

# We are IntechOpen, the world's leading publisher of Open Access books Built by scientists, for scientists

6,900

Open access books available

185,000

International authors and editors

200M

Downloads

Our authors are among the

154

Countries delivered to

TOP 1%

most cited scientists

12.2%

Contributors from top 500 universities



WEB OF SCIENCE™

Selection of our books indexed in the Book Citation Index  
in Web of Science™ Core Collection (BKCI)

Interested in publishing with us?  
Contact [book.department@intechopen.com](mailto:book.department@intechopen.com)

Numbers displayed above are based on latest data collected.  
For more information visit [www.intechopen.com](http://www.intechopen.com)



# Health-Longevity Medicine in the Global World

Dan Riga<sup>1</sup>, Sorin Riga<sup>1</sup>,  
Daniela Motoc<sup>2</sup>, Simona Geacă<sup>3</sup> and Traian Ionescu<sup>4</sup>

<sup>1</sup>*Academy of Romanian Scientists, Dept. Stress Res. & Prophylaxis,  
Al. Obregia Clin. Hosp. Psychiatry, Bucharest,*

<sup>2</sup>*Centre Appl. Physiol. & Mol. Biol., V. Goldis Western University, Arad,*

<sup>3</sup>*Faculty of Psychology and Education Sciences, University of Bucharest, Bucharest,*

<sup>4</sup>*Romanian Academy of Medical Sciences, Bucharest,  
Romania*

*The doctor of the future will give no medicine,  
but will interest his patient in the care of the human frame,  
in diet and the cause and prevention of disease.*

**Thomas Alva Edison (1847-1931),**  
American inventor, scientist, and businessman

## 1. Introduction

### 1.1 Health in ontogenesis

Health in the human life cycles produces healthy longevity. The construction of health-longevity can be accomplished through primary prophylaxis, namely education, promotion, training, protection and prevention.

As such, medicine seeks to achieve the prevention of disease; it aspires to treat all pathologies, as secondary prophylaxis and leads to recovery after illnesses, as tertiary prophylaxis.

The common elements of longevity health sciences - LHS (Cutler et al., 2005a) and mental health - MH (Knapp et al., 2007) consist of personal sanogenesis at an individual level, and public health in relation to the societal dimension.

### 1.2 Objectives for health-longevity medicine. Past, present and future

Nowadays it is time to promote and apply the ancient wisdom concerning health and healing concepts alongside medical ones.

Actual scientific data about health strategy (human biology and risk factors, behaviour and lifestyle, health care systems, the environment), technological medical progress, information

technology and information technology and communication (ITC), together with experience and the practice of developed countries should be integrated at a regional and global level.

In addition, new concepts can be used and applied to the understanding of the complexity of healthy-longevity medicine at a global level:

- regional and global programmes, strategies and actions (WHO, Regional Office for Europe, 1986; Knapp et al., 2007);
- new paradigms for medical education: from health promotion and protection to longevity health sciences and life extension (S. Riga et al., 2010d);
- the implementation of a healthy diet and a physically active lifestyle (Simopoulous, 2005);
- nutraceuticals and nutrigenomics (D. Riga and S. Riga, 2011b);
- the palaestra paradigm (D. Riga and S. Riga, 2010a);
- synergistic anti-stress, anti-impairment and anti-ageing drugs and strategies (D. Riga and S. Riga, 1995-2005);
- regenerative and pro-longevity medicine (de Grey, 2004; D. Riga et al., 2004a; S. Riga et al., 2004b);
- a new pyramid of health-longevity services (S. Riga et al., 2011a);
- health, longevity and ecology - an integrated paradigm (D. Riga et al., 2010b);
- the bio-psycho-socio-ecological dimension of human being (S. Riga et al., 2010c).

## 2. Health and preventative medicine in ancient times

### 2.1 Prophylaxis and physical activity in traditional Chinese medicine

Dating back thousands of years, the practice of traditional Chinese medicine includes Yinyangism and Daoism as philosophical concepts, holistic and integrative medical concepts, phytotherapy (herbal medicine) and dietary therapy, acupuncture, Shiatsu and Tui na massage, movement therapy, Qigong, Taiji and other methods of maintaining health and vitality.

A remarkable characteristic of the Chinese system of natural healthcare is its prophylactic side. A programmatic document in this direction is the first Chinese medical text (c2600 B.C.). It stipulates: *Superior doctors prevent the disease. Mediocre doctors treat the disease before evident. Inferior doctors treat the full-blown disease* (Unschuld, 2003). In addition, this famous manuscript *Huángdi Neijing Suwen (Inner Canon: Basic Questions)*, also known as *The Inner Canon of Huángdi* or *Yellow Emperor's Inner Canon*, book written between 2698 B.C. - 2596 B.C. presents a dialogue between the Yellow Emperor (Huángdi) and Qibo (Qi Bo, Chi Bo), his minister and advisor, an excellent physician and the father of massage treatment. Another quote from this treatise shows the importance of prophylaxis: *To treat an illness after it has already set in or to smother a riot already spread is liked digging for a fountain when you're already thirsty or making weapons after the war has already begun. Isn't it too late, I wonder?* (Lin, 2000).

A further defining feature of the traditional Chinese therapeutic system is the promotion of movement and physical activity in maintaining health and treating illness. The famous Chinese physician Huà Tuó (c145 A.D. - c208 A.D.), the first person in China to use anaesthesia in surgery, created a series of exercises called *Wuqinxi* or *Frolics (Exercise) of the Five Animals*, towards the end of the 2nd Century A.D. The exercises mimicked the

movements of the tiger, the deer, the bear, the monkey and the crane. In Huà Tuó's medical system, the therapeutic use of movement was inspired from nature: *Running water never grows stale, and the doorpost is never eaten away by wood decay. For the same reason, if we do physical activity on a regular basis, we can remain in good health and keep disease away. Regular exercises stimulate blood flow and the circulation of the qi (energy), thus maintaining the agility of the body* (Lin, 2000).

## 2.2 Preventative medicine in Greek and Roman antiquity

The doctrines of Mediterranean ancient medicine are also based on dietary (rational nutrition) and physical exercises.

Hippocrates of Cos (Kos), c460 B.C. - c370 B.C., one of the most outstanding figures in the history of medicine, emphasized the importance of diet: *Let thy food be thy medicine and thy medicine be thy food* (Hanson, 2006). Moreover, the veneration of the human body as well as daily and professional physical activity were extensively spread in Hellas. Palaestra (special arranged places and also a type of physical exercises) and the Ancient Olympic Games are only two examples.

The Romans, who conquered, took over and enriched Greek civilization, also had great respect for a harmonious development of the human body. Besides this, they pointed out the necessity and simultaneity of the sanogenetic binomial psychic ↔ body. The old adage: *Mens sana in corpore sano*, *Satyrae X (Book IV, Satyrae X, Line 356 - 10.356)*, Decimus Iunius Iuvenalis (c60 A.D. - c135 A.D.), Roman poet, is still famous and up-to-date even now (D. Riga et al., 2009c).

The principles of preventative medicine and competitive health-vitality have been well-documented in human history since ancient times. Unfortunately, current civilizations and human beings could not manage, up to the present, to transform these principles into their daily routine or integrate them into their lifestyles.

## 3. From health to disease

### 3.1 Stress bio-medicine

From this perspective, the strategic key in public health is represented by stress medicine (stressology), adaptology and MH (S. Riga and D. Riga, 2008).

**Figure 1** shows the multi-factorial progress, which localizes stress bio-medicine at the boundary/interface between normality-health-longevity and ageing-disease.

The integrative concept (from molecule to individual and society) groups together:

- the diseases of lifestyle/adaptation/civilization (Selye, 1976);
- stress-related disorders, burnout and chronic fatigue syndrome (Cooper, 1996; WHO. ICD-10, 1992);
- the free radical theory of ageing and free radical diseases (Harman, 1984);
- The oxidative stress theory of ageing and oxidative stress-associated diseases (Cutler et al., 2005c);
- antioxidant deficit diseases (in food, blood and tissues) (Slater and Block, 1991; Muller et al., 1992).

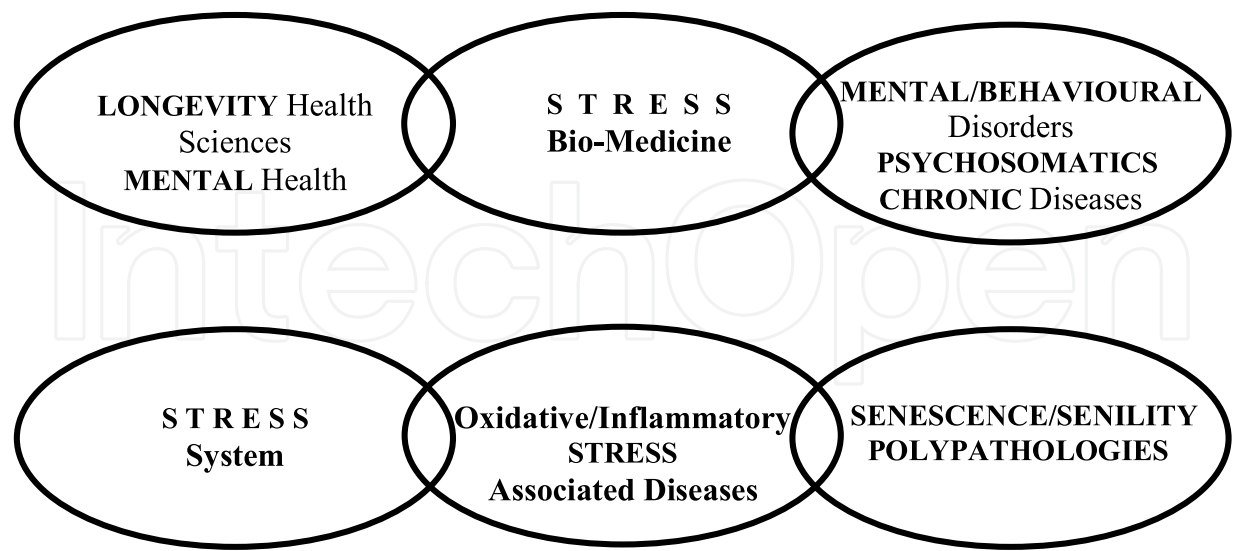


Fig. 1. Oxidative stress in stress bio-medicine, health, ageing and disease

In conclusion, the new concept of stress in bio-medicine represents the primary cause (the beginning) of various human illnesses: pathological manifestations of acute and chronic psychic stress, stress-related disorders, free radical diseases, oxidative stress-associated pathologies, accelerated impairment and ageing (premature senescence), diseases of lifestyle and civilization, nervous and body inflammatory-degenerative pathologies and senility.

3.2 Antagonism of health construction versus human pathology

Public health strategies and policies, as well as everyday preventative-prophylactic and medical-curative practice, are substantiated in dynamics by two opposite tetrads (cascades), (D. Riga and S. Riga, 2007; S. Riga et al., 2009a). These concepts also represent two antagonistic fundamental pathways:

- *stress ↔ ageing*, entropic, aetio-pathogenic *tetrad*: distress/stress-dependent disorders ↔ wear and tear/impairment ↔ premature/accelerated ageing ↔ poly-pathology;
- *health ↔ longevity*, anti-entropic, protective-therapeutic *tetrad*: anti-stress/eustress/adaptation ↔ anti-impairment/vitality/resistance ↔ anti-ageing/active, healthy longevity ↔ anti-illnesses/anti-diseases.

Therefore, health construction is in total opposition to the development of human pathology. Health construction promotes and protects sanogenesis and impedes the appearance and evolution of disease.

3.3 Dynamic structure of destructive cascade

*Stress ↔ ageing tetrad (distress ↔ impairment ↔ ageing ↔ disease)* is a progressively destructive, entropic and time-dependent phenomenon: from primary processes and chronic manifestations (distress, impairment, ageing) to chronic illnesses. The dynamic pattern of this cascade is shown in **Figure 2** (D. Riga and S. Riga, 2007).

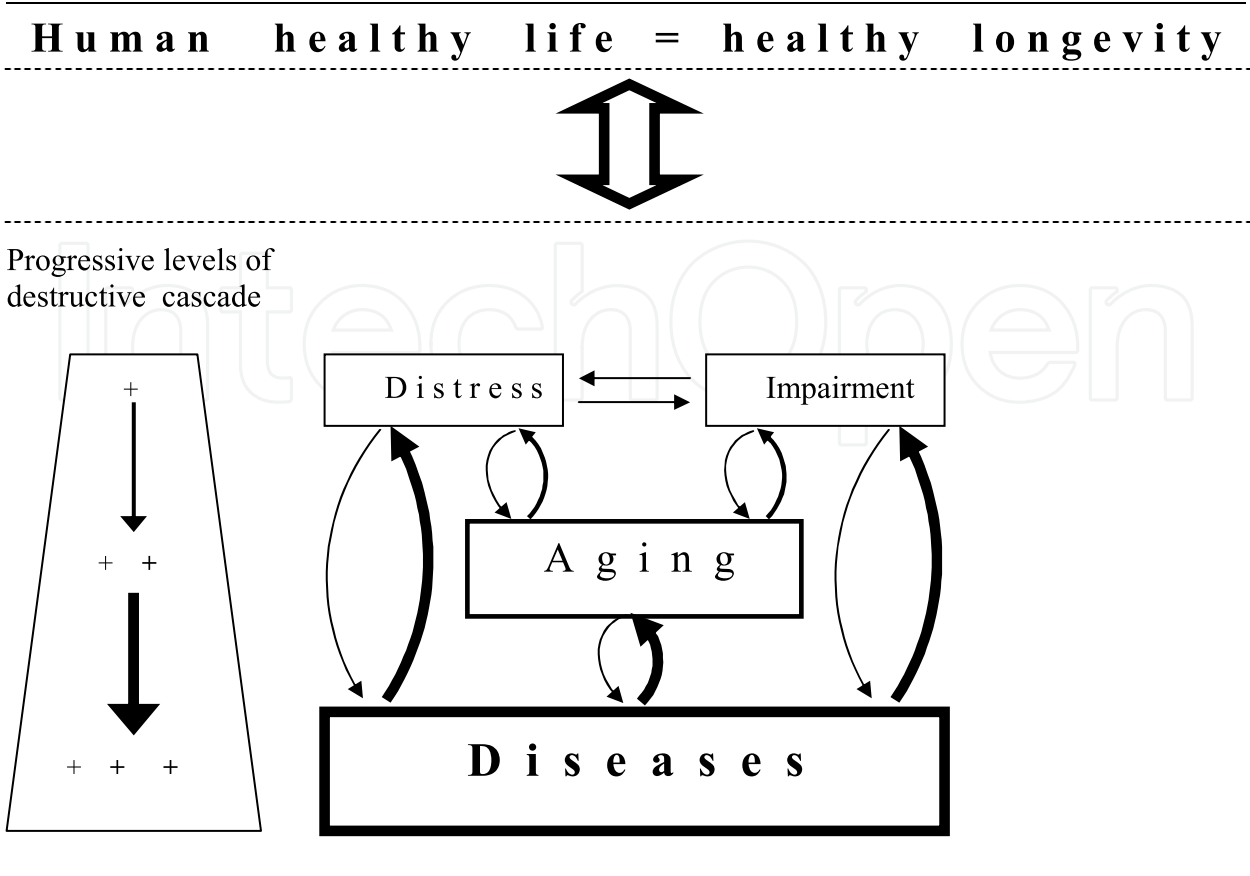


Fig. 2. Dynamic structure of destructive cascade:  
distress ↔ impairment ↔ ageing ↔ disease.  
From human healthy life/longevity to old age/poly-pathologies

Time acts in a very complex way:

- as a harmful amplifier – the initial subclinical stages turn into final clinical phases, namely into manifest diseases; and
- as a continuous initiator, by transforming causes into effects, which in their turn become secondary and multiple causes for new negative consequences; thus, the four components of the cascade successively represent both cause and effect.

In addition, free radical attacks, oxidative stress and antioxidant deficits are amplifiable and worsen in accordance with a pattern of destructive synergism. Therefore, the accumulation of distress, impairment and ageing is aggravated in oxidative stress (chronic) diseases (Cutler, 1996; Miwa et al., 2008).

3.4 Risk factors and preclinical stages of ageing and disease

“Risk factor” (an epidemiological concept) is a variable (characteristic, condition or behaviour) associated with an increased risk of disease (or infection, or injury). Sometimes, “determinant” is also used, being a variable associated with either increased or decreased risk. Risks factors are co-relational and not necessarily causal, since correlation does not imply causation.

They are categorized into *intrinsic* “within oneself” and *extrinsic* “outside” influences.



In another classification, risk factors are divided into four domains:

- *biological risk factors*. Firstly, they are represented by *age, gender and race (ethnicity)*, which are non-modifiable. In addition, *heredity, genetic predisposition and inherited familial risks* are all very important, as well as *other diseases and conditions* (among others, *hypertension, high cholesterol levels, obesity and diabetes mellitus*);
- *behavioural risk factors* are associated with a person's daily choices, emotions and actions. Mainly they are inappropriate habits: *level of acute and/or chronic distress, dietary factors (eating customs, fat intake, alcohol consumption and excess), tobacco smoking, intake of multiple medications, level of physical activity (often a lack of physical exercises, sedentary behaviour)*;
- *environmental risk factors* with regards to the interplay of individuals with their environment: *geo-graphic location, home hazards, hazardous features in the public environment, industrial toxins and poisons; the chaotic technological development of civilization*;
- *socio-economic risk factors* connected with a person's social conditions and the economic status of the individual which has a direct impact on access to healthcare: *occupation, social status, other social determinants of health (poor housing, low education, low degree of social interaction, low income, limited access to social healthcare services)*.

Some examples of risk factors connected to a specific disease in the second part of life and in the ageing period:

- cardiovascular diseases: *heredity (genetic factors); other diseases (obesity, hypertension, diabetes); stressful lifestyle; smoking; wrong and harmful diet habits (not drinking enough water, too much salt in the diet, increased fat and/or sugar intake, high LDL-cholesterol); lack of physical activity and exercises; drug use, abuse and combinations*;
- stroke: *advanced age; hypertension; previous stroke or transient ischemic attacks; diabetes; high LDL-cholesterol levels; smoking*;
- Alzheimer's disease: *advancing age; family history and heredity (risk and deterministic genes)*;
- complex interactions among genes and other risk factors, resulting from defective lifestyle and the deficient management of health conditions (i.e. head trauma, heart-brain connection and pathology, cardiovascular risk factors, interference with vascular dementia, low level of education);
- breast cancer: *age, gender and racial factors; heredity (BRCA 1 and BRCA 2 autosomal dominant genes), prior cancers, hormones and obesity; dietary factors; environmental chemical and physical agents; socioeconomic factors*.

Controlling health risk factor, in relation to type, number and intensity, is paramount to the development of a global health strategy. Risk factors:

- are strong distressors;
- disturb the good functioning of human socioeconomic organization;
- increase the cost of healthcare services; and
- are taken into account as anti-globalization factors.

The impact of risk factors on health is represented by preclinical (infra-, sub-clinical) phases of disease, which are the chronic-silent periods. The action of risk factors, diseases of lifestyle and silent pathologies (e.g. hypertension, hyperglycaemia etc.) cumulate their negative effects and thus they self-amplify into cascades of diseases.

In the pre-senescence and pre-disease period of the individual, knowledge of the preclinical phase of disorders obliges one to perform sub-clinical diagnosis and evaluation, and as a consequence determines personalized prevention.

The preclinical diagnosis of ageing and disease involves the investigation of oxidative stress-inflammatory disorders by establishing a pre-morbid individual profile: assays of biomarkers for the oxidative stress - inflammation status (Cutler et al., 2005c).

The increase of oxidative damages (evaluated in blood/serum, urine and breath) and a decrease of protective/defence antioxidant capacity (in serum), together with the augmentation of inflammation markers (in serum) will lead over the course of time to changes in the proper state of differentiation (Cutler, 2005b): cancer, senescence and senility.

## 4. Construction of human health-longevity

### 4.1 Longevity health sciences and mental health. Common characteristics

LHS and MH are in essence a form of health promotion associated with preventative medicine. For this reason (S. Riga et al., 2009a):

- the complementarity of LHS  $\leftrightarrow$  MH is evident as a binomial: the construction of one of them meaning the development of the other one and vice versa;
- the superposition of LHS with MH is total during the last cycles of life: mature adult  $\rightarrow$  old adult  $\rightarrow$  3rd age (65-85 years)  $\rightarrow$  4th age (over 85 years);
- The dependence of LHS  $\leftrightarrow$  MH coupled to ecology (human, social and environmental) is manifested antagonistically:
  - (-) in a negative register, *stress*  $\leftrightarrow$  *ageing tetrad*: aetio-pathogenic and morbigenerating factors, ways and processes;
  - (+) in a positive register, *health*  $\leftrightarrow$  *longevity tetrad*: resources, strategies and therapies for longevity and mental health.

Essentially, *bio-medical gerontology* is the global and interdisciplinary study of ageing phenomena in phylogeny, ontogeny and medicine, while *clinical gerontology* and *geriatrics* are the medicine of ill old people (consequences of senescence and senility). In opposition with geriatrics, *anti-ageing medicine* and *positive ageing* are causal and preventative (from childhood and adolescence). Therefore, anti-ageing medicine is focused on health and longevity development, in conformity with genetic programming, the theoretical estimate of the maximum human lifespan being around 125 years (Weon and Je, 2009). *Longevity health sciences* and *SENS (Strategies for Engineered Negligible Senescence)* involve the utilization of advanced studies and translational medicine in public policies, in health and longevity (causes, resources, means, evaluations, programs and strategies) (D. Riga, 2003; de Grey, 2004; D. Riga and S. Riga, 2007).



## 4.2 From health to health-longevity

Man is a bio-psycho-social being, in close interrelation with his environment. Therefore, the bio-psycho-socio-ecological dimension of contemporary humans is fundamental for health-longevity (S. Riga et al., 2010c).

On the other hand, the 1946 WHO definition of health (*a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity*) confirms the bio-psycho-socio-ecological determinant of contemporary man. The definition of healthy ageing (Haber, 2003) comprises the following three components:

- *health promotion*, which includes strategies for reducing lifestyle risk factors as well as concepts for increasing healthy lifestyle habits;
- *health protection*, which contains strategies for modifying social and environmental structural health risks;
- *disease prevention*, which includes strategies to maintain and to improve health through medical care systems.

At present, the percentage of determining factors in ensuring health is as follows:

- lifestyle - 51%;
- biologic factor - 20%;
- environment - 19%;
- health care system - 10%.

Their control at national, regional and global levels involves coherent and efficient measures and strategies.

## 4.3 Palaestic civilization

The concept of palaestic civilization is an integrative global health conception (D. Riga and S. Riga, 2010a). At present, it comprises the beliefs, customs and culture of the ancients, the Renaissance ideals of physical beauty attained through exercise, the 19th - 20th Century efforts to institutionalize, generalize and popularize physical education and sports, and contemporary strategies of complementary health nutrition-physical activity.

The palaestic principles, characteristics which are clearly defined and highly positive, are:

- applicable throughout ontogenesis: child, adolescent, adult, old person;
- universal, efficient, long-term, easily put into practice, pleasant (entertaining) and low-cost;
- sanogenetic-prophylactic, therapeutic and recuperative (Bogdan and Bogdan, 2009);
- entropic, reorganizing, physical and cerebral activator, motivating, volitive, re-balancing (D. Riga and S. Riga, 2007).

The palaestic remedies work quite efficiently owing to the strong, long-term, multiple, positive effects that daily physical activity displays. Thus, they are important factors in:

- anti-stress, by lowering distress and raising eustress;
- anti-impairment, against the negative effects of daily life: lack of utilization, socio-sensory deprivation and physical inactivity, which is a complex deprivation, namely socio-sensory-effector deprivation (tactile, exercise and physical activity deprivation) and by overwork;

- anti-senescence, since they are somatic and psychic ageing decelerators;
- anti-polypathology, resulting from sedentariness and dysmetabolic syndrome: muscular atrophy, joint stiffness, osteoporosis, obesity, high blood pressure, diabetes, cardiovascular diseases, chronic fatigue syndrome.

There is a positive correlation between nourishment and exercise. Both rational nutrition and regular physical activity contribute to maintaining and improving good health (Simopoulos, 2005). Moreover, the palaestic solution also takes into account the bio-psycho-socio-ecological human dimension (S. Riga et al., 2010c). Physical education is a contributing factor in biologically and socially harmonizing a human being, as well as in integrating humans in their natural surroundings. In palaestic education, healthy nutrition is the 1st strategy for health-longevity. An unhealthy diet represents a major risk factor in non-communicable/chronic diseases, in the causation of global morbidity and for mortality. A lifestyle including physical activity is the 2nd principle and remedy. Physical inactivity represents a pathological habit, which increases the prevalence of 25 chronic diseases and produces more than 2 million deaths worldwide.

At present, there is strong global concern in relation to educating individuals in view of leading a healthier lifestyle, irrespective of age. In this sense, the palaestic paradigm, scientifically backed up by a large number of studies and researches, is prefigured as a valid solution. *The Declaration of Olympia*, May 28-29, 1996, drawn out and published one hundred years after 1896, when the modern and contemporary Olympic games were resumed in Athens, and the *WHO Documents and Recommendations* and the *European Union Legislation* (*White paper on a Strategy for Europe on Nutrition, Overweight and Obesity related Health Issue*, 2007; *White paper on Sport*, 2007) officially advocate the necessity of physical culture and education for each individual, as well as for the entire human society.

#### **4.4 Declaration of Olympia on nutrition and fitness**

##### **4.4.1 Ancient Olympia, Greece, May 28-29, 1996 (Simopoulos, 2005)**

1. Nutrition and physical activity interact in harmony and are the two most important positive factors that contribute to metabolic fitness and health interacting with the genetic endowment of the individual. Genes define opportunities for health and susceptibility to disease, while environmental factors determine which susceptible individuals will develop illness. Therefore, individual variation may need to be considered to achieve optimal health and to correct disorders associated with micronutrient deficiency, dietary imbalance and a sedentary lifestyle.
2. Every child and adult needs sufficient food and physical activity to express their genetic potential for growth, development, and health. Insufficient consumption of energy, protein, essential fatty acids, vitamins (particularly vitamins A, C, D, E and the B complex) and minerals (particularly calcium, iron, iodine, potassium and zinc), and inadequate opportunities for physical activity impair the attainment of overall health and musculoskeletal function.
3. Balancing physical activity and good nutrition for fitness is best illustrated by the concept of energy intake and output. For sedentary populations, physical activity must be increased; for populations engaging in intense occupational and/or recreational physical activities, food consumption may need to be increased to meet their energy needs.

4. Nutrient intakes should match more closely human evolutionary heritage. The choice of foods should lead to a diverse diet high in fruits and vegetables and rich in essential nutrients, particularly protective antioxidants and essential fatty acids.
5. The current level of physical activity should match more closely our genetic endowment. [The] reestablishment of regular physical activity into everyday life on a daily basis is essential for physical, mental and spiritual well-being. For all ages and both genders the physical activity should be appropriately vigorous and of sufficient duration, frequency, and intensity, using large muscle groups rhythmically and repetitively. Special attention to adequate nutrition should be given to competitive athletes.
6. The attainment of metabolic fitness through energy balance, good nutrition and physical activity reduces the risk of and forms the treatment framework for many modern lifestyle diseases such as diabetes mellitus, hypertension, osteoporosis, some cancers, obesity, and cardiovascular disorders. Metabolic fitness maintains and improves musculoskeletal function, mobility, and the activities of daily living into old age.
7. Education regarding healthy nutrition and physical activity must begin early and continue throughout life. Nutrition and physical activity must be interwoven into the curriculum of school age children and of educators, nutritionists and other health professionals. Positive role models must be developed and prompted by society and the media.
8. Major personal behavioural changes supported by the family, the community, and societal resources are necessary to reject unhealthy lifestyles and to embrace an active lifestyle and good nutrition.
9. National governments and the private sector must coordinate their efforts to encourage good nutrition and physical activity throughout the life cycle and thus increase the pool of physically fit individuals who emulate the Olympic ideal.
10. The ancient Greeks (Hellenes) attained a high level of civilization based on good nutrition, regular physical activity, and intellectual development. They strove for excellence in mind and body. Modern men, women, and children can emulate this Olympic ideal and become swifter, stronger and fitter through regular physical activity and good nutrition".

#### 4.5 New conception - strategy - therapeutics in pro-longevity medicine

Anti-stress, anti-impairment, anti-ageing and anti-pathology therapy is a new specific, simultaneous and synergistic strategy and conception in preventative, curative and recovery medicine (Class of the Antagonic-Stress® drugs), (D. Riga and S. Riga, 1995-2005).

The therapy acts aetio-pathogenically in antagonizing and attenuating the *stress ↔ ageing tetrad* (*mental-biologic-oxidative-inflammatory distress ↔ impairment-wear and tear ↔ normal and accelerated ageing-inflammaging ↔ poly-pathologies as stress- and age-associated diseases*), at metabolic, subcellular, cellular, tissual, organic and systemic levels. This way, the entropic cascade of *stress ↔ ageing* is replaced with the *health ↔ longevity*, anti-entropic, protective-therapeutic *tetrad*: *anti-stress/eustress/adaptation ↔ anti-impairment/vitality/resistance ↔ anti-ageing/active, healthy longevity ↔ anti-illnesses/anti-diseases*. In addition, this first-hand restorative therapy recovers the anti-oxidative capacity/reserve/defence, a feature of the human body which has a direct relation with health-longevity.

The drug-therapy was elaborated by association of the following active principles:

- against oxidative and catabolic stress: methionine with aminoethanol phenoxyacetates and/or aminoethyl phenoxyacetamides;
- against anabolic stress: hydrooxypyrimidine carboxylates and/or oxopyrrolidine acetamides with potassium, zinc and lithium;
- vasodilative and normolipidemic: nicotinic alcohol and/or acid, or its derivatives, with magnesium and iodine;
- ergo-active and anti-toxic: aspartate, fructose, vitamin B1, vitamin B6, monoacid phosphate and sulphate.

The process for manufacturing the drug stipulates:

- pharmaceutical preparation in two complementary types of capsules or coated tablets, gastrosoluble and enterosoluble, the last being enteric coated;
- prolonged-release of vasodilator from the enterosoluble unit.

For competitive and long-term health-longevity, this original therapy must be associated and integrated with:

- healthy diet, nutraceuticals, and regenerative bioactive factors;
- caloric restriction with adequate nutrition;
- cerebral activation therapy, other antioxidants, nootropics, neurovascular and neurometabolic activators;
- cognitive stimulation, continuous learning-education, brain training and fitness;
- regular exercise, daily physical activity, and resistance exercises;
- hormesis, including adaptation to stimulation, and low-level stress (Rattan and Demirovic, 2009).

## 5. Health-longevity strategy

### 5.1 Quality of life for all. The WHO public health policy

“Targets for Health for All - 2000” is a global strategy envisioned by the WHO and represents a programmatic document (WHO, Regional Office for Europe, 1986): “Primary health care is the most important single element in the reorientation of the health care system and will require very strong support” (p. 11). For this objective, “Lifestyles conducive to health” (Ch. 4) and a “Healthy environment” (Ch. 5) become fundamental.

The six important subjects and the four dimensions of health promotion were very well emphasized:

“Six major themes run throughout the whole book.

- Health for all implies *equity*. This means that the present inequalities in health between countries and within countries should be reduced as far as possible.
- The aim is to give a positive sense of health so that they can make full use of their physical, mental and emotional capacities. The main emphasis should therefore be on *health promotion* and the prevention of disease.
- Health for all will be achieved by people themselves. A well-informed, well-motivated and actively *participating community* is a key element for the attainment of the common goal.

- Health for all requires the coordinated action of all sectors concerned. The health authorities can deal only with a part of the problems to be solved, and *multisectoral cooperation* is the only way of effectively ensuring the prerequisites for health, promoting healthy policies and reducing risks in the physical, economic and social environment.
- The focus of the health care system should be on *primary health care* - meeting the basic health needs of each community through services provided as close as possible to where people live and work, readily accessible and acceptable to all, and based on full community participation.
- Health problems transcend national frontiers. Pollution and trade in health-damaging products are obvious examples of problems whose solution requires *international cooperation*" (pp. 5-6).

"Thus, health for all in Europe has four dimensions as regards health outcomes, involving action in order to:

- *ensure equity in health*, by reducing the present gap in health status between countries and groups within countries;
- *add life to years*, by ensuring the full development and use of people's integral or residual physical and mental capacity to derive the full benefit from it and to cope with life in a healthy way;
- *add health to life*, by reducing disease and disability;
- *add years to life*, by reducing premature deaths, and thereby increasing life expectancy" (p. 23).

The WHO (a specialized agency of the United Nations, primarily responsible for international public health) published, in 1987, an essential tool: "Measurement in health promotion and protection" (Abelin et al., 1987). This WHO manual represents a new health movement for a global strategy, promoting positive health, in the socio-ecological paradigm of health. Therefore, "the main goal of health promotion is to maintain or improve health potential" (p. 19).

Also, on October 12, 1990, the WHO teleconference cautions against "diseases of lifestyle", which are the cause of 70-80% of premature deaths in industrialized countries. Thus, health promotion signifies the prevention of stress-related diseases (Cooper, 1996).

Therefore, the quality of life for all represents the promotion of positive health, a new socio-ecological paradigm of health and preventative medicine (S. Riga and D. Riga, 2009b).

## 5.2 Health ↔ longevity tetrad

Mental (psychic, behavioural) and somatic (body, metabolic) health with the construction of the health-longevity couple represent the medicine of the future. The *health ↔ longevity tetrad* (*anti-stress ↔ anti-impairment ↔ anti-ageing ↔ anti-diseases*) is in total opposition with the stress ↔ ageing cascade.

LHS and MH have common principles and strategies. Both:

- will reform the previous paradigm of contemporary medicine (**Figure 3**), the modern pyramid of (mental) medical services (Funk et al., 2007), from treatments and illness recovery;



- to the medicine of the healthy individual (**Figure 4**), - New pyramid of (mental) health services (S. Riga et al., 2009a; S. Riga et al., 2011a).



Fig. 3. Modern pyramid of (mental) medical services.  
Optimal mix recommended by WHO (2007)



Fig. 4. New pyramid of (mental) health services.  
Advanced paradigm in (mental) health - longevity services (2009)



The societal cost/benefit ratio is decisively in favour of health-longevity promotion, in comparison with current medical care systems, represented by polyclinics, hospitals and sanatoriums. The cost/benefit ratio will always rank prevention and prophylaxis as higher place than therapeutics and recovery whenever savings and economic factors are involved.

### 5.3 New health-longevity strategy. Structure of health as a pyramid

This original paradigm is structured in *a new pyramid* of health-longevity services (S. Riga and D. Riga, 2009a; S. Riga et al., 2011a), with five levels:

1. Ecology: “the health” of the environment, permanent human healthy conceptions and actions on the surroundings, normal human-environment interactions;
2. The culture of sanogenesis, which involves education, learning, construction, development, training, maintenance, continuity and permanence;
3. Rational life and use of health-longevity resources: balanced diet and often dietary restriction, regular physical activity, cerebral metabolic activation, cognitive and social stimulation, hormesis;
4. Health protection (promotion) and preventative medicine;
5. Sub-clinical (infra-clinical) medicine, with developmental origins of health and diseases, risk factors for health, biologic and psychic impairment, pre-senescence, pre-illness and silent pathologies.

An optimal mix of ecological, bio-medical and care systems and services in the promotion of health-longevity integrates the costs (left side), the frequency of needs (right side) and the quantity of services needed (presented on a horizontal line). The most favourable and viable combination is structured as a new pyramid of health-longevity services (**Figure 4**), (S. Riga et al., 2010d; S. Riga et al., 2011a).

From the base to the top, the hierarchy of services needed comprises five levels:

1. Ecology: the “health” of the environment (natural, artificial, societal, regional and, finally, global - the earth), (WHO, Regional Office for Europe, 1986; Abelin et al., 1987);
2. The continuous education, learning and training of sanogenesis (Abelin et al., 1987; S. Riga et al., 2009b): 1st stage (cognitive education → construction → development) and 2nd stage (maintenance → training/coaching → improvement → continuity / permanence);
3. The rational utilization of personal life and health-longevity resources (Klatz and Goldman, 2003; Le Bourg, 2003; Simopoulous, 2005; D. Riga et al., 2006b): diet, physical activity, cerebral activation (psychic, nutraceutical, metabolic, psychological and social);
4. Health protection → promotion → development and preventative medicine (primary prophylaxis), (WHO, Regional Office for Europe, 1986; Abelin et al., 1987; Knapp et al., 2007; S. Riga and D. Riga, 2008);
5. Infra-clinical medicine in pre-senescence and pre-pathology (Cutler, 1996; Cutler et al., 2005a; D. Riga and S. Riga, 2007): diagnosis - evaluation - intervention for risk factors, inductors of pre-senescence, pre-illness and silent pathology and, finally, for diseases (markers of oxidative stress and inflammation, cancer antigens etc.).

#### 5.4 Health-longevity - A global progress

The First Law (*Law of use and disuse*), in its extended form, enunciated by Jean-Baptiste Lamarck (1744-1828), the French naturalist, is very important for the health-longevity strategy: *In every animal which has not passed the limit of its development, a more frequent and continuous use of any organ gradually strengthens, develops and enlarges that organ, and gives it a power proportional to the length of time it has been so used; while the permanent disuse of any organ imperceptibly weakens and deteriorates it, and progressively diminishes its functional capacity, until it finally disappears* (Lamarck, 1809, trans. 1914).

As an actual concept, it becomes “use it or lose it” (engl.)/“utilisez-la ou perdez-la” (fr.), both for neurons (Swaab, 1991) as well as for mental activity (Roth, 1975; Giurgea, 1993), namely therapy for cerebral activation, utilized in sanogenesis, prophylaxis of neuro-degenerative diseases and against pathological ageing.

*At an individual (personalized) level* the continuous education of health is defining.

*At a national (societal) level*, for an increased efficacy of health-longevity strategies, two directions must be covered:

- the improvement of programmes for the assessment of risks of diseases and of the precocious discovery of illnesses, followed by:
- the elaboration and implementation of programmes for health-longevity improvement and maintenance.

Now, is the time to create global standards in the training of health promotion. For this reason, the International Institute for Health promotion was organized in 1996 at the American University in Washington, DC (Kirsten, 2010), as an interdisciplinary network of specialists from various fields, and also of academic, governmental and non- governmental organizations.

In our new conception, the aim of health-longevity is health promotion together with illness prevention and the improvement of the quality of life. Moreover, the advantages of the proposed public health strategies and policies (pyramid of health) are low societal costs compared to the enduring treatments for chronic diseases. Therefore, a new millennium strategy for a healthy person's medicine must entail qualified interventions:

- in the early life of the origins of human health and disease (Newnham and Ross, 2009);
- in stress-ageing aetio-pathogenic entropic cascade (distress-impairment-ageing-illness), (Fahy et al., 2010; D. Riga et al., 2006a; D. Riga et al., 2006b; S. Riga et al., 2010d);
- in diseases of lifestyle, risk factors, silent pathologies (persistent mental - biologic - oxidative - inflammatory stress).

Consequently, future medicine will be and must be the medicine of health, mainly the planning of personalized and public health, together with the strategies of longevity, somatic and mental health.

The ageing of the population (implicitly chronic diseases) and also mental/behavioural disorders are in rapid expansion. Due to the high public costs, these phenomena will force society towards a new health policy: health protection/promotion and preventative/prophylactic medicine. Consequently, in the global world, the future medicine

will be the medicine of health: the planning of personalized/public health and strategies of longevity/mental health.

In 2002, non-communicable diseases accounted for 60% of total mortality worldwide and 46% of the global burden of disease (WHO, 2003). This disease burden is expected to increase from 46% in 2002 to 60% in 2020. The major causes of this are represented by five factors (high blood pressure, high cholesterol, low intake of vegetables and fruits, high body mass index and physical inactivity) from the top 10 global disease burden factors enumerated by the WHO. These current risk levels (a worldwide risk diagram) predict major increases in chronic diseases, as a poly-pathology of ageing.

On May 2004, at the 56th World Health Assembly, the WHO substantiated an important global public health initiative (Waxman, 2005), the main targets of which were diet, physical activity and health.

## 6. Conclusions

The progress in science, medicine, technology and communication imposes global policies - strategies - standards in health promotion from the WHO regarding education, training, expertise, culture and research.

Contemporary civilization should therefore substantiate key competences:

- durable health development;
- a knowledge-based society;
- social, communication and civic abilities;
- learning to learn competencies.

Health-longevity medicine is a new concept for public health, health promotion and protection, in accordance with world demographic tendencies. This strategy for future health at a global level reunites preventative (prophylaxis and hygiene) medicine, LHS, MH and the human bio-psycho-socio-ecological dimension.

## 7. References

- [1] Abelin T., Brzezinski Z. J., Carstairs V. D. L., Eds. 1987. *Measurement in Health Promotion and Protection*. WHO Regional Publications, European Series No. 22. World Health Organization, Regional Office for Europe. Copenhagen, DK.
- [2] Bogdan V., Bogdan A. 2009. The sanogenetic role of physical activity. Why should we wait until it is too late? *Palestrica of the 3rd Millennium - Civilization and Sport*. 10: 48-53.
- [3] Commission of the European Communities. 2007. *White Paper on a Strategy for Europe on Nutrition, Overweight and Obesity related Health Issue*. [http://ec.europa.eu/health/ph\\_determinants/life\\_style/nutrition/documents/nutrition\\_wp\\_ro.pdf](http://ec.europa.eu/health/ph_determinants/life_style/nutrition/documents/nutrition_wp_ro.pdf)
- [4] Commission of the European Communities. 2007. *White Paper on Sport*. [http://ec.europa.eu/sport/whitepaper/wp\\_on\\_sport\\_ro.pdf](http://ec.europa.eu/sport/whitepaper/wp_on_sport_ro.pdf)
- [5] Cooper C. L., Ed. 1996. *Handbook of Stress, Medicine and Health*. CRC Press. Boca Raton, FL.

- [6] Cutler R. G. 1996. The molecular and evolutionary aspects of human aging and longevity. In: *Advances in Anti-Aging Medicine*. R. Klatz, Ed.: 71-99. Mary Ann Liebert. New York, NY.
- [7] Cutler R. G., Harman S. M., Heward C., Gibbons M., Eds. 2005a. *Longevity Health Sciences. The Phoenix Conference*. Ann. N. Y. Acad. Sci, Vol. 1055. New York Academy of Sciences. New York, NY.
- [8] Cutler R. G. 2005b. Oxidative stress profiling. Part I. Its potential importance in the optimization of human health. *Ann. N. Y. Acad. Sci.* 1055: 93-135.
- [9] Cutler R. G., Plummer J., Chowdhury K., Heward C. 2005c. Oxidative stress profiling. Part II. Theory, technology and practice. *Ann. N. Y. Acad. Sci.* 1055: 136-158.
- [10] de Grey A. D. N. J., Ed. 2004. *Strategies for Engineered Negligible Senescence. Why Genuine Control of Aging May Be Foreseeable*. Ann. N. Y. Acad. Sci, Vol. 1019. New York Academy of Sciences. New York, NY.
- [11] Fahy G. M., West M. D, Coles L. S., Harris S. B., Eds. 2010. *The Future of Aging. Pathways to Human Life Extension*. Springer. Dordrecht, NL.
- [12] Funk M., Drew N., Saraceno B. 2007. Global perspective on mental health policy and service development issues: the WHO angle. In: *Mental Health Policy and Practice across Europe. The future direction of mental health care*. M. Knapp, D. McDaid, E. Mossialos & G. Thornicroft, Eds.: 426-440. Open University Press. New York, NY.
- [13] Giurgea C. E. 1993. *Le vieillissement cérébral normal et réussi. Le défi du XXI<sup>e</sup> siècle*. Mardaga. Liège, BE.
- [14] Haber D. 2003. *Health Promotion and Aging. Practical Applications for Health Professionals*, 3rd ed. Springer. New York, NY.
- [15] Hanson A. E. 2006. *Hippocrates: the "Greek Miracle" in Medicine*. L. T. Percy, The Episcopal Academy. Merion, PA.
- [16] Harman D. 1984. Free radical theory of aging: the "free radical" diseases. *Age*. 7: 111-131.
- [17] Klatz R., Goldman R. 2003. *The New Anti-Aging Revolution*. Basic Health Publ. North Bergen, NJ.
- [18] Knapp M., McDaid D., Mossialos E., Thornicroft G., Eds. 2007. *Mental Health Policy and Practice Across Europe*. Open University Press. McGraw-Hill Education. Maidenhead, UK.
- [19] Kristen W. 2010. Creating global standards in health promotion training - the International Institute for Health Promotion. *Palestrica of the 3rd Millennium - Civilization and Sport*. 11: 291-292.
- [20] Lamarck J.-B. 1914. *Philosophie zoologique, ou exposition des considérations relatives à l'histoire naturelle des animaux, 1809*. Trans. by H. Elliot. Macmillan. London, UK.
- [21] Le Bourg E. 2003. Antioxidants as Modulators. In: *Modulating Aging and Longevity*. S. I. S. Rattan, Ed.: 183-203. Kluwer. Dordrecht, NL.
- [22] Lin H. B. 2000. *Chinese Health Care Secrets. A Natural Lifestyle Approach*. Llewellyn Publ., St. Paul, MN.
- [23] Miwa S., Beckman K. B., Muller F. L., Eds. 2008. *Oxidative Stress in Aging. From Model Systems to Human Diseases*. Humana Press-Springer Science. Totowa, NJ.

- [24] Muller D. P. R., Goss-Sampson M. A., MacEvilly C. J. 1992. Antioxidant deficiency and neurological disease in humans and experimental animals. In: *Free Radicals in the Brain. Aging, Neurological and Mental Disorders*. L. Packer, L. Prilipko & Y. Christen, Eds.: 62-73. Springer. Berlin, DE.
- [25] Newnham J. P., Ross M. G., Eds. 2009. *Early Life Origins of Human Health and Disease*. Karger. Basel, CH.
- [26] Rattan S. I. S., Demirovic D. 2009. Hormesis and aging. In: *Hormesis: a revolution in biology toxicology and medicine*. M. P. Mattson & E. Calabrese, Eds.: 153-175. Springer. New York, NY.
- [27] Riga D., Riga S. 1995-2005. *Anti-stress, anti-impairment and anti-aging drugs and process for manufacturing thereof (Class of the Antagonic-Stress® drugs/therapy - Dr. Dan Riga & Dr. Sorin Riga)*, 64 pp., a new conception - strategy - therapeutics with 27 worldwide patents in 3 international organizations, 25 states and 5 continents: WIPO, PCT: PCT/WO 95/33486;
- [28] EPO: EUR. Pat. 1999 (17 countries - AT, BE, CH, DE, DK, ES, FR, GB, IE, IT, LI, LU, MC, NL, PT, RO, SE);
- [29] AU Pat. 1998, KR Pat. 1999, RU Pat. 2000, US Pat. 2001, CN Pat. 2001, CA Pat. 2002, JP Pat. 2003, BR Pat. 2005.
- [30] Riga D. 2003. SENS acquires SENSE: present and future anti-aging strategies. *J. Anti-Aging Med. (Rejuvenation Res.)* 6: 231-236.
- [31] Riga D., Riga S., Schneider Fr. 2004a. Regenerative medicine: Antagonic-Stress® therapy in distress and aging. I. Preclinical synthesis - 2003. *Ann. N.Y. Acad. Sci.* 1019: 396-400.
- [32] Riga S., Riga D., Schneider Fr. 2004b. Prolongevity medicine: Antagonic-Stress® drug in distress, geriatrics and related diseases. II. Clinical review - 2003. *Ann. N.Y. Acad. Sci.* 1019: 401-405.
- [33] Riga D., Riga S., Hălălău F., Schneider Fr. 2006a. Lipofuscin and ceroid pigments - markers of normal and pathological brain aging. In *Anti-Aging Therapeutics*, Vol. 8, R. Klatz, R. Goldman, Eds.: 213-221. American Academy of Anti-Aging Medicine. Chicago, IL.
- [34] Riga D., Riga S., Hălălău F., Schneider Fr. 2006b. Neuro-n-glia mechanisms in brain protection, aging deceleration and neuro-psycho-longevity. In *Anti-Aging Therapeutics*, Vol. 8, R. Klatz, R. Goldman, Eds.: 223-236. American Academy of Anti-Aging Medicine. Chicago, IL.
- [35] Riga D., Riga S. 2007. *Anti-Aging Medicine and Longevity Sciences* (Romanian lang.). Cartea Universitara Publ. Bucharest, RO.
- [36] Riga S., Riga D. 2008. *Stressology, Adaptology and Mental Health* (Romanian lang.). Cartea Universitara Publ. Bucharest, RO.
- [37] Riga S., Riga D., Danailă L., Mihăilescu A., Motoc D., Moș L., Schneider, Fr. 2009a. New politics for global health and longevity: complementarity of anti-aging medicine with mental health. *19th IAGG (Int. Assoc. Gerontol. Geriatrics) World Congress*. July 5-9, 2009. Paris, FR. Abstract PB7 495. *J. Nutr. Health Aging*. 13(S1): S475.



- [38] Riga S., Riga D., Danăilă L., Mihăilescu A., Motoc D., Moş L., Schneider, Fr. 2009b. Longevity science and mental health - unification of their concepts and strategies, essential key for the future medicine. *13th IABG (Int. Assoc. Biomed. Gerontol.) Congress*. Québec, CA, May 18-20, 2009.
- [39] Riga D., Riga S., Moş L., Motoc D., Schneider Fr. 2009c. Pro-longevity life styles. Importance of physical activity and sport. *Palestrica of the 3rd Millennium - Civilization and Sport*. 10: 138-144.
- [40] Riga D., Riga S. 2010a. Palestra's paradigm. *Palestrica of the 3rd Millennium - Civilization and Sport*. 11: 7-9.
- [41] Riga D., Riga S., Ardelean A., Schneider Fr. 2010b. Health, longevity and ecology - an integrated paradigm. *Fiziologia-Physiology*, 20(1): 13-16.
- [42] Riga S., Riga D., Ardelean A., Schneider Fr. 2010c. The contemporary man in his bio-psycho-socio-ecological dimension. *Fiziologia-Physiology*, 20(2): 8-10.
- [43] Riga S., Riga D., Mihăilescu A., Motoc D., Moş L, Schneider Fr. 2010d. Longevity health sciences and mental health as future medicine. *Ann. N.Y. Acad. Sci.* 1197: 184-187.
- [44] Riga S., Riga D., Ghinescu M., Mihăilescu A., Motoc D., Geacăr S. 2011a. Health-Longevity Pyramid in the Anti-Aging Global Progress. *61st Annual Scientific Meeting of the British Society for Research on Ageing - BSRA & 14th Congress of the International Association of Biological Gerontology - IABG*, Brighton, UK, July 11-14, 2011.
- [45] Riga D., Riga S. 2011b. The Science of Ageing - Global Progress, *Rejuvenation Res.* 14: 573-577.
- [46] Roth M. 1975. The diagnosis of dementia. *Br. J. Psychiatry*. 125(9): 87-99.
- [47] Selye H. 1976. *Stress in Health and Disease*. Butterworths. Boston, MA.
- [48] Simopoulous A. P., Ed. 2005. *Nutrition and Fitness*. Vol. 1 - *Obesity, the Metabolic Syndrome, Cardiovascular Disease, and Cancer*. Vol. 2 - *Mental Health, Aging, and the Implementation of a Healthy Diet and Physical Activity Lifestyle*. Karger. Basel, CH.
- [49] Slater T. F., Block G., Eds. 1991. Antioxidant vitamins and  $\beta$ -carotene in disease prevention. *Am. J. Clin. Nutr.* 53(S1): 189S-396S.
- [50] Swaab, D. F. 1991. Brain aging and Alzheimer's disease, "wear and tear" versus "use it or lose it". *Neurobiol. Aging*. 12: 317-324.
- [51] Unschuld P. U. 2003. *Huang Di nei jing su wen: Nature, Knowledge, Imagery in an Ancient Chinese Medical Text*. University of California Press, Berkeley, CA.
- [52] Waxman A. 2005. Why a global strategy on diet, physical activity and health? In: *Nutrition and Fitness: Mental Health, Aging, and the Implementation of a Healthy Diet and Physical Activity Lifestyle*. Vol. 2. A. P. Simopoulous, Ed.: 162-166. Karger. Basel, CH.
- [53] Weon B. M., Je J. H. 2009. Theoretical estimation of maximum human lifespan. *Biogerontology*. 10: 65-71.
- [54] WHO, Regional Office for Europe. 1986. *Targets for Health for All - 2000. Targets in Support of the European Regional Strategy for Health for All*. World Health Organization, Regional Office for Europe. Copenhagen, DK.
- [55] WHO. 1992. *The ICD-10. Classification of Mental and Behavioural Disorders. Clinical Descriptions and Diagnostic Guidelines*. World Health Organization. Geneva, CH.



- [56] WHO. 2003. *Shaping the Future. The World Health Report*. World Health Organization. Geneva, CH.

IntechOpen

IntechOpen



## **Public Health - Methodology, Environmental and Systems Issues**

Edited by Prof. Jay Maddock

ISBN 978-953-51-0641-8

Hard cover, 432 pages

**Publisher** InTech

**Published online** 30, May, 2012

**Published in print edition** May, 2012

Public health can be thought of as a series of complex systems. Many things that individual living in high income countries take for granted like the control of infectious disease, clean, potable water, low infant mortality rates require a high functioning systems comprised of numerous actors, locations and interactions to work. Many people only notice public health when that system fails. This book explores several systems in public health including aspects of the food system, health care system and emerging issues including waste minimization in nanosilver. Several chapters address global health concerns including non-communicable disease prevention, poverty and health-longevity medicine. The book also presents several novel methodologies for better modeling and assessment of essential public health issues.

### **How to reference**

In order to correctly reference this scholarly work, feel free to copy and paste the following:

Dan Riga, Sorin Riga, Daniela Motoc, Simona Geacăr and Traian Ionescu (2012). Health-Longevity Medicine in the Global World, Public Health - Methodology, Environmental and Systems Issues, Prof. Jay Maddock (Ed.), ISBN: 978-953-51-0641-8, InTech, Available from: <http://www.intechopen.com/books/public-health-methodology-environmental-and-systems-issues/health-longevity-medicine-in-the-global-world>

**INTECH**  
open science | open minds

#### **InTech Europe**

University Campus STeP Ri  
Slavka Krautzeka 83/A  
51000 Rijeka, Croatia  
Phone: +385 (51) 770 447  
Fax: +385 (51) 686 166  
[www.intechopen.com](http://www.intechopen.com)

#### **InTech China**

Unit 405, Office Block, Hotel Equatorial Shanghai  
No.65, Yan An Road (West), Shanghai, 200040, China  
中国上海市延安西路65号上海国际贵都大饭店办公楼405单元  
Phone: +86-21-62489820  
Fax: +86-21-62489821

© 2012 The Author(s). Licensee IntechOpen. This is an open access article distributed under the terms of the [Creative Commons Attribution 3.0 License](https://creativecommons.org/licenses/by/3.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

IntechOpen

IntechOpen