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Cellular Medicine

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Cellular Health Depends on Cellular Bioenergy

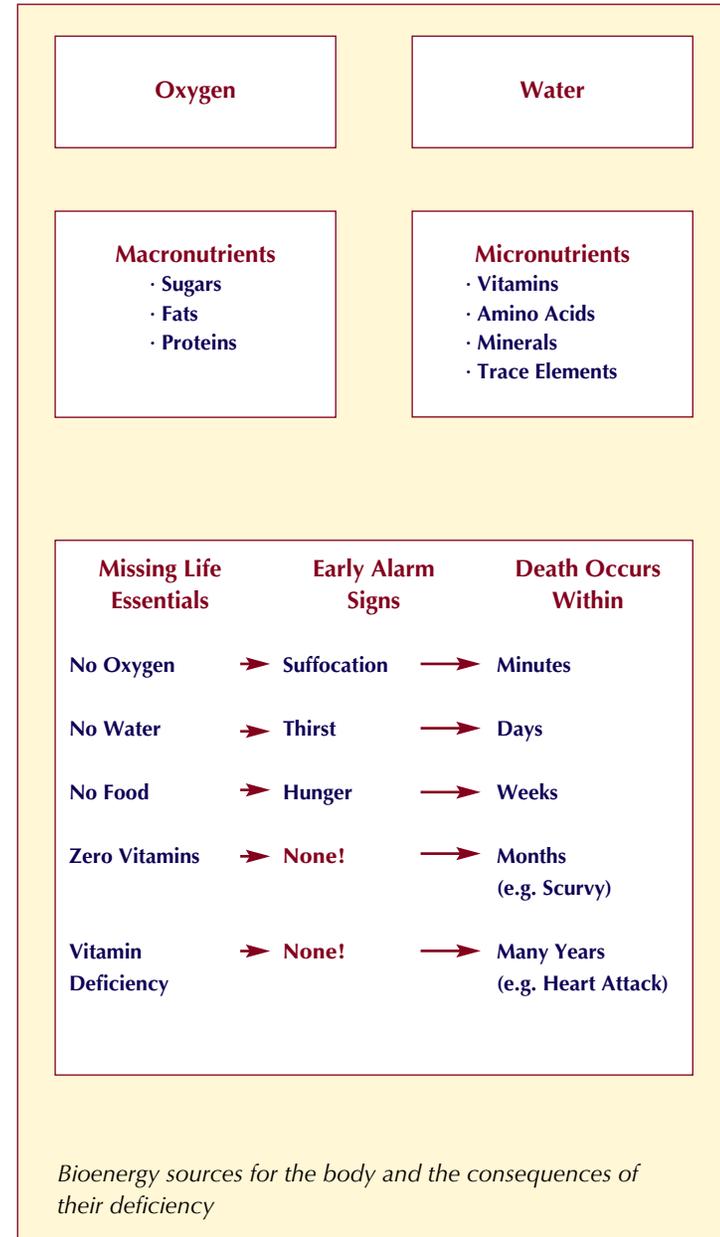
Life depends on a constant supply of four main elements: air (oxygen), water, macronutrients (proteins, fats and carbohydrates) and micronutrients (vitamins, minerals, certain amino acids and trace elements).

There is a distinct characteristic that sets micronutrients apart from air, water and food: a lack of micronutrients does not give any early “alarm” signs. Oxygen deficiency, for example, leads within minutes to the alarm suffocation. Water deficiency’s alarm sign is thirst. Lack of food causes hunger.

In contrast, a deficiency of vitamins and other essential nutrients, the carriers of cellular bioenergy, do not give any alarm signs in the body. The first sign of micronutrient deficiency is the outbreak of a disease. A total depletion of vitamins, such as that in scurvy, leads to death within months. Since we all get small amounts of vitamins and other essential nutrients, we generally do not suffer from a total depletion.

Most of us, however, suffer from a chronic deficiency of vitamins and other essential nutrients over many years and decades. This long-term deficiency of cellular bioenergy is the precondition for the development of chronic diseases, such as atherosclerosis, heart failure, diabetic circulatory problems and other health conditions described in this book. The first sign of chronic micronutrient deficiency can be a heart attack, a stroke or the outbreak of disease.

Since our bodies do not give us any alarm signs, the best way we can avoid deficiencies in cellular energy — and prevent the onset of many diseases — is with optimum daily supplementation of essential nutrients contained in my Cellular Health recommendations.



Cellular Medicine

This book introduces the scientific concept of Cellular Medicine, which marks a new era in health care. It is based on a new understanding of health and disease: Health and disease in our bodies and organs are determined by the functioning of millions of cells. Optimum cell functioning is a precondition for health. In contrast, cellular malfunction causes disease.

The primary, and by far the most frequent, cause of the malfunctioning of cells is a chronic deficiency of essential cellular nutrients, particularly, vitamins, amino acids, minerals and trace elements. These cellular nutrients are needed for a multitude of biochemical reactions and other cellular functions taking place in every single cell of our bodies. Chronic deficiencies of one or more of these essential nutrients, therefore, must lead to cellular malfunctioning and disease.

Cellular Medicine can also explain why cardiovascular disease is the number one cause of death in many countries. The circulatory system is mechanically the most active organ in our bodies because of the continuous pumping function of the heart and pulsatile blood flow through the arteries. Because of this high mechanical stress, the cells of the cardiovascular system have a high rate of consumption of vitamins and other essential nutrients.

Cellular Medicine defines an optimum daily intake of specific micronutrients as a basic preventive and therapeutic measure for cardiovascular disease, as well as for many other health conditions.

The Principles of Cellular Medicine

- I. **Health and disease are determined on the level of millions of cells, which compose our bodies and organs.**

- II. **Vitamins and other essential nutrients are needed for thousands of biochemical reactions taking place in each cell. Chronic deficiency of these vitamins and other essential nutrients is the most frequent cause of malfunction of millions of body cells and the primary cause of cardiovascular disease and other chronic health conditions.**

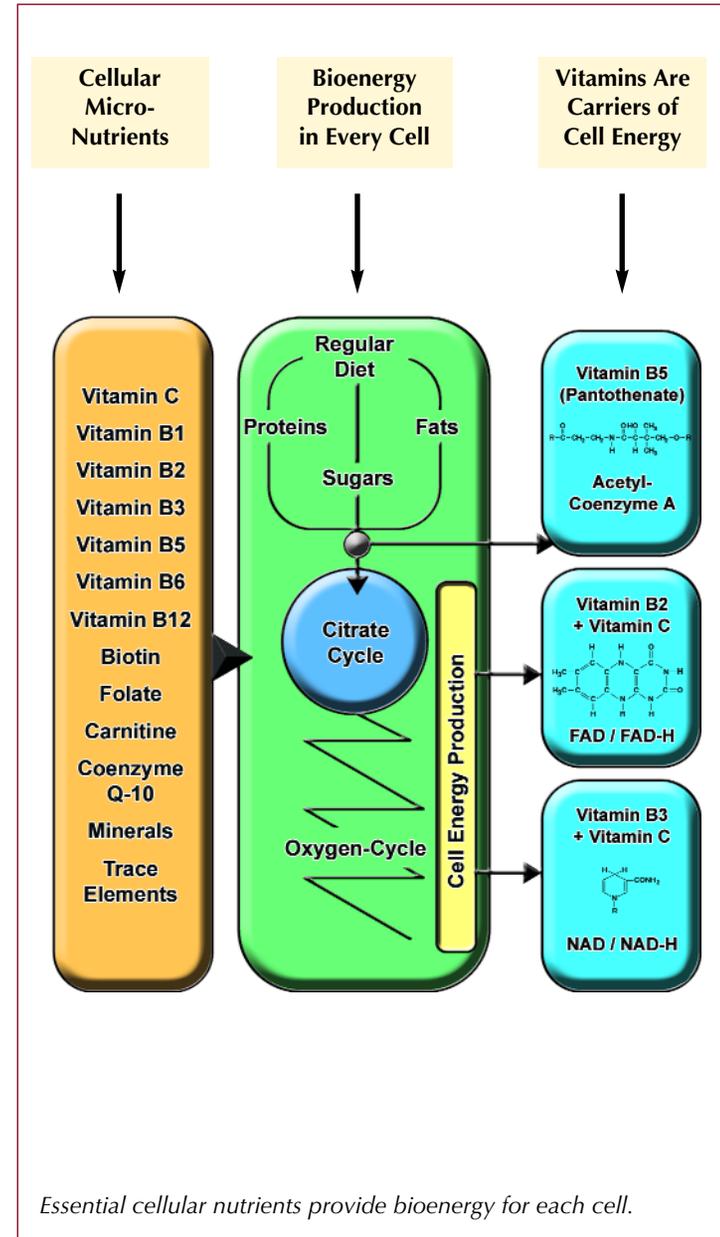
- III. **Cardiovascular diseases are the most prevalent diseases because cardiovascular cells consume vitamins and other essential nutrients at a high rate due to the mechanical stress on the heart and the blood vessel wall from the heartbeat and pulse wave.**

- IV. **Optimum dietary supplementation of vitamins and other essential nutrients is the key to the prevention and effective treatment of cardiovascular disease, as well as other chronic health conditions.**

Cellular Nutrients Deliver Essential Bioenergy to Cellular “Power Plants”

Most cellular nutrients target the “power plant” in each cell. There, they help to “ignite” the biological “burning” of energy derived from sugars, proteins and fats. Compared to a conventional power plant, macronutrients are the coal and micronutrients are the igniters of the energy-generating process. The adjacent graphic summarizes these important facts:

- Acetyl-Coenzyme A (Acetyl-CoA)**, the central molecule of cellular metabolism, is indispensable for processing all components of food (carbohydrates, proteins, fats) and their conversion into bioenergy. Vitamin B5 (pantothenic acid) is a structural component of this key molecule. A deficiency of vitamin B5 leads to decreased acetyl-coenzyme A levels and metabolic “congestion.” This can result in increased blood levels of cholesterol and other blood fats. Optimum supplementation of vitamin B5 corrects this “congestion” and improves the production of cellular energy.
- Vitamin B3 (nicotinic acid)** is the energy transport molecule of one of the most important cellular energy carriers, nicotinamide adenine dinucleotide (NAD). Vitamin C provides the bioenergy to NAD transport molecules by adding hydrogen atoms (-H) and thus, biological energy. The energy-rich shuttle molecules NAD-H provide energy for thousands of cellular reactions. A sufficient supply of vitamin B3 and vitamin C is indispensable for optimum cellular energy.
- Vitamin B2 (riboflavin)** and vitamin C cooperate in a similar way within each cell as a bioenergy shuttle. Vitamin B2 is a structural component of the energy transport molecule flavin adenine dinucleotide (FAD), and vitamin C provides bioenergy for the activation of millions of bioenergy-rich FAD molecules.



Scientific Facts About the Nutrients in Dr. Rath's Cellular Health Recommendations

The worldwide success of my Cellular Health recommendations is due to the fact that this natural program is scientifically based. The exact biochemical composition and many biological functions of the ingredients of these recommendations are known. Thus, the health benefits of this program are reproducible, and millions of people around the world can benefit from them now and in future generations.

For each component of my Cellular Health recommendations, there are numerous scientific studies substantiating their great importance for human health. The following pages summarize the comprehensive knowledge about the importance of each of the ingredients in this essential nutrient program.

Interestingly, many of these biochemical functions are already contained in leading textbooks of biology and biochemistry. In sharp contrast, many textbooks in medicine are still lacking this lifesaving knowledge. The leading textbook for cardiologists, Eugene Braunwald's *Heart Disease – A Textbook of Cardiovascular Medicine*, does not mention vitamin C one single time in 2,000 pages of teaching material for future cardiologists, despite the fact that this vitamin is the single most important reason why animals don't get heart attacks, but people do.

The omission of this lifesaving information in medical textbooks is no coincidence. It happens in the interest of the multi-trillion dollar pharmaceutical investment "business with disease." This investment industry is based on patented, synthetic drugs that merely target symptoms. The continuation and global expansion of this industry depends on eliminating any competition from natural, non-patentable approaches to health. Preventing doctors and other health professionals from recognizing the role of micronutrients as the basis for optimum cellular function and human health serves this goal.

The scientific basis of Cellular Medicine can bring about the necessary and long overdue modernization of medicine. Each day that the implementation of Cellular Medicine is delayed, thousands of patients worldwide will continue to die from preventable diseases.

The following pages contain the most important scientific facts about the components of my Cellular Health recommendations. This information will also help an increasing number of physicians and health professionals accept and implement the principles of Cellular Medicine in their daily practices.

Vitamins, Minerals, Trace Elements, Amino Acids and Other Cellular Nutrients

Vitamin C

Vitamin C is the key nutrient for the stability of our blood vessels, our hearts, and all other organs in our bodies. Without vitamin C, our bodies would literally collapse and dissolve, as in scurvy. Vitamin C is responsible for the optimum production and function of collagen, elastin and other connective tissue molecules that give stability to our blood vessels and our entire bodies.

Vitamin C is important for fast wound healing throughout our bodies, including the healing of millions of tiny wounds and lesions inside our blood vessel walls.

Vitamin C is the most important antioxidant in the body. Optimum amounts of vitamin C effectively protect the cardiovascular system and body against biological rusting.

Vitamin C is also a cofactor for a series of biological catalysts (enzymes), which are important for the improved metabolism of cholesterol, triglycerides and other risk factors. This helps to decrease the risk for cardiovascular disease.

Vitamin C is an important energy molecule needed to recharge energy carriers inside the cells.

Vitamin E

Vitamin E is the most important fat-soluble antioxidant vitamin. It protects, particularly, the membranes of the cells in our cardiovascular systems. Vitamin E also prevents free radical attacks and oxidative damage.

Vitamin E is carried in low-density lipoproteins (LDL) and other cholesterol and fat-transporting particles. Taken in optimum amounts, vitamin E can prevent these fat particles from oxidizing (biological rusting) and damaging the inside of blood vessel walls.

Vitamin E was shown to render the platelets in blood circulation less sticky and, thereby, keep the blood thin and decrease the risk of blood clotting.

Beta-carotene

Beta-carotene is also called pro-vitamin A, and is another important fat-soluble antioxidant vitamin. Like vitamin E, it is transported primarily in lipoprotein particles in the bloodstream to millions of body cells. Also like vitamin E, beta-carotene prevents these fat particles from rusting and damaging the cardiovascular system. Beta-carotene is documented in a rapidly growing number of clinical studies as another protective agent against cardiovascular disease. Similar to vitamin E, beta-carotene has been shown to decrease the risk of blood clotting.

Vitamin B1 (Thiamine)

Thiamine functions as the cofactor of an important biocatalyst called pyrophosphate. This catalyst is involved in phosphate metabolism in our cells, another key energy source that optimizes millions of reactions in cardiovascular and other cells.

Vitamin B2 (Riboflavin)

Riboflavin is the cofactor for flavin adenine dinucleotide (FAD), one of the most important carrier molecules of cellular energy inside the tiny energy centers (power plants) of all cells.

Vitamin B3 (Niacin, Niacinamide)

Niacin is an important nutrient, essential as the cofactor of nicotinamide adenine dinucleotide (NAD) and related energy carrier molecules. This energy carrier molecule is one of the most important energy transport systems in the entire body. Millions of these carriers are created and recharged (by vitamin C) inside the cellular energy centers of the cardiovascular system and the body. Cell life, and life in general, would not be possible without this energy carrier.

Vitamin B5 (Pantothenate)

Pantothenate is the cofactor of coenzyme A, the central fuel molecule in the metabolism of our heart cells, blood vessel cells and all other cells. The metabolism of carbohydrates, proteins and fats inside each cell all lead to a single molecule, acetyl-coenzyme A. This molecule is the key molecule that helps to convert all food into cell energy. This important molecule is actually composed, in part, of vitamin B5 and the importance of supplementing this vitamin is evident. Again, cell life would not be possible without this vitamin.

Vitamin B6 (Pyridoxine)

Vitamin B6 is the cofactor of pyridoxal phosphate, an important cofactor for the metabolism of amino acids and proteins in cardiovascular and other cells. Vitamin B6 is needed for the production of red blood cells, which are the carriers of oxygen to the cells of the cardiovascular system and all other cells in the body. Vitamin B6 is also essential for the optimum structure and function of collagen fibers.

Vitamin B12

Vitamin B12 is needed for the proper metabolism of fatty acids and certain amino acids in the cells of our bodies. Vitamin B12 is also required for the production of red blood cells. A severe deficiency of vitamin B12 can cause a disease called pernicious anemia, which is characterized by an insufficient production of blood cells.

Folate

Folate is a very important nutrient for the production of red blood cells and oxygen supply.

The last three vitamins are good examples of how these bioenergy molecules work together in synergy, like an orchestra. Without proper oxygen transport to all the cells, their function would be impaired, no matter how much of the other vitamins you might take. It is, therefore, important to supplement your diet as completely as possible with the right essential nutrients in the right amounts.

Biotin

Biotin is needed for the metabolism of carbohydrates, fats and proteins.

Vitamin D

Vitamin D is essential for optimum calcium and phosphate metabolism in the body. Vitamin D is needed for the growth and stability of the bones and teeth. For centuries, vitamin D deficiency was a frequent children's condition, causing retarded growth and malformation. Thus, in many countries, milk is enriched with vitamin D.

Vitamin D is also essential for optimum calcium metabolism in the artery walls, including the removal of calcium from atherosclerotic deposits.

Minerals

Minerals are important essential nutrients. Calcium, magnesium and potassium are the most important among them. Minerals are needed for a multitude of catalytic reactions occurring in each cell in the body.

Calcium

Calcium is important for the proper contraction of muscle cells, including millions of heart muscle cells. It is needed for the conduction of nerve impulses and, therefore, for optimum heartbeat. Calcium is also essential for the hardening and stability of our bones and teeth. It is also needed for the proper biological communication among the cells of the cardiovascular system and most other cells, as well as for many other biological functions.

Magnesium

Magnesium is nature's calcium antagonist, and its benefit for the cardiovascular system is similar to the calcium antagonist drugs that are prescribed, except that magnesium is produced by nature itself.

Clinical studies have shown that magnesium is particularly important for helping to normalize elevated blood pressure; moreover, it can help normalize irregular heartbeat.

Trace Elements

The trace elements zinc, manganese, copper, selenium, chromium and molybdenum are also important essential nutrients. Most of the trace elements are metals needed as catalysts for thousands of biochemical reactions in the metabolism of cells. However, they are needed only in very tiny amounts—less than one tenth of a thousandth of a gram.

Amino Acids

Amino acids are the building blocks of proteins. Most of the amino acids in our bodies are derived from regular food and from digesting proteins. Many amino acids can be synthesized in our bodies when needed; these amino acids are called “non-essential” amino acids. Those amino acids that the body *cannot* synthesize are called “essential” amino acids.

It is important to understand that — even though the body can produce certain amino acids — the amount produced may not be enough to maintain proper health. A good example is the amino acid proline.

Proline

The amino acid proline is a major building block of the stability proteins collagen and elastin. More than 10% of the building blocks of collagen molecules consist of proline alone. It is easy to understand how important it is for the optimum stability of our blood vessels, and our bodies in general, to get an optimum amount of proline in our diets.

Proline is very important in the process of reversing atherosclerotic deposits. As described in this book, cholesterol-carrying fat globules (lipoproteins) attach to the inside of the blood vessel wall via biological adhesive tapes. Proline is a formidable “Teflon” agent, which can neutralize the stickiness of these fat globules. The therapeutic effect is twofold. First, proline helps to prevent the further buildup of atherosclerotic deposits and second, proline helps to release already deposited fat globules from the blood vessel wall into the bloodstream. When many fat globules are released from the plaques in the artery walls, the deposit size decreases and leads to a reversal of cardiovascular disease.

Proline can be synthesized by the body, but the amounts synthesized are frequently inadequate, particularly in patients with an increased risk for cardiovascular disease.

Lysine

As opposed to proline, lysine is an essential amino acid, which means that the body cannot synthesize it. Daily supplementation of this amino acid is, therefore, critical. Lysine, like proline, is an important building block of collagen and other stability molecules, and its intake helps to stabilize the blood vessels and other organs in the body.

The combined intake of lysine and proline with vitamin C is of particular importance for the optimum stability of body tissue. For optimum strength of the collagen molecules, its building blocks lysine and proline need to be biochemically modified to hydroxy lysine and hydroxy proline. Vitamin C is the most effective biocatalyst for accomplishing this “hydroxylation” reaction and, thereby, for providing optimum strength to the connective tissue.

Lysine is another “Teflon” agent, which can help release deposited fat globules from the blood vessel deposits. People with existing cardiovascular disease may increase their daily intake of lysine and proline to several grams in addition to the basic program recommended in this book.

Lysine is also the precursor for the amino acid carnitine. The conversion of lysine into carnitine requires the presence of vitamin C as a biocatalyst. This is another reason why the combination of lysine and vitamin C is essential.

Arginine

Arginine has many functions in the human body. In connection with the cardiovascular system, one function is of particular importance. The amino acid arginine can split off a small molecule called nitric oxide. This tiny part of the former arginine molecule has a powerful role in maintaining cardiovascular health. Nitric oxide relaxes the blood vessel walls and helps to normalize high blood pressure. In addition, nitric oxide helps to decrease the stickiness of platelets and has an anti-clogging effect.

Carnitine

Carnitine is a very important essential nutrient. It is needed for the conversion of fat into energy. Carnitine functions like a shuttle between the cell factory and the energy compartment within each cell. It transports energy molecules in and out of these cellular power plants. This mechanism is particularly important for all muscle cells, including those of the heart.

For the constantly pumping heart muscle, carnitine is one of the most critical “cell fuels.” Thus, it is not surprising that many clinical studies have documented the great value of carnitine supplementation in improving the pumping function and performance of the heart.

Carnitine also benefits the electrical cells of the heart, and its supplementation has been shown to help normalize different forms of irregular heartbeat.

Cysteine

Cysteine is another important amino acid with many important functions in the body. The cardiovascular system benefits particularly from supplementation with this amino acid because cysteine is a building block of glutathione, one of the most important antioxidants produced in the body. Among other functions, glutathione protects the inside of blood vessel walls from free radical and other kinds of damage.

Other Important Cellular Nutrients**Coenzyme Q-10**

Coenzyme Q-10 is another important essential nutrient. It is also known as ubiquinone. Coenzyme Q-10 functions as an extremely important catalyst for the energy center of each cell. Because of its high workload, the heart muscle cells have a particularly high demand for coenzyme Q-10. In patients with insufficient pumping function of the heart, this essential nutri-

ent is frequently deficient. An irrefutable number of clinical studies have documented the great value of coenzyme Q-10 in treating heart failure and optimizing heart performance.

Inositol

Inositol is a component of lecithin. It is essential for sugar and fat metabolism in the cells of our bodies.

Inositol is also important for the biological communication process between the cells and organs in the body. Hormones, such as insulin and other molecules, are signals from outside the cell. If a hormone docks to a cell, it needs to transmit information to that cell. Inositol is part of the proper reading mechanism of this information through the cell membrane. Thus, inositol is part of the proper biological communication process, which in turn, is critical for optimum cardiovascular health.

Pycnogenols and Other Bioflavonoids

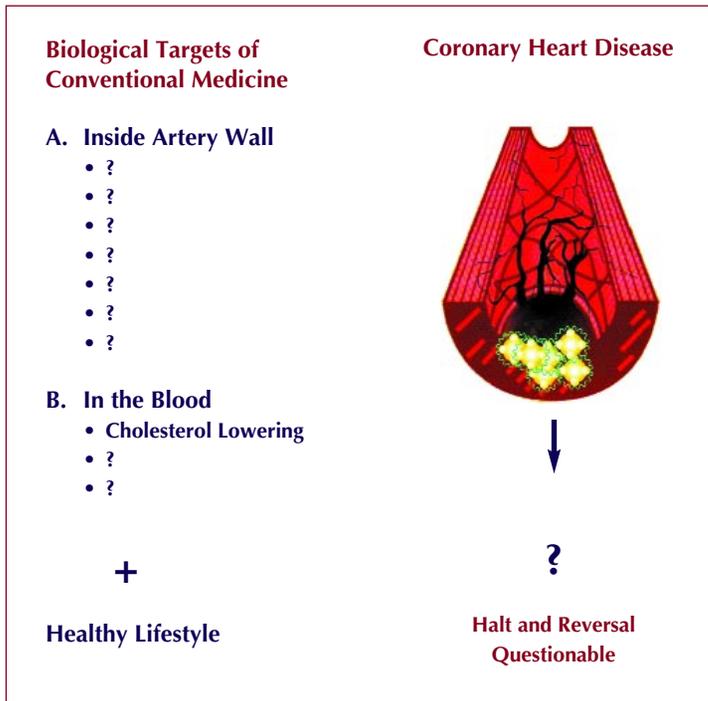
Pycnogenols refers to a group of bioflavonoids (pro-anthocyanidins) with remarkable properties. In the cardiovascular system, pycnogenols have several important functions:

- Pycnogenols are powerful antioxidants that work together with vitamin C and vitamin E in preventing damage to the cardiovascular system by free radicals.
- Together with vitamin C, pycnogenols have a particular value in stabilizing the blood vessel walls and capillaries. Pycnogenols have been shown to bind to elastin, the most important elasticity molecule, and protect elastin molecules against enzymatic degradation.

Conventional Medicine vs. Cellular Medicine:

Conventional Medicine

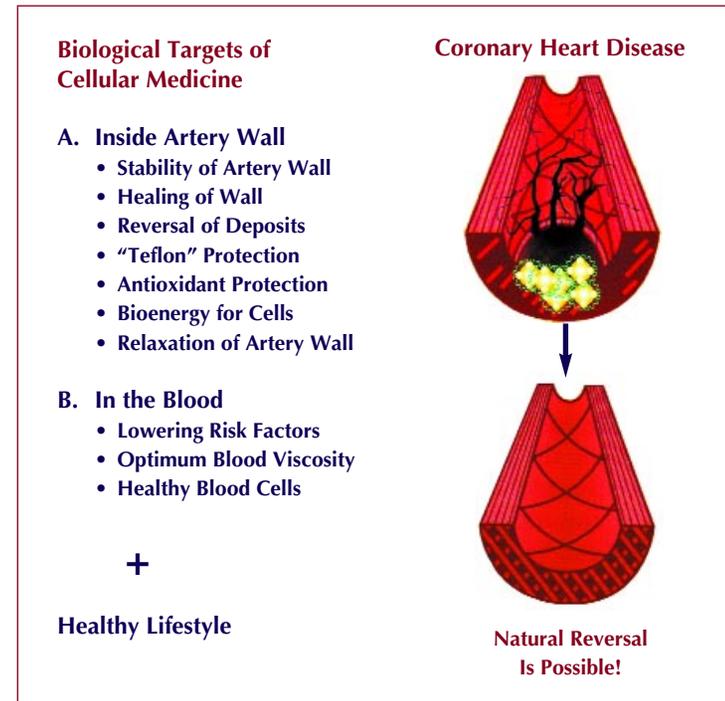
My Cellular Health recommendations withstand any comparison to other preventive cardiovascular approaches. Preventive approaches by conventional medicine focus on cholesterol lowering and the reduction of other risk factors, as well as lifestyle changes. These approaches miss key targets of cardiovascular health, such as optimum vascular stability and repair, antioxidant protection and bioenergy for cells.



Comparing Therapeutic Targets in Cardiovascular Disease

Cellular Medicine

In contrast, my Cellular Health recommendations have defined biological targets. The scientific basis of Cellular Medicine defines therapeutic targets of unprecedented scope and specificity to prevent and treat cardiovascular disease. Vascular wall stability is optimized, vascular healing processes are induced and antioxidant and “Teflon” protection is provided. The most important biological targets of this natural cardiovascular health program are summarized in the figure below.



Conventional Medicine vs. Cellular Medicine:

Effectiveness

Conventional therapy is generally limited to the treatment of cardiovascular *symptoms*, one at a time. Since most heart disease patients have many cardiovascular problems at the same time, they frequently are prescribed several medications.

In contrast, my Cellular Health recommendations correct the underlying causes of the disease. It provides “cell fuel” for millions of cells, allowing for the correction of impaired cellular function in different compartments of the cardiovascular system simultaneously.

Conventional Medicine Primarily Treats Symptoms

Medication Type	Treatment of Symptoms
Nitrate Group	→ Angina Pectoris (Symptoms)
Anti-arrhythmic Group	→ Arrhythmia (Symptoms)
Beta-blocker Group	→ High Blood Pressure (Symptoms)
Diuretic Group	→ Heart Failure (Symptoms)

Cellular Medicine Aims to Correct Underlying Causes

Cellular Health Nutrients → “Cell Fuel” for All Cells and Organs

- Coronary Heart Disease
- Heart Failure
- Arrhythmia
- High Blood Pressure

Comparing Effectiveness and Safety

Safety

Another important advantage of my Cellular Health recommendations compared to conventional drug therapies is that they are safe and undesirable side effects are unknown. Dr. A. Bendich summarized the safety aspects of vitamins in a review in the *New York Academy of Sciences*. She found that all rumors about the side effects of vitamins are unsubstantiated. These deceptions are being spread in the interest of the pharmaceutical industry to create a false dependency on prescription drugs alone.

Below, my Cellular Health recommendations are compared to conventional cardiovascular therapies and their risks.

Conventional Medicine		
Therapy	Potential Side Effects	References
Cholesterol-lowering Drugs	Cancer, Liver Damage and Myopathy (Muscle Weakness)	Physician’s Desk Reference (PDR)
Aspirin	Strokes, Ulcers, Collagen Breakdown and Promotes Heart Disease	PDR Brooks
Calcium Channel Blockers	Cancer	Psaty
Cellular Medicine		
Therapy	Potential Side Effects	References
Essential Nutrients	None	Bendich, Rath <i>(Why Animals Don’t Get Heart Attacks, But People Do, First Edition)</i>

How You Can Live Longer and Stay Healthy

The same biological mechanisms that lead to the hardening of arteries and cardiovascular disease determine the process of aging in your body. One could say that the aging of your body is a slow form of cardiovascular disease. The speed at which it ages is directly dependent on the state of the health of your cardiovascular system. Particularly important is the optimum functioning of the 60,000-mile-long pipeline of your arteries, veins and capillaries. This blood vessel pipeline supplies all the organs of your body and its billions of body cells with oxygen and essential nutrients.

Your body is as old as its cardiovascular system.

If you do not protect your body with essential nutrients, the aging process leads to a gradual thickening of your blood vessel walls. This eventually leads to the malnutrition of millions of your body's cells and an accelerated aging of your entire body and its organs.

My Cellular Health recommendations are a proven way to protect your cardiovascular system. It is also the best way to help retard the aging process of your body in a natural way and, thereby, contribute to a long and healthy life.

Questions and Answers About Dr. Rath's Cellular Health Recommendations

The following are some of the most frequently asked questions about my Cellular Health recommendations. The responses are general advice that cannot replace a personal consultation with your doctor.

What are Dr. Rath's Cellular Health recommendations?

They are a daily nutrient program composed of specific vitamins, amino acids, minerals and trace elements scientifically developed to optimize the function of the cardiovascular system. My recommendations comprise a program in which the chosen ingredients work synergistically together. It is complemented by moderate lifestyle changes as outlined in the "Ten Step Program for Natural Cardiovascular Health" in the first chapter of this book.

What sets Dr. Rath's Cellular Health recommendations apart from other multivitamins?

My nutrient program is based on a new and scientifically correct understanding about the causes of cardiovascular disease and other chronic health conditions. Its effectiveness has been proven in clinical studies and in hundreds of thousands of people who have used these recommendations for natural prevention and basic therapy. Their nutrient composition is carefully chosen for maximum synergy of these ingredients to achieve optimum health benefits in the millions of cells. This fact also explains why these moderately dosed nutrients are more effective than megadoses of individual ingredients recommended elsewhere.

Within only a few years, my Cellular Health recommendations have become the world's leading natural health program that is followed by hundreds of thousands of people around the world.