostasis system causes the accumulation of body fat, a decrease in tissue sensitivity to insulin, and the development of atherosclerosis. Dilman found that age-related transformations occurred because of homeostatic ontogenesis, creating conditions for the formation of malignancies. Thus, the scientist concluded that aging is not

¹ Ontogeny is the individual development of an organism. – *Ed. note.*

programmed, but is a byproduct of the genetic developmental program. This led to the belief that aging can be slowed down if homeostasis is stabilized at the level achieved by the end of the organism's development.

- **Telomere theory of aging.** The number of divisions of each cell in the body is limited. This is because the protective structures at the ends of chromosomes, called telomeres, shorten with each cell division [9]. Telomere shortening may be a molecular “clock” triggering aging. It was found that the enzyme telomerase, which protects telomeres from shortening, is actively produced in cancer cells, that can divide almost infinitely. Telomerase activity has been detected in more than 85% of malignant tumors, whereas it is absent in cells of healthy tissues [10].
- **Inflammatory theory of aging.** This concept intersects with the immunologic theory of aging, but the priority here is given to the overblown immune response to various factors, including autoimmune responses—“aggression” directed at one’s tissues—and not on the loss of the ability to fight off infections and recognize mutations. Under this theory, which is considered one of the most relevant today, aging is a general inflammatory process affecting all organs. It is inflammation that underlies the development of such age-related diseases as atherosclerosis, Alzheimer’s disease, cardiovascular disease, diabetes mellitus type II [11].

We told only some theories of aging—there are many more. This large number of views on the causes and nature of age-related changes demonstrates the lack of a unified understanding of the process. It also suggests that aging is based not on a single mechanism, affecting which could indefinitely prolong youth, but on a complex set of causes operating at the genetic, molecular, and evolutionary levels. The multifactorial nature of aging helps us to understand that prevention of aging shall also be comprehensive and diversified.

HEALTHY LIFESTYLE HELPS TO SLOW DOWN AGING

A healthy lifestyle has many definitions, but all scientists agree on one trend: it is a way of living aimed to maintain and improve health, both physical and mental. And firstly, people themselves are responsible for their well-being: they must have the knowledge and skills, as well as be active in achieving the goal of being healthy.

A healthy lifestyle is a combination of many healthy habits (and rejection of bad ones, such as smoking, drinking abuse, etc.). The effectiveness of some aspects of a healthy lifestyle to prevent aging has been confirmed by many studies.

1. PHYSICAL ACTIVITY. Exercise is seen as a beneficial stress for the body, positively affecting various aspects of physiology. It is proved that moderate stress caused by physical activity slows down the skeletal muscles aging [12], activates the antioxidant systems of the body [13], normalizes metabolic processes [14], stimulates the formation of somatotropic hormone (growth hormone), which significantly accelerates regeneration processes in the body [15], helps normalize blood pressure levels and reduces the risk of hypertonia [16].

FUN FACT

TO REDUCE THE RISK OF PREMATURE DEATH, IT IS ENOUGH TO JUST STAND MORE DURING THE DAY.

A study conducted by scientists from UCLA School of Medicine found that older people who spent more time standing had a 37% lower risk of death compared to those who sat more often during the day. The longest “standing” time among the subjects was about 90 minutes a day, but it turned out that even half an hour spent in an upright stance allow achieving the desired effect.

2. BREATHING EXERCISES. Breathing is essential to the functions of the body. But do we breathe right? If we do not pay enough attention to this important process, and breathe frequently and intermittently, as it happens unknowingly, it causes dysfunction

of the internal organs, and major health problems—from insomnia to atherosclerosis. To avoid this, it is essential to be able to do breathing exercises. Read more in Chapter 13.

3. CALORIE RESTRICTION. The idea that a caloric deficit can prolong life comes from theories connecting longevity and metabolic rate. The authors and defenders of these theories believe that living beings are given a limited number of resources, including energy, which can be expended during life. Restricting caloric intake, leading to a slowing down of metabolic processes, helps to save “life force”: figuratively speaking, a fire will burn longer if we toss small portions of fuel into it. There is evidence for the accuracy of such a view.

4. SLEEP CULTURE. According to the National Sleep Foundation, adults need 7 to 9 hours of sleep per night [17]. Young children need more hours to grow and develop (the younger the child, the more). People over the age of 65 need 7 to 8 hours of sleep.

Getting enough hours of sleep and monitoring its quality are two important aspects for those who want to achieve longevity and maintain their health. Sleep gives energy for mental and physical activity, contributes to the recovery processes, and strengthens almost all systems of the body.

Experts recommend always following a sleep regime, even on weekends, performing relaxing treatments before going to bed (for example, meditating, reading, taking a hot bath), avoiding caffeine or alcohol several hours before bedtime, choosing a comfortable quality mattress and pillow, maintain an optimal temperature and pleasant aroma in the bedroom, turn off lights and electronic devices (TV, computer, smartphone, etc.) an hour before bedtime.

Find out if you suffer from apnea (pauses in breathing during sleep), one of the most common causes of poor sleep. It increases the risk of high blood pressure and heart disease.

5. HEALTHY MIND. A healthy lifestyle is not just about exercising or dieting. It is also a concern for mental well-being and the development of cognitive skills. Such components of a healthy lifestyle as a positive attitude to life, stress management, and

intellectual discipline (reading, language learning, and logic games), play a key role in maintaining mental health and increasing life expectancy.

One of the most effective methods to “free the mind” is meditation. It helps to shift attention from worrying about the future or fixing the past to the present moment and thus helps to interrupt the endless flow of negative thoughts and anxiety. You do not need to play appropriate music or light incense (this is optional) to start meditating, just find a quiet place and take a comfortable position. You can learn the meditation process yourself. For example, with the help of dedicated apps.

6. FEELING YOUNGER. Although health deterioration in the aging process is universal, people perceive and experience it in different ways. Scientists from Seoul National University, together with colleagues from Yonsei University (South Korea), concluded that feeling younger than you are is a major component of good health in mature years [18]. But the subjective feeling of being older, as MRI has shown, on the contrary, reflects a more rapid brain aging. This has also been confirmed by French and American scientists [19]. The study involved 17,000 retirement-age people who were followed for 20 years. It turned out that subjects who felt 8-13 years older had an increased risk of early death (by 18-25%).

7. GREATER SOCIAL TIES. It is almost impossible to keep track of long life without diseases alone, without the motivating force of family, friends, and loved ones. You can only do it with people supporting you. A person has a great opportunity to generate more resources, energy, and experience together with other people, which will necessarily affect not only the general quality of life but also the internal physiological and mental condition.

8. GOAL SETTING. People who know why they live have the best chance to live longer. Many studies confirm this hypothesis. Having a purpose in life is characteristic of the inhabitants of the so-called “longevity regions”—places where people on average live longer than the population of the Earth. Dan Buettner, an American

writer, and traveler, calls such places “blue zones.” In a series of books on features of life in these amazing areas, Buettner points out that almost all blue zone inhabitants have special mindfulness practices allowing them to find meaning in life.

The inhabitants of the Japanese island of Okinawa have a practice called *ikigai*. This is translated as “something or someone that gives a person a sense of purpose or a reason for living.” It is a person’s main interest, the main aspiration in life. It answers the questions like “What am I doing here?”—“Why am I living?”—“How can I be useful to the world?” etc. *Ikigai* is a comprehensive notion running through life and helping to find yourself, your path, meaning, and purpose.

The inhabitants of another blue zone, the Nicoya Peninsula in Costa Rica, believe that a *plan de vida* is essential for a long, happy life. This term means a constant search for a reason to wake up in the morning, to enjoy every single day.

CONCLUSION

It is everyone’s dream to live in a young body as long as possible. There is no universal recipe, practice, or panacea that can solve the problem of aging and premature death once and for all. The way to this dream is through the formation of many habits: sufficient physical activity, adequate nutrition, healthy sleep, as well as mindfulness practices allowing to boost optimism and define life goals.

And it does not matter which view of aging dominates now—the “program” written in the genes, or the random accumulation of “breakdowns.” Indeed, these theories allow us to understand some patterns and build a safety net in dangerous moments. At the same time, research shows that the main levers for managing life and youth prolongation are in our hands. That is why each of us can now take responsibility for our own lives and begin to create our own “blue zone.”

BIOMARKERS OF AGING

BIOMARKER	BIOMARKER DESCRIPTION	REFERENCE RANGE
PHYSIOLOGICAL INDICATORS		
HEART RATE	Heart rate is the number of contractions of the heart per minute. Monitoring of heart rate with age helps assess the risk of cardiovascular disease. A high heart rate is associated with a higher risk of premature death	60–90 BEATS PER MINUTE
BLOOD PRESSURE (BP)	Blood pressure is the pressure that blood has on the walls of blood vessels. Abnormal blood pressure regulation is often observed with age and causes conditions such as hypertension and hypotension	OPTIMAL — 100–119/60–79 MMHG NORMAL — 120–129/80–84 MMHG ELEVATED NORMAL — 130–139/85–89 MMHG
RESPIRATORY FREQUENCY DURING EXERCISE	Respiratory frequency is the number of respiratory movements (inhalation–exhalation cycles) per unit of time (usually a minute). The number of respiratory frequencies is assessed by the number of movements of the thorax and anterior abdominal wall. Respiratory frequency during exercise is used as a biomarker of aging. The ventilatory lung capacity deteriorates with age and shortness of breath occurs. This results in an increase in respiratory frequency during exercise	40–50 BREATHS PER MINUTE (INTENSE EXERCISE)

BIOMARKER	BIOMARKER DESCRIPTION	REFERENCE RANGE
<p>BODY MASS INDEX (BMI)</p>	<p>Body mass index is a value derived from the mass (weight) and height of a person, allowing one to indirectly assess whether a person is underweight, normal weight, or overweight.</p> <p>Being overweight is associated with various pathological conditions that cause a decrease in the quality and duration of life</p>	<p>NORM: 18.5-24.9 KG/M². BMI EQUAL TO OR GREATER THAN 25 — OVERWEIGHT. BMI EQUAL TO OR GREATER THAN 3</p>
<p>HEART RATE VARIABILITY (HRV)</p>	<p>A physiological phenomenon of variation in the time interval between heartbeats. If the human autonomic nervous system is in “fight-or-flight” mode, the difference between heartbeats is small, while in a relaxed state, it increases. High HRV is generally considered to indicate a normal heart and is associated with a reduced risk of disease or death. In addition, HRV changes accompany various cardiac diseases</p>	<p>ASSESSMENT IS MADE BY A SPECIALIST</p>
<p>VASCULAR STIFFNESS</p>	<p>Vascular wall remodeling, resulting in increased stiffness, is specific to aging, as well as hereditary and other known risk factors. Arterial wall stiffness is considered a key parameter in the concept of early vascular aging</p>	<p>ASSESSMENT IS MADE BY A SPECIALIST</p>
<p>BONE MINERAL DENSITY</p>	<p>Detects decreased bone mineral density (osteoporosis). Calcium and other minerals responsible for bone strength are lost with age, as well as bone structure is disturbed.</p>	<p>ASSESSMENT IS MADE BY A SPECIALIST</p>

BIOMARKER	BIOMARKER DESCRIPTION	REFERENCE RANGE
	Bones become fragile, and the risk of fractures and skeletal deformities increases	
BODY IMPEDANCE	Bioimpedance is a method for estimating body composition based on measuring the impedance of biological body tissues where a weak electric current of low intensity flows through the body. It allows for assessing changes in the distribution of adipose tissue, reduction of water, and some electrolytes in tissues. There is a gradual slowdown of the metabolic rate with age, as well as a decrease in soft tissue proportion (fat-free mass and body cell mass)	ASSESSMENT IS MADE BY A SPECIALIST
VISION AND HEARING SCREENING	The quality of vision and hearing decreases with age	ASSESSMENT IS MADE BY A SPECIALIST
SPIROMETRY	Assessment of functional lung capacity. Represents the volume of air measured by the spirometer exhaled during the first second of forced expiration	ASSESSMENT IS MADE BY A SPECIALIST
GRIP TEST (HANDHELD DYNAMOMETRY)	Handheld dynamometry allows for estimating the maximum muscle compression force. There is muscular wasting and functional muscle performance with age	ABSOLUTE GRIP STRENGTH FOR MEN IS MORE THAN 45 KG AND FOR WOMEN MORE THAN 31 KG
MUSCULOSKELETAL ULTRASOUND	A non-invasive method for visualization of changes in muscle tissue, including dystrophy and sarcopenia. There is muscular wasting and functional muscle performance with age	ASSESSMENT IS MADE BY A SPECIALIST

Конец ознакомительного фрагмента.

Приобрести книгу можно

в интернет-магазине

«Электронный универс»

e-Univers.ru