Anti Aging Medicine

4.1.1 As far as human history goes, man has been concerned with aging and death and dying. Especially in the last two decades, a new and better understanding of the aging process on a physiological level has emerged. In the course of human development, the average life expectancy has increased dramatically. During Antiquity, the life expectancy was about 25 years; in the beginning of the 19th century, it had increased to 38 years for men and 41 years for women. Nowadays, in the industrialized world, the life expectancy is 75 years for men and 80.5 years for women. Old people have always existed, but they were rare.

The reasons for the improvement of the life expectancy are to be found mainly in cultural and medical areas. Most important improvements were caused by the understanding of microbiology and hygiene, and the consequent application of hygienic (public health) measurements. Probably, better nutrition is the next most important course.

Early on, man got ill and died from more *external* reasons, like accidents and trauma, natural catastrophes, lack of food, infections and epidemics. These events could hit at any phase in life.

Because of the greatly diminished accidental deaths more people reach old age.

In the second half of life, diseases develop, which accelerate significantly morbidity and mortality. These are chronic-degenerative diseases, which are endogen of origin and double mortality every decade. The most important ones are coronary artery disease and cerebro-vascular accidents (50%) and malignancies (25%), followed by degenerative joint disease, osteoporosis, diabetes mellitus, autoimmune diseases and dementia. Today, the connection with genetic predisposition is much better understood.

Aging is a multifactorial process and for each species regulated by specific genomes. Many genetic, biochemical, hormonal, environmental and particular life styles have been identified as causes for aging. These aspects are intimately interrelated with the basic life processes. During evolution, effective biological defense mechanisms have emerged. From an evolutionary point of view, aging is a chronic-degenerative systemic process, which, after reproduction, eventually leads to death. Interestingly, humans can still live another lifespan after they are no longer fit for reproduction. Practically all animals die as soon as they are no longer able to reproduce.

4.1.1.a ***Biochemical aging***: carbo-dioxide, water and sun light (energy) are fundamental elements for photosynthesis, which serves the storage of energy as (complex) carbohydrates (sugars) and the production of free oxygen. Cyanobacterias (Blue Algaes) and later plants have developed photosynthesis and thus, achieved significant evolutionary benefits in selection and survival. They have increased the oxygen content of the atmosphere from less than 1% to about 20%. In addition, a massive amount of oxygen is absorbed in the water of the oceans. Active oxygen is a very aggressive and chemically very active element. It binds with other elements (oxidation), sometimes in an explosive way (for instance with Magnesium), sometimes with high temperatures (burning), sometimes very slowly, like in rusting of iron, patina with bronze, or in oxidation of oils and fats. Oxygen destroys many

organic bindings like in colors (bleaching) and rubber, kills bacterias (disinfection) and damages many cell structures of organisms.

During evolution, certain bacterias have been incorporated into living organisms and became mitochondrias. Mitochondrias have reversed the process of photosynthesis and set free the stored energy in a very effective way (biochemical burning, or biochemical oxidation). This way of energy production was a prerequisite for the development of higher and more complex organisms. However, the necessary oxidation in the mitochondrias produces, as a by-product, large quantities of damaging free oxygen radicals. In addition, the element water is absolutely necessary, as all biochemical processes take place in a watery milieu. Age-related dehydration is another important factor in aging.

4.1.1.b ***Free Radicals***: Free radicals include reactive free *oxygen* (oxygen radicals) and free *nitrogen* radicals. They are molecules with a free electron. Therefore, they can bind easily to almost any other element, molecule or organic structure. In doing so, they cause denaturation of proteins, structural lipids (myelin in the cells of Schwann, which envelop nerve axons) and genes (DNA and RNA of mitochondrias and cell nucleus; point mutations; malignancies). Every day, through exogenous influences from the global biosphere (radioactivity, UV-light) and through endogenous metabolism (intracellular oxidation) so many free radicals are produced, that without protection mechanisms, a human being would die within 24 hours.

4.1.1.c ***Protection against Free Radicals***: During evolution, gradually on, protection- and defense mechanisms against the detrimental effects of free radicals have been developed. These mechanisms must be supported external by for instance anti-oxidative vitamins like vit. C and E, and internally, by continuous production or recycling of enzymes (glutathione). Many trace elements like Selene, Zinc and Magnesium are a prerequisite for their biosynthesis.

In addition, other repair- and scavenger (apoptosis) mechanisms are in place, but through aging, these mechanisms become less effective.

4.1.2.a ***Hormonal Aging***: the endocrinal system includes intracrinal (intra-cellular), paracrinal and endocrinal production of hormones. The endocrinal hormones are excreted into the blood stream, and are delivered to all parts of the body in this way. The highest plasma concentrations of anabolic hormones in humans are to be found around age 25. In this period of the biography, most organs and organ systems have their greatest volume and strength (capacities), like muscle- and bone mass. Also, reproduction is at its peak. Then, very gradually, hormone production slows down. Around age 50, free testosterone levels have decreased by one-third, DHEA levels by half, and growth hormone by two-thirds. The gradual decline of hormone production leads to a catabolic state of the organism. This leads to loss of function and capacity of practically all organ systems. Man withers away, physically and mentally.

Previously, medical interventions were mainly aimed at treating acute events, congenital malformations and relieve or cure of illness. Nowadays, medical interventions are much more focused on the treatment of chronic-degenerative diseases. Here, Prevention Medicine has a major task ahead to prevent or, al least,

propone the onset of chronic-degenerative diseases. Anti-Aging Medicine plays an important role as part of Prevention Medicine.

4.2.1 The Immune System and Aging

The most important immune cells which are affected by aging are the Thymus-Dependent Lymphocytes, or so-called T-Lymphocytes, and the Cells of Langerhans, which turn into dendritic cells, when activated by a specific antigen. The T-lymphocytes manage the cellular immunity (important for the defense mechanisms against cancerous cells). The thymus gland declines in tissue mass and function steadily after it had its peak during the perinatal period. Anatomically, the immune system consists of a lymphatic- and a non-lymphatic part. The lymphatic part originates from thymus- and bone marrow tissues. The non-lymphatic part includes lymph nodes, spleen, tonsils, mucosa-associated lymphatic tissue in the gastro-intestinal-, respiratory- and urogenital tracts.

To the cellular part of the immune system belong first of all lymphocytes, including their subpopulations, Natural Killer Cells (NK cells), monocytes, macrophages and granulocytes.

B-cells are the main cells of the humoral part of the immune system. They produce antibodies (AB): primarily immunoglobulins IgG, IgM, IgA, IgE and IgD. B-lymphocytes are continuously produced by the bone marrow throughout life.

T-lymphocytes, which numbers do not decrease by aging, can perceive new antigens and with the collaboration of macrophages, which produce interleukin-6, and T-helper cells (CD4+ lymphocytes), they hand over the information to B-cells. The process of perceiving new antigens, learning new things, turning from a naïve T-lymphocyte into a Memory Cell, can be compared to learning as we do as an individual (1).

T-Suppressor cells (CD8+ lymphocytes) suppress over-reactive immune responses. They induce also immune tolerance.

In the middle-aged and the elderly, because of thymus involution, hormones, like Thymosin, and small thymus peptides are produced in less quantities. Because of increasing disruptions of the HLA system, the number and function of suppressor cells decrease. This leads to increased immune overreactions, certain forms of allergies, and autoimmune diseases.

Therefore, in the ***Cologne Model***, not only the function of the thymus and numbers of immune competent cells are evaluated but also their ***function***.

4.3.1. Environment and Aging

Besides the well-known risk factors from the environment, like passive smoking, inhalation of exhaust, exposure to natural and man-made radiation, electro smog, there are many new chemicals, like pesticides, antibiotics, colorings and preservatives, and heavy metals in the environment.

Interestingly, also man brings harm upon himself by malnutrition, adipositas, alcohol use, smoking, drugs and pharmaceuticals.

In addition, there are many viral, fungal, bacterial and parasitic infections, which burden continuously the immune system.

And, finally, there is the Burn Out Syndrome, caused by long-lasting psychological (mental) and physical exhaustion.

4.4.1. Longevity Increased by Positive Self-Perception of Aging

There has been a proliferation of studies in the last decennium showing that the effects of race and gender self-stereotypes on behavior and functioning (e.g., Leyens, *et al*. 2000; Steele *et al*. 1995; Stone *et al*. 1999). Most of these studies have explained their findings by referring to stereotype threat (Wheeler *et al*. 2001).

Self-stereotypes of aging, or older individuals believes about old people as a category, do not appear to fit into the stereotype-threat framework. The underlying reason is that self-stereotypes of aging seem to develop and operate through internalization. In the Cologne Model, it is postulated that older individuals internalized age stereotypes contribute to the formation of their self-perceptions of aging, which, in turn, can have a physiological outcome.

Once individuals become older, they may lack the defenses of other groups to ward off the impact of negative stereotypes on self-perceptions. The depth and breadth of self-stereotypes of aging may be explained by their focus on cognitive and physical decline, which conveys a sense of the ultimate outcome: death (Becker, 1980; Levy *et al*. 1999-2000).

Levy *et al*. (2002) found that positive self-perceptions of aging measured up to 23 years earlier contributed to individuals living longer. Positive self-perception had a greater impact on longevity than did gender, socioeconomic status, loneliness, and functional health. Interestingly, Levy et al. could demonstrate that good self-perception improved significantly longer survival in men as well as women, those with better as well worse functional health, those less than 60 years as well as 60 years and over, those less than 70 years as well as 70 years and over, those with lower as well as higher socioeconomic status, and those who reported experiencing loneliness as well those who did not.

Therefore, it is more than likely, that a fundamental commonality may arise from the impact of stigmatization. Stigmatization can have a negative influence on ones positive self-perception. On the other hand, support and positive feed-back can improve or enhance ones self-perception, and add to longevity.

In the *Cologne Model*, as part of the strategy to improve health, function, quality of life, and longevity, attention is paid to ones self-perception. A positive self-perception is discussed and supported by various interventions, including support group activities, discussions on world conceptions, artistic activities and art therapy, physical and mental exercise, biography workshops, weight control and nutrition, etc.

Summary

In the ***Cologne Model***, ones biological age is compared to ones actual calendar age. Health, vitality, endurance, productivity and joy for life are given facts until one

reaches mid-life (around age 40). Then, the first physical symptoms of wear and tear appear. Effects of burnout, lack of exercise, insomnia and malnutrition become more evident and one cannot ignore them that easily any longer as at a much younger age.

A healthy life style is the best protection against burnout and early aging.

Through life style changes and the administration of certain identified vitamins and trace elements, and hormones, the wear and tear of the physical body can be slowed down significantly.

As part of the ***Cologne Model***, an anti-aging therapy is recommended and, after a thorough consultation with the patient, initiated when there is a well-documented deficiency of vitamins and trace elements, or when there is a significant imbalance or decline in the hormone production.

The therapy concept in the Cologne Model is rational and realistic. The Multiple Step Therapy Concept includes an extensive history and focused diagnostics of parameter expressing biological markers for function and age, and the following steps:

- Simplicity and transparency in designing and optimizing a new life style and emphasizing self-responsibility;
- Prevention of health risks;
- Development of concrete therapeutic interventions for nutrition and physical exercise;
- Prescription of nutritional supplements with trace elements, vitamins and anti-oxidants.
- Inducing the production of hormones in a natural way, or hormone substitution (as little as possible; as much as necessary).

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