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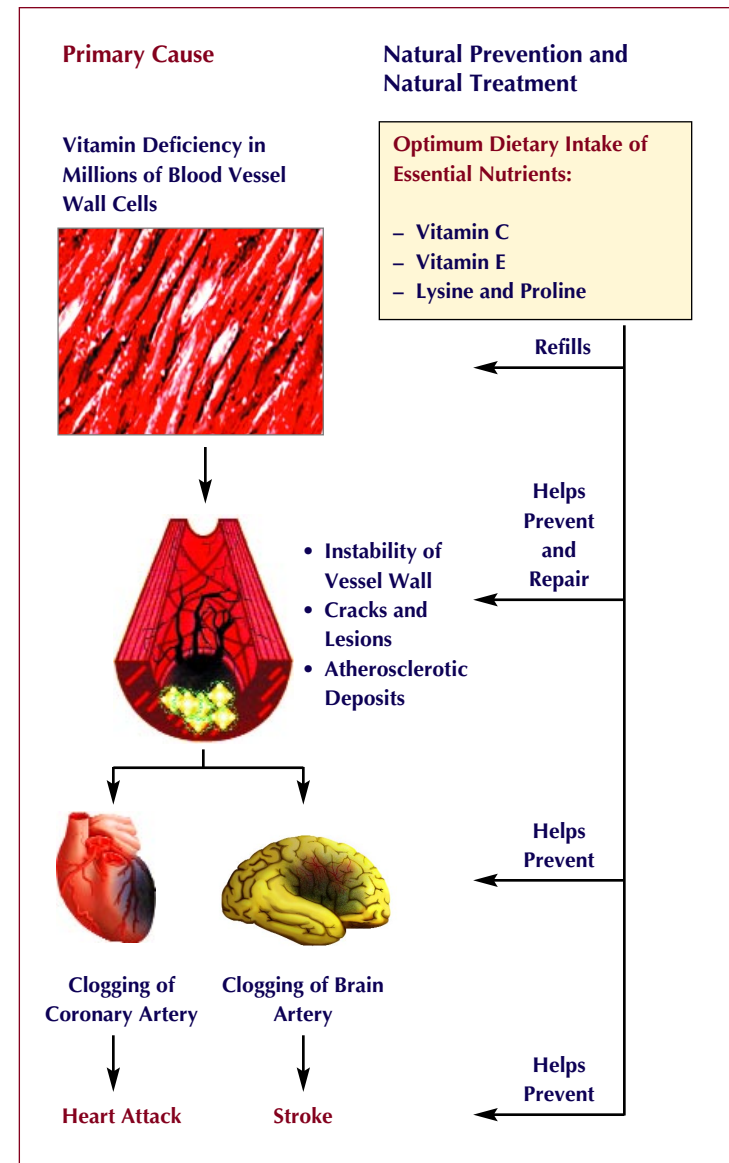
Atherosclerosis, Heart Attack and Stroke

**Dr. Rath's Cellular Health Recommendations
for Prevention and Adjunct Therapy**

- **The Facts About Coronary Heart Disease**
- **Dr. Rath's Cellular Health Recommendations:**
 - **Documented Health Benefits in Patients**
 - **Documented Health Benefits in Clinical Studies**
- **Scientific Background Information**

The Facts About Coronary Heart Disease

- **Every second man and woman** in the industrialized world dies from the consequences of atherosclerotic deposits in the coronary arteries (leading to heart attack) or in the arteries supplying blood to the brain (leading to stroke). The epidemic spread of these cardiovascular diseases is largely due to the fact that, until now, the true nature of atherosclerosis and coronary heart disease has been insufficiently understood.
- **Conventional medicine** is largely confined to treating the symptoms of this disease. Calcium antagonists, beta-blockers, nitrates and other drugs are prescribed to alleviate angina pain. Surgical procedures (angioplasty and bypass surgery) are applied to improve blood flow mechanically. Rarely does conventional medicine target the underlying problem: the instability of the vascular wall, which triggers the development of atherosclerotic deposits.
- **Cellular Medicine** provides a breakthrough in our understanding of the underlying causes of these conditions and leads to the effective prevention and treatment of coronary heart disease. The primary cause of coronary heart disease and other forms of atherosclerotic disease is a chronic deficiency of vitamins and other essential nutrients in millions of vascular wall cells. This leads to the instability of the vascular walls, lesions and cracks, atherosclerotic deposits and, eventually, heart attacks or strokes. Since the primary cause of cardiovascular disease is a deficiency of essential nutrients in the vascular wall, the daily optimum intake of these essential nutrients is the primary measure to prevent atherosclerosis and help repair artery wall damage.



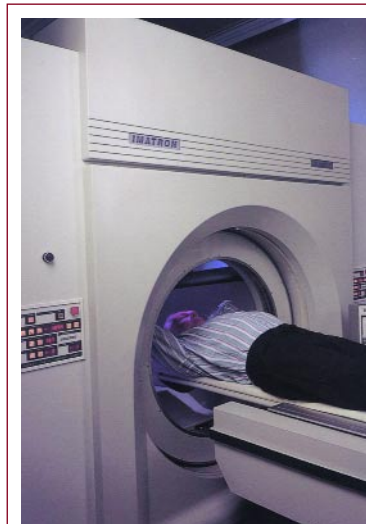
Coronary heart disease, stroke and other forms of atherosclerotic cardiovascular disease

- **Scientific research and clinical studies** have already documented the particular value of vitamin C, vitamin E, beta-carotene, lysine, proline and other ingredients in Dr. Rath's Cellular Health recommendations for preventing cardiovascular disease and improving the health of patients with existing cardiovascular disease.
- **Dr. Rath's Cellular Health recommendations** comprise specific essential nutrients that help prevent cardiovascular disease naturally and repair existing damage. The following pages document health improvements in patients with coronary heart disease and other forms of cardiovascular disease who have benefited from this program.
- **My recommendation for patients** with cardiovascular disease: Start immediately with this natural cardiovascular program and inform your doctor about it. Follow the Cellular Health recommendations and take your medication. Vitamins C and E are natural "blood thinners." If you are on blood thinning medication, you should talk to your doctor about the vitamins you take so that additional blood tests can be performed and your prescription medication decreased. Do not adjust any medication without consulting your doctor.
- **Prevention is better than treatment.** The success of these Cellular Health recommendations in patients with existing atherosclerosis and cardiovascular disease is based on the fact that the millions of cardiovascular cells are replenished with "cell fuel" for optimum cell function. A natural cardiovascular program proven to correct an existing health condition is, of course, your best choice in preventing this condition in the first place.

Dr. Rath's Cellular Health Recommendations Can Halt and Reverse Coronary Heart Disease

Millions of people die every year from heart attacks because no effective treatment to halt or reverse coronary heart disease has been available. Therefore, we decided to test the efficacy of Dr. Rath's Cellular Health recommendations for the number one health problem of our time: coronary atherosclerosis, the cause of heart attacks. If these Cellular Health recommendations were able to stop further progression of coronary atherosclerosis, the fight against heart attacks could be won and the goal of eradicating heart disease would become a reality.

To measure the success of this program, we did not primarily look at risk factors circulating in the bloodstream. We focused directly on the key problem, the atherosclerotic deposits inside the walls of the coronary arteries. A fascinating new diagnostic technique had just become available that allowed us to measure the size of the coronary deposits non-invasively: Ultrafast Computed Tomography (Ultrafast CT).



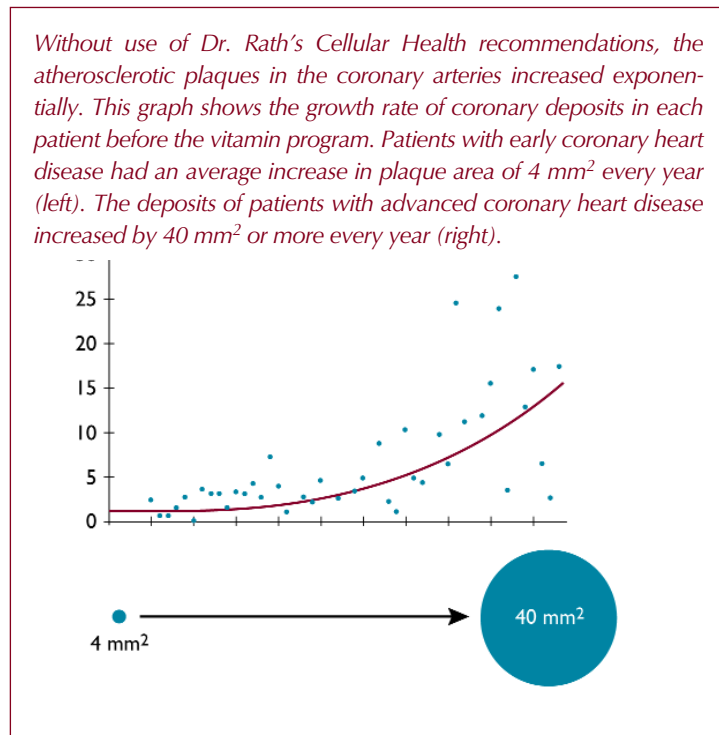
Ultrafast CT, the "mammo-gram for the heart," is a new diagnostic technology that allows non-invasive testing for coronary heart disease.

Ultrafast CT measures the area and density of calcium deposits without the use of needles or radioactive dye. The computer automatically calculates their size by determining the Coronary Artery Scan (CAS) score. The higher the CAS score, the more calcium has accumulated, which indicates more advanced coronary heart disease.

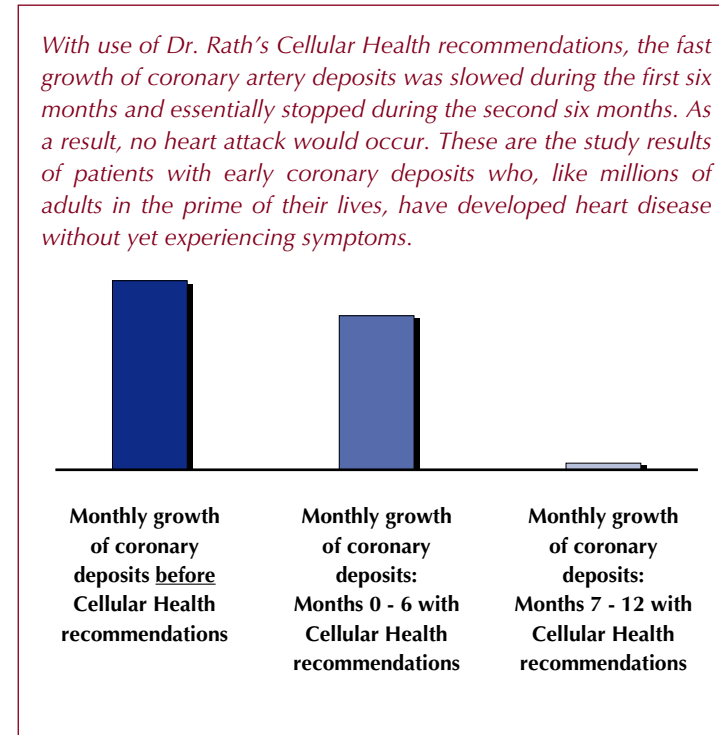
Compared to angiography and treadmill tests, Ultrafast CT is the most precise diagnostic technique available today to detect coronary heart disease already in its early stages. This diagnostic test allows the detection of deposits in the coronary arteries long before a patient notices angina pectoris or other symptoms. Moreover, since it directly measures the deposits in the artery walls, Ultrafast CT is a much better indicator of a per-

son's cardiovascular risk than measurements of cholesterol or other risk factors in the bloodstream.

We studied 55 patients with various degrees of coronary heart disease. Changes in the size of the coronary artery calcifications in each patient were measured over an average period of one year without vitamin supplementation, followed by one year with Dr. Rath's Cellular Health recommendations. In this way, the heart scans of the same person could be compared before and after the vitamin program. This study design had the advantage of patients serving as their own controls. The dosages of essential nutrients given were in the approximate amounts listed in the vitamin table on page 25.



Growth rate of coronary deposits per year in each patient



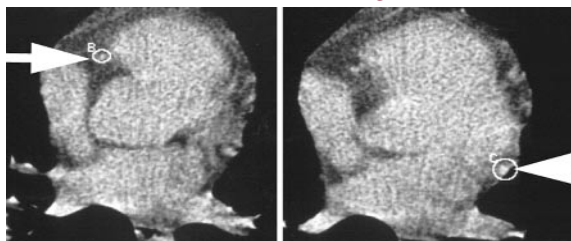
Dr. Rath's Cellular Health recommendations can stop coronary heart disease.

The results of this study were published in the *Journal of Applied Nutrition*. The full text of this landmark study is documented at the end of this book. The most important findings can be summarized as follows: This study measured, for the first time, how aggressive coronary heart disease progresses until eventually a heart attack occurs. Without the use of Cellular Health recommendations, the coronary calcifications increased at an exponential rate (very fast) with an average growth of 44% every year. Thus, without vitamin protection,

coronary deposits increased approximately half their size every year. When patients followed the Cellular Health recommendations, this trend was reversed and the average growth rate of coronary calcifications actually slowed down. Most significantly, in patients with early stages of the disease, this essential nutrient program stopped further progression of coronary heart disease within one year. This study also gives us valuable information about the time it takes for the Cellular Health recommendations to show a repair effect on the artery wall. While for the first six months the deposits in these patients continued to grow, albeit at a decreased pace, the growth essentially stopped during the second six months with the vitamin program. Of course, any therapy that stops coronary heart disease in its early stages prevents heart attacks later on.

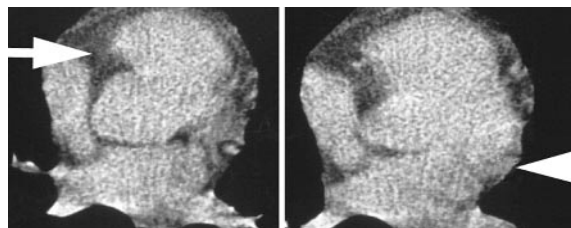
These pictures document a milestone in medicine – the complete natural disappearance of coronary heart disease. The Ultrafast Computed Tomography (Ultrafast CT) scans (top row) document atherosclerotic deposits in the right and left coronary arteries of this patient. After one year with Dr. Rath’s Cellular Health recommendations, these coronary deposits entirely disappeared (bottom row) – indicating a natural healing process of the artery wall.

Without Vitamin Program



Deposits in left and right coronary arteries

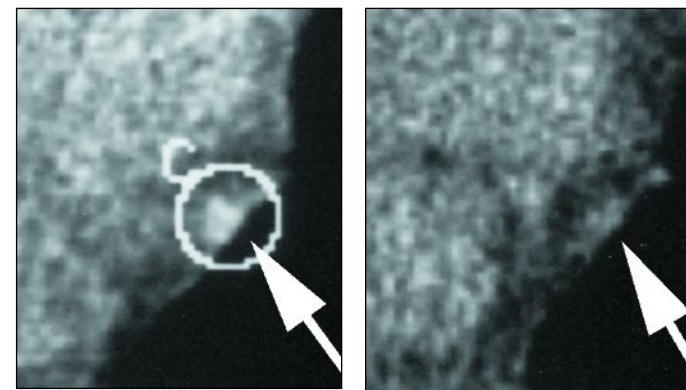
With Vitamin Program



Natural disappearance of deposits in both coronary arteries

It is not surprising that there is a delay of several months until the healing effect of these Cellular Health recommendations

Before following Dr. Rath’s Cellular Health recommendations, the patient had developed atherosclerotic deposits in the walls of his left coronary artery (white circled area in the left picture). The scans below are magnifications of the heart scan taken with Ultrafast CT.



Before

After

Natural healing of coronary artery disease (magnified)

Dr. Rath’s Cellular Health recommendations – the world’s first natural therapy documenting the disappearance of coronary deposits

on the artery wall becomes noticeable. Atherosclerotic deposits develop over many years or decades, and it takes several months to control this aggressive disease and start the healing process. More advanced stages of coronary heart disease may take still longer before the vascular healing process is measurable. To determine this, we are continuing our study.

Can already existing coronary deposits be reversed in a natural way? The answer is yes. In individual patients, we documented the natural reversal and complete disappearance of early coronary artery deposits approximately within one year. The ongoing study will tell us how long the natural reversal takes in patients with advanced coronary artery disease.

The complete natural disappearance of atherosclerotic deposits with Dr. Rath's Cellular Health recommendations confirms that this vitamin program contains the essential ingredients needed to start the natural healing process of the artery wall.

In patients with *early* coronary heart disease, this healing of the artery wall can lead to the complete, natural disappearance of atherosclerotic deposits (see pages 40-41).

In patients with *advanced* coronary artery disease, these Cellular Health recommendations can stabilize the artery walls, halt the further growth of coronary deposits, reverse them, at least in part, and contribute to the prevention of heart attacks.

Improving Human Health Worldwide

Our clinical study marks a major breakthrough in medicine and will lead to health improvements for millions of people throughout the world. For the first time, the following clinical results were documented:

- Without vitamin therapy, coronary heart disease is a very aggressive disease. Deposits grow, on average, at a staggering rate of 44% per year.
- Dr. Rath's Cellular Health recommendations are proven to halt coronary atherosclerosis, the cause of heart attacks, already in its early stages.
- There now exists an effective natural therapy to prevent and reverse coronary heart disease naturally – without angioplasty, bypass surgery or cholesterol-lowering drugs.
- Every man and woman in any country of the world can immediately take advantage of this medical breakthrough.
- In the coming decades, deaths from heart attacks and strokes will be reduced to a fraction of their current rates, and cardiovascular disease will essentially be unknown to future generations.

How Dr. Rath's Cellular Health Recommendations Can Help Patients With Coronary Heart Disease

These pages present letters from coronary heart disease patients who have followed my Cellular Health recommendations. This essential nutrient program improved the health of these patients and their quality of life beyond anything possible before.

Dear Dr. Rath:

In August 1990, at the age of 20, I was diagnosed with viral cardiomyopathy. My doctors informed me that my only hope for survival would be a heart transplant. In November 1990, I was transported to the hospital for **heart transplant surgery**.

As part of my post-operative treatment, I went into the hospital for an annual heart catheterization. Up until January, my heart cath were fine. In January, I had a heart catheterization and my cardiologist found four blockages. **Three (coronary artery) vessels were approximately 90% occluded (blocked) and the fourth vessel was approximately 60% occluded.** I had also gained 100 pounds since the transplant, and my cardiologist was furious. I was instructed to begin a strict, low-fat diet immediately.

In May, I was introduced to your Cellular Health recommendations. I had lost 30 pounds on my low-fat diet and began using your formulas. **I had a repeat catheterization in November. The results were phenomenal!! This cath showed that the three occlusions previously at approximately 90% were reduced by approximately 50% and the fourth occlusion previously at approximately 60% had no obstruction at all.** The other exciting news was that I had also lost an additional 50 pounds for a total of 80 pounds!! All of this occurred in six months. This program has dramatically improved my life!

Sincerely,
J.B.

Dear Dr. Rath:

I'm a 51-year-old business executive. Because of my position, I am consistently placed in high stress situations. My lifestyle and business responsibilities have caused me to be concerned about the potential of developing coronary artery disease.

Approximately two years ago, I scheduled myself for a coronary artery scan on an Ultrafast CT scanner. This new diagnostic technique allows the measurement of small calcifications in the coronary arteries that are invariably associated with atherosclerotic plaques. The test was fast, painless, and involved no injections or any discomfort.

My coronary artery scan of two years ago and a second scan one year later showed the **beginnings of atherosclerosis in my coronary arteries**. A few months after my second scan was taken, I was introduced to your vitamin-based cardiovascular health program. After eight months of following your program, I received an additional coronary artery scan in order to evaluate the possible effect of your program on the calcium deposits in my coronary arteries. This most recent coronary artery scan showed that the **calcifications in my coronary arteries had disappeared entirely. It was apparent to me that these deposits had been reversed, or eliminated, during your cardiovascular health program.**

Because I was skeptical of the dramatic results, I scheduled a second follow-up coronary artery scan immediately after receiving the results. This follow-up scan confirmed the earlier results, demonstrating no evidence of coronary artery calcification. I must also add that I have made no other significant changes in other aspects of my lifestyle during the past eight months - only your cardiovascular vitamin program. I want to offer you my sincere thanks.

Yours truly,
S.L.M.

Dear Dr. Rath:

I am a 57-year-old man, and have lived a very active life. Two years ago, I was diagnosed with **angina pectoris**. The cardiologist prescribed a calcium antagonist and nitroglycerin tablets, as needed, for pain. Dr. Rath, I was taking 8-10 nitroglycerin tablets weekly.

Then I was introduced to your Cellular Health recommendations and a fiber formula, and within 6 weeks I no longer needed the nitroglycerin. I was not able to mow my yard with a push mower without stopping every 5 to 10 minutes to take a nitroglycerin tablet. **About a week ago, I push-mowed my entire yard, about three hours of work. I did not stop at all and did not have any chest pain. I felt great.** I have also lost about 10 pounds, and my cholesterol level dropped from 274 to 191. My doctor says he is real pleased with my condition.

I am indebted to you for a great change in my life. With your help, I will be able to live a more fulfilling life for a longer time for a lot less money.

Thank you so very much.
H.D.

Dear Dr. Rath:

I am an 85-year-old woman. Ten years ago, I was diagnosed with angina pectoris. **I was told by my doctor that two major arteries were 95% blocked.** The doctor prescribed nitroglycerin tablets to relieve the painful condition induced by stress. I have been taking three nitroglycerin tablets a day for chest pains for 10 years.

Last December, I started on your cardiovascular vitamin program. After two months, I was almost completely off nitroglycerin, and now I take a nitroglycerin tablet only occasionally.

Sincerely,
R.A.

Dear Dr. Rath:

In July, I complained of chest pain and pain in my left arm. During a treadmill test of about 9 minutes, I had pain in my chest and numbness in my left arm. I was given nitroglycerin, and the pain went away immediately. The following day I was admitted to the hospital for an angiogram. The doctor also found that I had an overactive thyroid.

The results of the angiogram indicated that my left main (coronary) artery was 75% blocked and that I would need a double bypass. The doctors didn't want to do the surgery until my thyroid condition was under control.

In the meantime, I started your Cellular Health recommendations. I tripled the dosage, while continuing to take the doctor's prescribed medication. The heart surgeon called me for open heart surgery even though my thyroid condition was not yet under control. **When the cardiologist set up a thallium treadmill test, he was amazed by the results – they were normal, with no chest pain or shortness of breath. He told me that I could postpone the surgery indefinitely and come back in six months.**

Just last week the doctor looked at my laboratory records and said, "This is amazing." He went across the hall to see the cardiologist to make sure the report was correct.

Thank you again, Dr. Rath. I think this is the beginning of the end of heart disease.

Sincerely,
J.K.

Dear Dr. Rath:

I was very excited about the possibility of improving heart function and reversing heart disease due to atherosclerosis after reading your books this past February. **I have familial hypercholesterolemia (high cholesterol), and had a myocardial infarction six years ago at age 40.**

I started following your cardiovascular vitamin program and using a fiber formula in February. Within the first month, I started feeling less tired, and was able to keep on going without exhaustion or angina. Within two months, the pain in my lower left leg, due to poor circulation (atherosclerosis), disappeared. My heart feels like it's just on overdrive - just purring along - no longer pounding in my chest.

My annual physical in May was quite interesting. I never told my doctor I was doing anything different, but he shared with me that my ECG looked normal! **I asked my doctor about possibly lowering my heart medication (a calcium antagonist and beta-blocker). He said that based on my examination he would take me off all this medicine** if I lost 17 more pounds of weight. I have already lost 12 pounds since February, so I see losing 17 pounds as just a matter of time.

I have supplemented your vitamin program with additional vitamin C, L-proline, and L-lysine. I do not know if my atherosclerosis will ever be 100% reversed, but I do know that whatever progress your program has brought me so far has already improved my condition, and has impacted my overall quality of life.

I will continue your cardiovascular health program for the rest of my life, and I recommend it to anyone concerned about their health.

I thank God for your research.

Sincerest regards,
R.R.

Dear Dr. Rath:

I am a 57-year-old male who had a heart attack on November 20, 1986. **I was told by my cardiologist that I had incurred a myocardial infarction** of a small artery in the lower portion of my heart. It was determined that angioplasty or some other surgical procedure was not relevant or pertinent. The aftereffects were reduced energy and stamina, angina pectoris and other related symptoms typical of this condition. Since that time, I have been on a calcium antagonist medication. Follow-up angioplasty procedures were performed in October 1987 and February 1993. Evidence of a noticeable change in my condition was limited to some increase in the partial blockage in other major coronary arteries.

I began following your Cellular Health recommendations last October. This April, another angioplasty was performed on me by a cardiologist who is highly respected and has many years of experience in this specialty area. He has performed several thousand of these procedures; however, he was amazed at what he observed in my case. **He found the previously blocked artery to have 25% to 30% blood flow and no advancement in the partial obstruction (blocking) of other arteries.** His comment was, "Your arteries look great. I don't know what you are doing, but keep doing it." **He further commented that this was only the second time he had observed an artery opening up that was previously blocked without some surgical procedure.**

I have experienced a remarkable improvement in my general health by a reduction in the incidence of angina, chest pressure, shortness of breath, and, I have increased energy and endurance. I truly believe your cardiovascular health program will extend my life and eliminate what appeared to be the inevitable need for cardiac bypass surgery some time in the future. Your program has dramatically improved my life, and I am very grateful.

Sincerely,
L.T.

Dear Dr. Rath:

A friend of mine started on your Cellular Health recommendations because of minor heart problems. I did not know, but he was also **scheduled for eye surgery because of a blood vessel blockage.** He went into the hospital for surgery last week. The doctor looked into his eyes and couldn't believe what he saw.

His blockages had cleared, and he no longer needed the surgery done! Needless to say, he has been telling everyone he knows about your cardiovascular health program.

Sincerely,
C.Z.

A growing number of health professionals around the world are suggesting my Cellular Health recommendations to their patients as an adjunct therapy. They appreciate that, finally, a clinically tested, natural health program is available. The benefits are evident from the following letter from a patient to his doctor:

Dear Doctor:

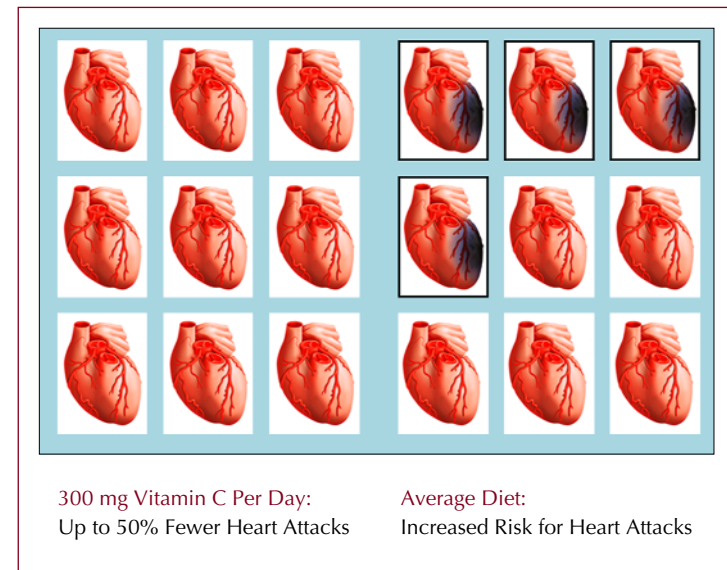
I can't wait to see you in six weeks. Since following Dr. Rath's Cellular Health recommendations, I have had no angina. This past month, I have walked and climbed the rugged trails of the rain forest without so much as a twinge. And recently, I have walked the last two to 18 holes of a golf course, something unheard of since my heart attack. In closing, my family and I are very pleased, and would like to thank you.

Sincerely,
J.T.

Clinical Studies Document the Prevention of Cardiovascular Disease With Vitamins

The paramount importance of several components of my Cellular Health recommendations in the prevention of cardiovascular disease has also been documented in numerous clinical and epidemiological studies.

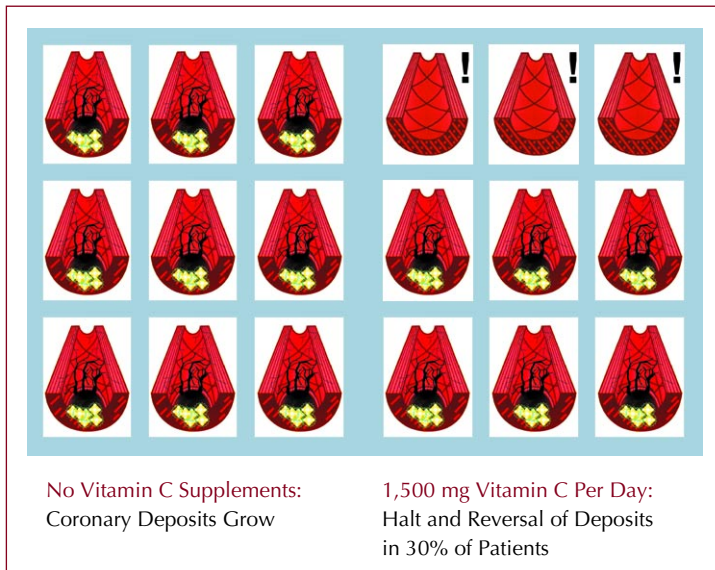
Dr. James Enstrom and his colleagues at the University of California at Los Angeles investigated the vitamin intake of more than 11,000 Americans over a period of 10 years. This government-supported study showed that people who consumed at least 300 mg per day of vitamin C through their diet or in the form of nutritional supplements, compared to 50 mg contained in the average American diet, could reduce their heart disease risk up to 50% in men and up to 40% in women. The same study showed that a higher intake of vitamin C was associated with an increased life expectancy of up to six years.



Vitamin C cuts risk for heart attacks in half.

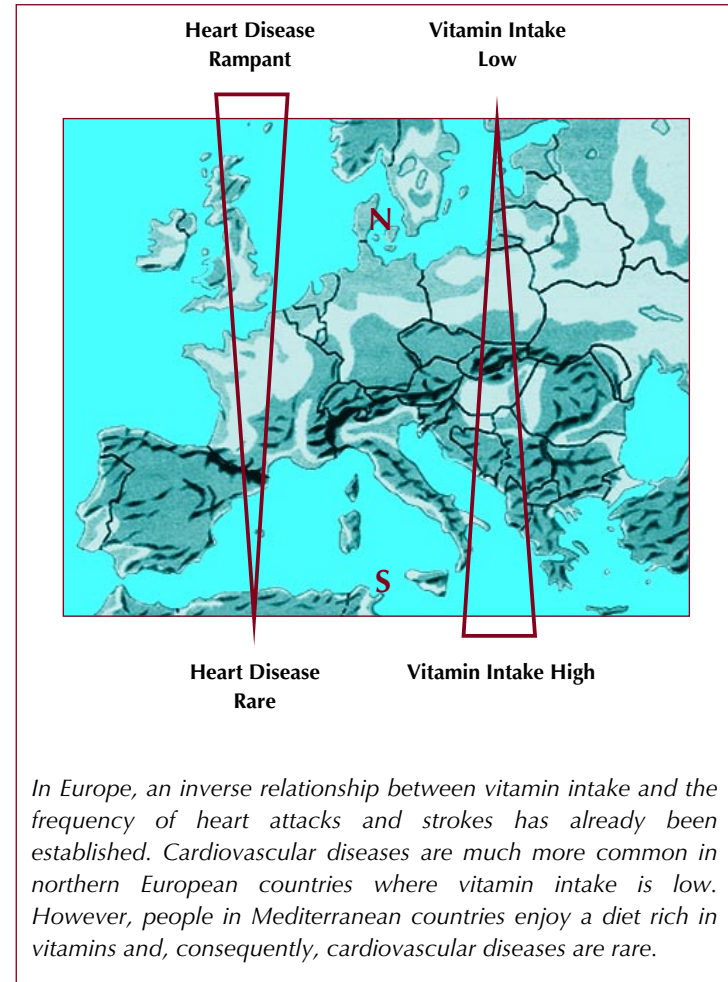
The Canadian physician Dr. G.C. Willis showed that dietary vitamin C can reverse atherosclerosis. At the beginning of his study, he documented the atherosclerotic deposits in his patients by angiography (injection of a radioactive substance followed by X-ray pictures). After this documentation, half of the study patients received 1.5 grams of vitamin C per day. The other half of the patients received no additional vitamin C. The control analysis, on average, after 10-12 months showed in patients who had received additional vitamin C that the atherosclerotic deposits had decreased in 30% of the cases. In contrast, no decrease in atherosclerotic deposits could be seen in those patients who had not received vitamin C supplementation. The deposits in these patients either had remained the same or had increased further.

Amazingly, this important clinical study was not followed up for half a century, and 12 million people continued to die each year from this preventable disease!



Europe: More Vitamins — Less Heart Disease

One of the largest studies about the importance of vitamins in the prevention of cardiovascular disease was conducted in Europe. It is a well-known fact that cardiovascular diseases are more frequent in Scandinavia and northern European countries, compared to Mediterranean countries.



Professor K.F. Gey, from the University of Berne in Switzerland, compared the rate of cardiovascular disease in these countries to the blood levels of vitamin C and beta-carotene, as well as cholesterol. His findings were remarkable:

- People in northern European countries have the highest rate of cardiovascular disease and, on average, the lowest blood levels of vitamins.
- Southern European populations have the lowest cardiovascular risk and the highest blood levels of vitamins.
- An optimum intake of the vitamins C, E and A had a much greater impact on decreasing the risk for cardiovascular disease than lowering cholesterol levels.

This study finally provides the scientific answer to the “French Phenomenon” and the low rate of heart attacks in France, Greece and other Mediterranean countries. The decisive factor for the low cardiovascular risk in these countries is an optimum intake of vitamins in the regular diets of these regions. Certain dietary preferences, such as the consumption of wine and olive oil, which are rich in bioflavonoids and vitamin E seem to be of particular importance.

Cellular Health Recommendations Clinically Proven to Decrease Your Cardiovascular Disease Risk

Optimum dietary intake of vitamin E, beta-carotene and certain other essential nutrients also significantly reduce cardiovascular disease risk. In clinical and epidemiological (population) studies, the importance of these vitamins for optimum cardiovascular health has been documented:

The Nurses’ Health Study included more than 87,000 American nurses, ages 34-59: None of the study participants had any signs of cardiovascular disease at the beginning of the study. In 1993, a first result was published in the *New England Journal of Medicine*. It was shown that study participants taking more than 200 International Units of vitamin E per day could reduce their risk for heart attacks by 34%, compared to those receiving only three International Units, which corresponded to the average daily intake of vitamin E in America.

The Health Professional Study included more than 39,000 health professionals, ages 40-75: At the beginning of the study, none of the participants had any signs of cardiovascular disease, diabetes or elevated blood cholesterol levels. The study showed that people taking 400 International Units of vitamin E per day could reduce their risk for heart attack by 40%, compared to those taking only six International Units of vitamin E per day. In the same study, an increased intake of beta-carotene was also shown to significantly decrease cardiovascular disease risk.

The Physicians’ Health Study included more than 22,000 physicians, ages 40-84: In this study in patients with existing cardiovascular disease published by Dr. Charles Hennekens in 1992, it was shown that in those patients, 50 mg of beta-carotene per day could cut the risk for suffering a heart attack or stroke in half.

The Cambridge Heart Antioxidant Study with vitamin E: In this study, participants with existing atherosclerosis who received either 400 or 800 International Units of vitamin E suffered 47% fewer non-fatal heart attacks than participants who received a placebo. In their review of several clinical studies, authors David H. Emmert, MD and Jeffrey T. Kirchner, DO noted that cardiovascular mortality could be reduced with the use of vitamin E.

A multi-center study showed decreased risk for coronary heart disease, stroke and peripheral vascular disease with higher levels of folic acid, and vitamin B6 and vitamin B12: In a clinical study with more than 1,500 patients, Dr. K. Robinson from the Cleveland Clinic Foundation in Ohio showed that blood levels of vitamin B6, vitamin B12 and folic acid are important in lowering homocysteine levels and decreasing the risk of coronary heart disease.

A large-scale study in Finland showed that optimum vitamin C intake is the single most important factor for preventing strokes in high blood pressure patients: In a 10-year study with more than 2,400 patients who were overweight and suffered from high blood pressure, it was shown that low levels of vitamin C increased the risk for a stroke by almost threefold. This study was conducted by Dr. Sudhir Kurl and his colleagues at the University of Kuopio in Finland.

A 20-year study in Japan showed that optimum vitamin C intake is the single most important factor for preventing all forms of strokes in men and women: In a clinical study involving more than 2,000 patients over two decades, Dr. Tetsuji Yokoyama and his colleagues from the University of Tokyo, Japan found that high vitamin C levels are the most important factor in determining whether men and women aged 40 and older would suffer a stroke later in life.

No prescription drug has ever been shown to be as effective as the components of Dr. Rath's Cellular Health recommendations in preventing coronary heart disease and strokes.

Cellular Health Recommendations for Patients With Coronary Heart Disease

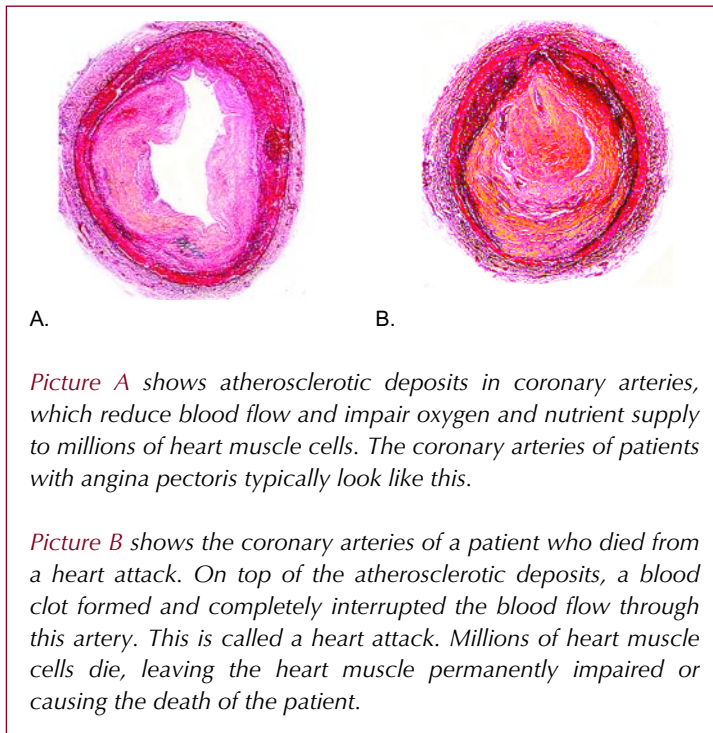
In addition to my Basic Cellular Health Recommendations (page 25), I recommend that patients with existing coronary heart disease or a high risk for this condition take the following cellular micronutrients in higher dosages.

- **Vitamin C:** provides protection and the natural healing of the artery wall and reversal of plaques
- **Vitamin E:** provides antioxidant protection
- **Vitamin D:** optimizes calcium metabolism and the reversal of calcium deposits in the artery wall
- **Folic acid:** provides a protective function against increased homocysteine levels together with vitamin B6, vitamin B12 and biotin
- **Biotin:** provides a protective function against increased homocysteine levels together with vitamin B6, vitamin B12 and folic acid
- **Copper:** supports stability of the artery wall with the improved cross-linking of collagen molecules
- **Proline:** supports collagen production, stability of the artery wall and reversal of plaques
- **Lysine:** supports collagen production, stability of the artery wall and reversal of plaques
- **Chondroitin sulfate:** supports the stability of the artery wall as a "cement" for connective tissue
- **N-acetyl-glucosamine:** supports the stability of the artery wall as a "cement" for connective tissue
- **Pycnogenol:** acts as a biocatalyst for improved vitamin C function and improved stability of the artery wall

Scientific Background for Dr. Rath's Cellular Health Recommendations in Cardiovascular Disease

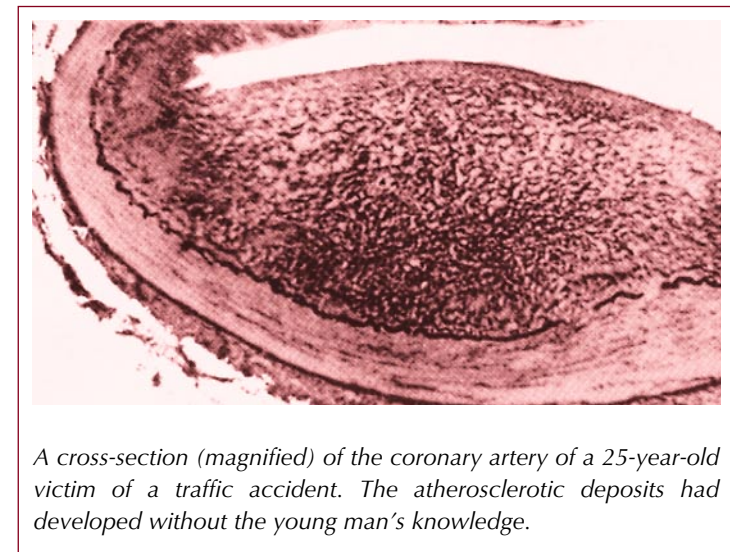
What Is Atherosclerosis?

The images on this page are cross-sections of the coronary arteries of a patient with coronary artery disease. These images provide a look inside these arteries through a microscope. The dark ring you notice is the original blood vessel wall as it would be found in a newborn baby. The gray area within this dark ring indicates atherosclerotic deposits, which developed over many years.



It is important to understand that the atherosclerotic deposits in Picture A developed over many years. In contrast, the additional blood clot in Picture B developed within minutes or perhaps seconds. The effective prevention of heart attacks has to start as early as possible with the prevention of atherosclerotic deposits. Atherosclerosis is not a disease of just those advanced in age. Studies of soldiers killed in the Korean and Vietnam Wars showed that nearly 75% of the victims had already developed some form of atherosclerotic deposits by age 25 or younger. The picture below shows the coronary artery of a 25-year-old victim of a traffic accident. This coincidental finding shows how far atherosclerosis can advance in young adults – without causing any symptoms.

The main cause of atherosclerotic deposits is the biological weakness of the artery walls caused by chronic vitamin deficiency. The atherosclerotic deposits are the consequence of this chronic weakness; they develop as a compensatory stabilizing cast of nature to strengthen weakened blood vessel walls.



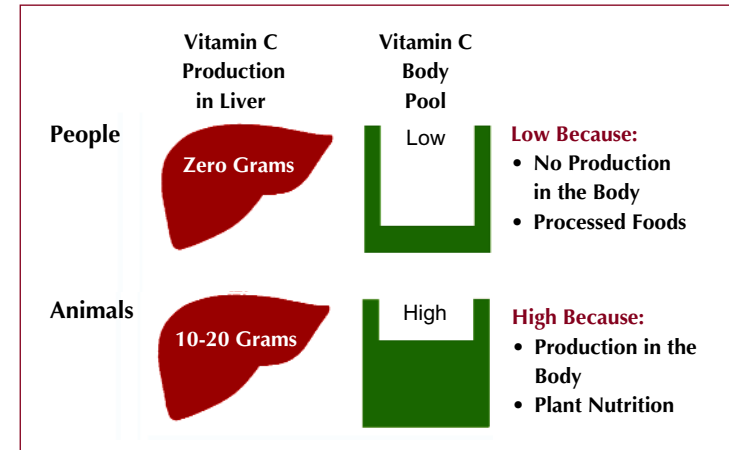
Why Animals Don't Get Heart Attacks

According to the statistics of the World Health Organization, each year more than 12 million people die from the consequences of heart attacks and strokes. Amazingly, while cardiovascular disease has become one of the largest epidemics ever to haunt mankind, these very same heart attacks are essentially unknown in the animal world. The following paragraph from the renowned textbook of veterinary medicine, *Veterinary Pathology* by T.C. Jones and H.A. Smith, documents these facts:

*“The fact remains, however, that in none of the domestic species, with the rarest of exceptions, do animals develop atherosclerotic disease of clinical significance. It appears that most of the pertinent pathological mechanisms operate in animals and that atherosclerotic disease in them is not impossible; **it just does not occur.** If the reason for this could be found, it might cast some very useful light on the human disease.”*

These important observations were first published in 1958. Now, more than four decades later, the puzzle of human cardiovascular disease has been solved. The solution to the puzzle of human cardiovascular disease is one of the greatest advances in medicine.

Here is the main reason why animals don't get heart attacks: With few exceptions, animals produce vitamin C in their bodies. The daily amounts of vitamin C produced by animals vary between 1,000 mg and 20,000 mg, compared to human body weight. Vitamin C is the “cement” of the artery wall, and optimum amounts of vitamin C stabilize the arteries. In contrast, we human beings cannot produce a single molecule of vitamin C ourselves. Our ancestors lost this ability generations ago when an enzyme that was needed to convert sugar molecules (glucose) into vitamin C became defunct. This change in the molecules of inheritance (genes) of our ancestors had no immediate disadvantage since, for thousands of generations,

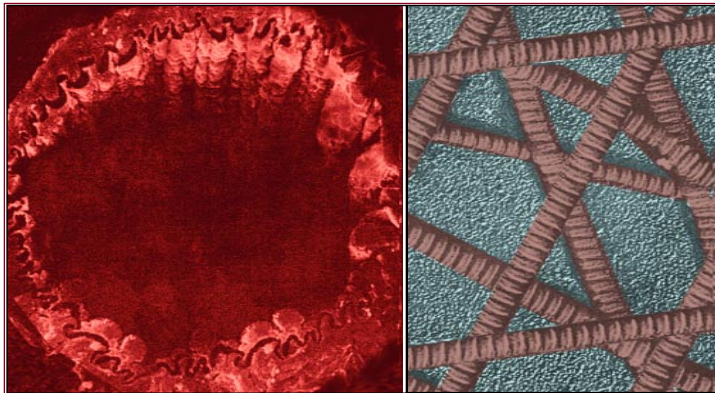


they relied primarily on plant nutrition, such as cereals, fruits and others, that provided the daily minimum of vitamins for them. The nutritional habits and dietary intake of vitamins by humans have changed considerably in this century. Today, most people do not receive sufficient amounts of vitamins in their diets. Still worse, food processing, long-term storage and overcooking destroy most vitamins in food. The consequences are summarized in the picture above.

The single most important difference between the metabolism of human beings and most other living species is the dramatic difference in the body pool of vitamin C. The body reservoir of vitamin C in people is, on average, 10-100 times lower than the vitamin C levels in animals.

How Does Vitamin C Prevent Atherosclerosis?

Vitamin C contributes in many different ways to the prevention of cardiovascular disease. It is an important antioxidant, and it serves as a cofactor for many biochemical reactions in the body's cells. The most important function of vitamin C in preventing heart attacks and strokes is its ability to increase the production of collagen, elastin and other reinforcement molecules in the body. These biological reinforcement rods constitute the connective tissue, which comprises approximately 50% of all proteins in our bodies. Collagen has the same structural stability function for our bodies as iron reinforcement rods have for a skyscraper building. Increased production of collagen means improved stability for the 60,000-mile-long pipeline of our arteries, veins and capillaries.



Left: The cross-section of an artery (magnified). Collagen and other connective tissue (white structures) provide basic stability to blood vessel walls.

Right: Individual collagen molecules under high magnification. Each of these fibers is stronger than an iron wire of comparable width.

The close connection between vitamin C deficiency and the instability of body tissue was established long ago. The following page is taken from the world-famous textbook *Biochemistry* by Professor Lubert Stryer of Stanford University.

Defective Collagen Hydroxylation Is One of the Biochemical Problems in Scurvy

“The importance of the hydroxylation of collagen becomes evident in scurvy. A vivid description of this disease was given by Jacques Cartier in 1536 when it afflicted his men as they were exploring the Saint Lawrence River:

‘Some did lose all their strength and could not stand on their feet...others also had all their skins spotted with spots of blood of a purple color: then did it ascend up to their ankles, knees, thighs, shoulders, arms and necks. Their mouths became stinking, their gums so rotten, that all the flesh did fall off, even to the roots of the teeth, which did also almost all fall out.’

The means of preventing scurvy was succinctly stated by James Lind, a Scottish physician, in 1753: ‘Experience indeed sufficiently shows that as greens or fresh vegetables with ripe fruits, are the best remedies for it, so they prove the most effectual preservatives against it.’ Lind urged the inclusion of lemon juice in the diet of sailors. His advice was adopted by the British navy some 40 years later.

Scurvy is caused by a dietary deficiency of ascorbic acid (vitamin C). Primates and guinea pigs have lost the ability to synthesize ascorbic acid, and they must acquire it from their diets. Ascorbic acid, an effective reducing agent, maintains prolyl hydroxylase in an active form, probably by keeping its iron atom in the reduced ferrous state. Collagen synthesized in the absence of ascorbic acid is insufficiently hydroxylated and, hence, has a lower melting temperature. The abnormal collagen cannot properly form fibers and, thus, causes the skin lesions and blood vessel fragility that are so prominent in scurvy.”

From *Biochemistry* by Lubert Stryer

While the vitamin C-collagen connection has been firmly established, the paramount importance of this connection for heart disease has apparently been overlooked or neglected.

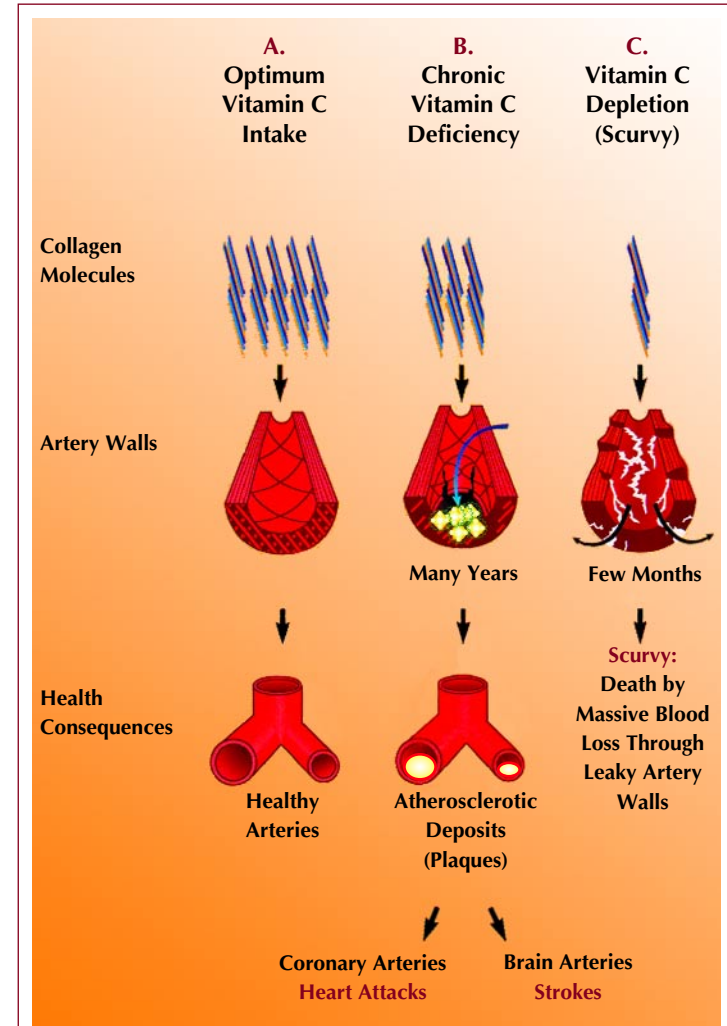
Atherosclerosis Is an Early Form of Scurvy

While these facts have been known for centuries, they still are not applied in medicine today. The next graphic summarizes the fact that the main cause of heart attacks and strokes is a scurvy-like condition of the artery wall.

Left Column A: Optimum intake of vitamin C leads to the optimum production and function of collagen molecules. A stable blood vessel wall does not allow atherosclerotic deposits to develop. The optimum availability of vitamin C in their bodies is the main reason why animals don't get heart attacks.

Right Column C: The right column of this graphic summarizes the events in scurvy. The total depletion of the body's vitamin C reserves, as they occurred in sailors of earlier centuries, leads to a gradual breakdown of the body's connective tissue, including the blood vessel walls. Thousands of sailors died within a few months from hemorrhagic blood loss through leaky blood vessel walls.

Center Column B: Atherosclerosis and cardiovascular disease occur exactly between these two conditions. The average diet contains enough vitamin C to prevent open scurvy, but not enough to guarantee stable, reinforced artery walls. As a consequence, millions of tiny cracks and lesions develop along the artery walls. Subsequently, cholesterol, lipoproteins and other blood risk factors enter the damaged artery walls in order to repair these lesions. With chronically low vitamin intake, however, this repair process continues over decades. Over many years, this repair overcompensates, or overshoots, and atherosclerotic deposits develop. Deposits in the arteries of the heart eventually lead to heart attack; deposits in the arteries of the brain eventually lead to stroke.



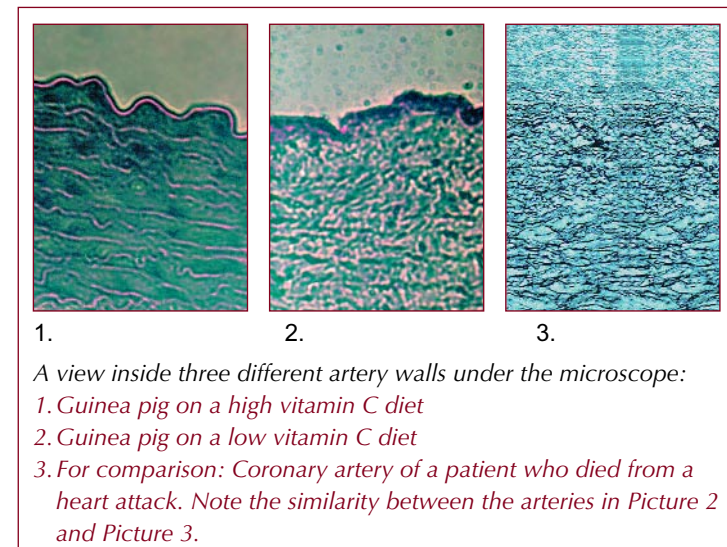
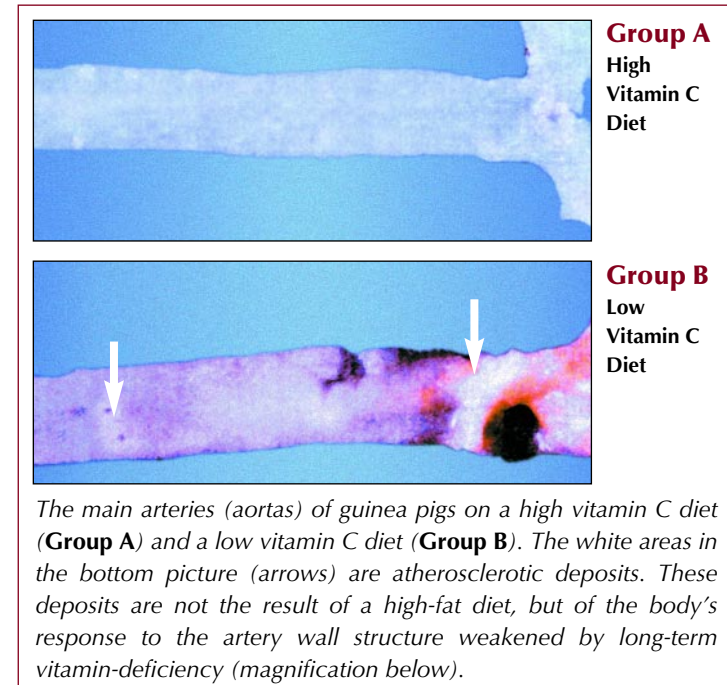
The scurvy-cardiovascular disease connection
 The connection between cardiovascular disease, vitamin C deficiency and scurvy is of such fundamental importance to our health that this graphic should become an essential part of health education in schools around the world.

Vitamin C Deficiency Causes Atherosclerosis — The Proof

It is possible to prove that insufficient dietary intake of vitamin C alone, without any other factors involved, directly *causes* atherosclerosis and cardiovascular disease. To prove this, we conducted an animal experiment with guinea pigs, which are exceptions in the animal world because they share with humans the inability to produce their own vitamin C. Two groups of guinea pigs received exactly the same daily amounts of cholesterol, fats, proteins, sugars, salt and all other ingredients in their diet with one exception — vitamin C. Group B received 60 mg of vitamin C per day in their diet, compared to human body weight. This amount was chosen to meet the official recommended daily allowance (RDA) for humans in the United States. In contrast, Group A received 5,000 mg of vitamin C per day, compared to human body weight.

These pictures document the changes in the artery walls in these two groups after only five weeks. The first picture shows the differences in the arteries of the two groups. The vitamin C-deficient animals of Group B developed atherosclerotic deposits (white areas), particularly in the areas close to the heart (right side of picture). The aortas of the animals in Group A remained healthy and did not show any deposits. The following pictures show the same artery walls examined under a microscope. The artery sections from animals with high vitamin C intake (Picture 1) show an intact cell barrier between the bloodstream and artery wall. The almost parallel alignment of the collagen molecules in the artery wall makes stability visible. In contrast, the arteries of the vitamin C-deficient animals (Picture 2) lost the protection (defective barrier cell lining) and stability (fragmented collagen structure) of their arteries. For comparison, a picture of the coronary arteries from a patient with coronary artery disease is included (Picture 3).

Note: In principle, animal experiments should be kept to an absolute minimum. They are only justified when human lives can be saved with the knowledge that results from these experiments. This was the case with the experiment described, which brought proof to millions of people of the value of vitamin C in the prevention of heart attacks.



Repeating Evolution: Dramatic Confirmation of the Vitamin C-Heart Disease Connection

The final proof for the vitamin C-cardiovascular disease connection was published by a research team from the University of North Carolina, Chapel Hill in the *Proceedings of the National Academy of Sciences* in early 2000. Six years after we received our first patents for the natural prevention and reversal of cardiovascular disease, these researchers confirmed our discovery in a convincing way.

The researchers examined the arteries of normal mice and found that they did not develop atherosclerosis. This was not surprising, since mice normally produce high amounts of vitamin C and cardiovascular disease is, therefore, unknown in normal mice. Then, they experimentally shut down one gene (gulono-lactone-oxidase, GLO) in certain mice. This gene is responsible for converting sugar (glucose) into vitamin C in the livers of mice. Consequently, the mutant mice were no longer able to produce vitamin C in their bodies. With this experiment, the researchers duplicated exactly the situation of human beings: we lack the very same GLO gene and are, therefore, unable to produce vitamin C in our livers.

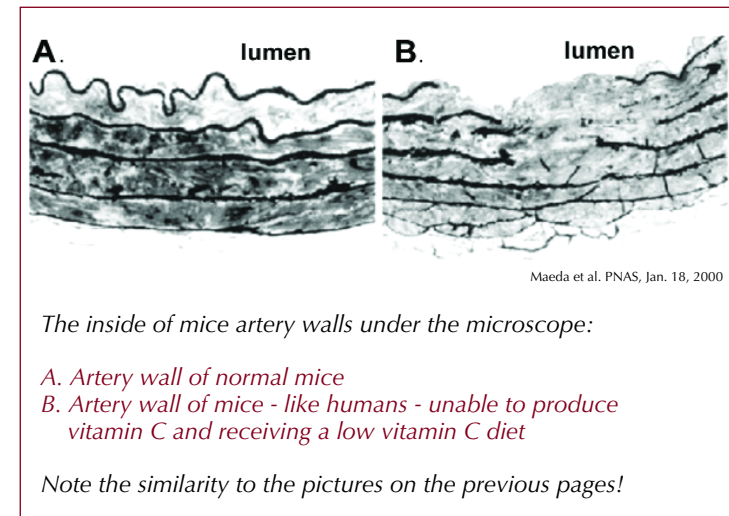
The decisive question was what would happen to those mutant mice when they — in addition to lacking endogenous vitamin C production in their bodies — received too little vitamin C in their diets? Would their artery walls develop lesions and cracks? Would their cholesterol levels rise in an effort by their bodies to repair this artery wall weakness?

The answer to these questions is “yes.” The connective tissue structure (collagen and elastin) of the artery walls of the vitamin C-deficient mice weakened. The cross-section under the microscope strikingly resembles our findings in the experiments on the previous page. Moreover, the vitamin C-deficient mice had significantly higher cholesterol levels. This experiment not only confirmed my discoveries in a dramatic way, but it also

terminated any speculation as to whether cholesterol is the cause or the consequence of cardiovascular disease.

This experiment in which only one factor was genetically modified — vitamin C production — confirmed that:

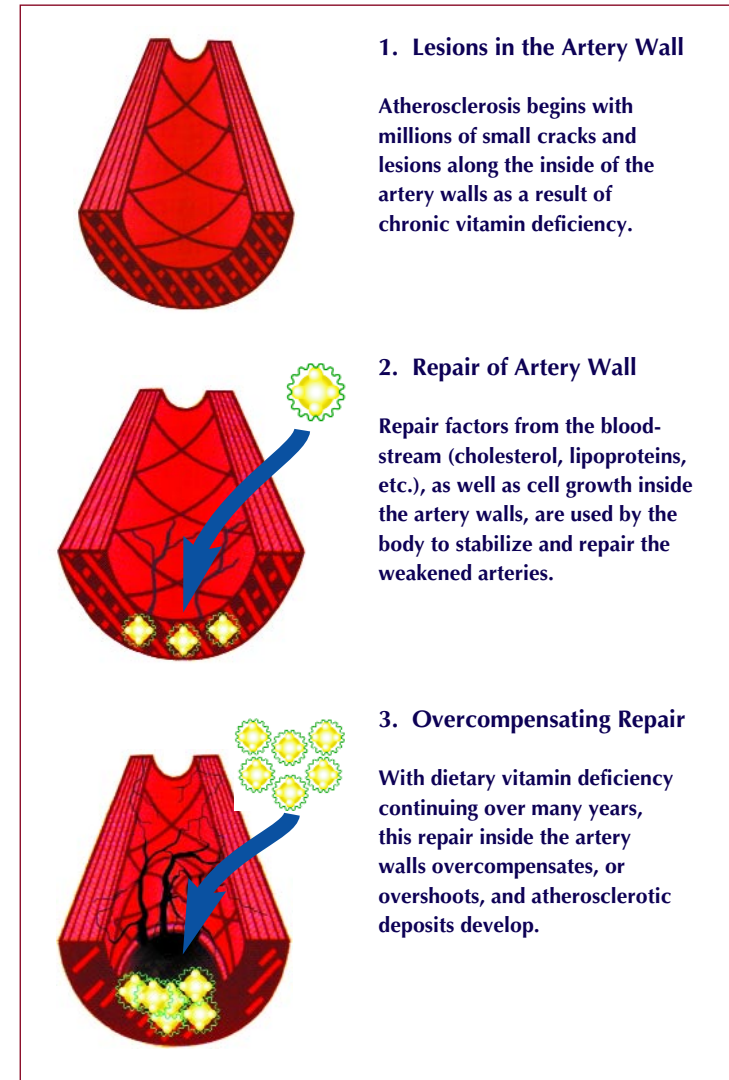
- Vitamin C deficiency is a primary cause of heart disease!
- High cholesterol is *not the cause of heart disease*, but the *consequence*!
- Cholesterol lowering, without correcting underlying vitamin deficiency, should be considered medical malpractice!



A New Understanding of the Nature of Heart Disease

The previous experiment underlines our modern definition of cardiovascular disease as a vitamin deficiency condition. This new understanding is summarized on the opposite page:

1. **Lesions:** The main cause of cardiovascular disease is the instability and dysfunction of the blood vessel wall caused by chronic vitamin deficiency. This leads to millions of small lesions and cracks in the artery wall, particularly in the coronary arteries. The coronary arteries are mechanically the most stressed arteries because they are squeezed flat from the pumping action of the heart more than 100,000 times per day, which is similar to a garden hose being stepped on.
2. **Beginning Repair:** Repair of the artery walls becomes necessary. Cholesterol and other repair factors are produced at an increased rate in the liver and transported in the bloodstream to the artery walls, which they enter in order to mend and repair the damage. Because the coronary arteries sustain the most damage, they require the most intensive repair.
3. **Ongoing Repair:** With continued vitamin deficiency over many years, the repair process in the artery walls overcompensates. Atherosclerotic plaques form predominantly at those locations in the cardiovascular system needing the most intensive repair: the coronary arteries. This is why infarctions occur primarily at this very same location and why the most frequent cardiovascular events are infarctions of the heart, not infarctions of the nose or ears.



Atherosclerosis develops in three steps.

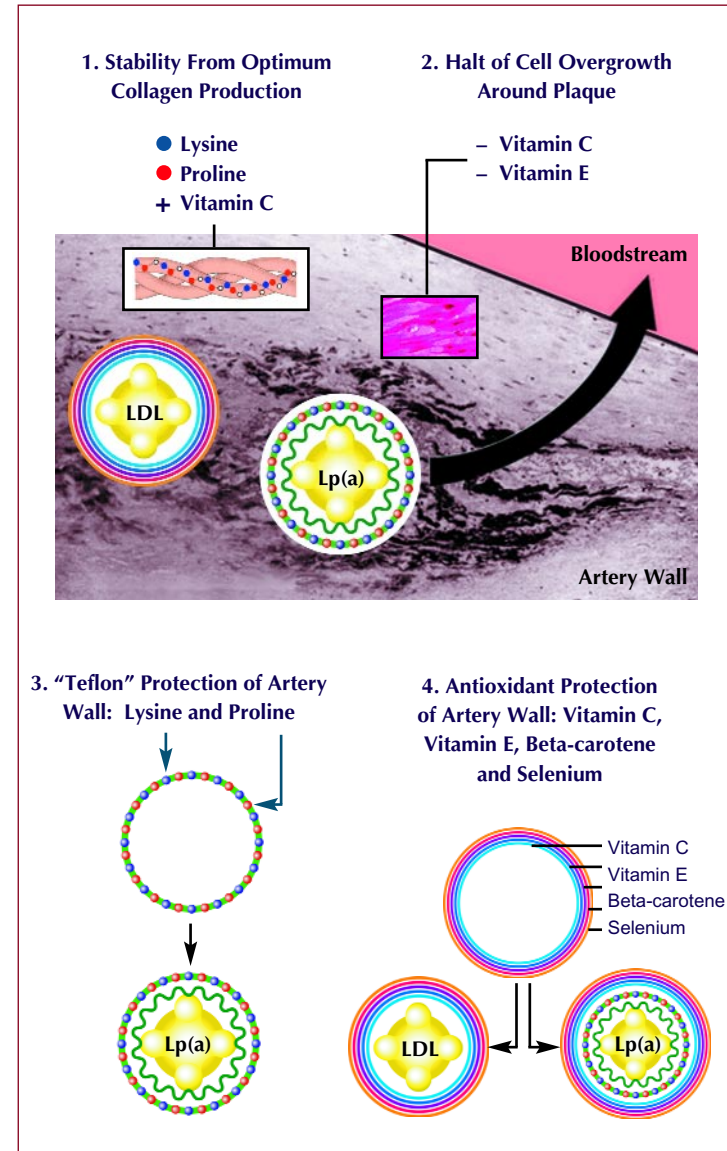
The Natural Reversal of Cardiovascular Disease

The basis for the reversal of atherosclerosis is the initiation of a healing process in the artery wall that has been weakened by chronic vitamin deficiency. Besides vitamin C, which stimulates production of collagen molecules, other constituents of Dr. Rath’s Cellular Health recommendations are also essential for this healing process. The graphic on the adjacent page summarizes the protective functions of this essential nutrient program.

In the middle of the graphic is a microscopic cross-section of the atherosclerotic deposit of a human coronary artery. The red area above the plaque represents the area where the blood normally flows. The lipoproteins (fat molecules) in the center of the deposits are stained black with a specific staining technique. Two of these lipoprotein (a) molecules (one lipoprotein (a) and one LDL molecule) among the thousands in this plaque are schematically magnified. These lipoproteins have been deposited inside the artery wall for many years.

Around the core of the plaque, a local “tumor” forms from muscle cells typical in the artery wall. This muscle cell tumor is another way in which the body stabilizes the vitamin-deprived artery wall. The deposit of lipoproteins from the bloodstream and the muscle cell tumor in the artery wall are the most important factors that determine the size of the plaque and, thereby, the progression of coronary heart disease. Any therapy that is able to reverse these two mechanisms of atherosclerosis must also reverse coronary heart disease itself. The nutrients in Dr. Rath’s Cellular Health recommendations synergistically affect both mechanisms in the following ways:

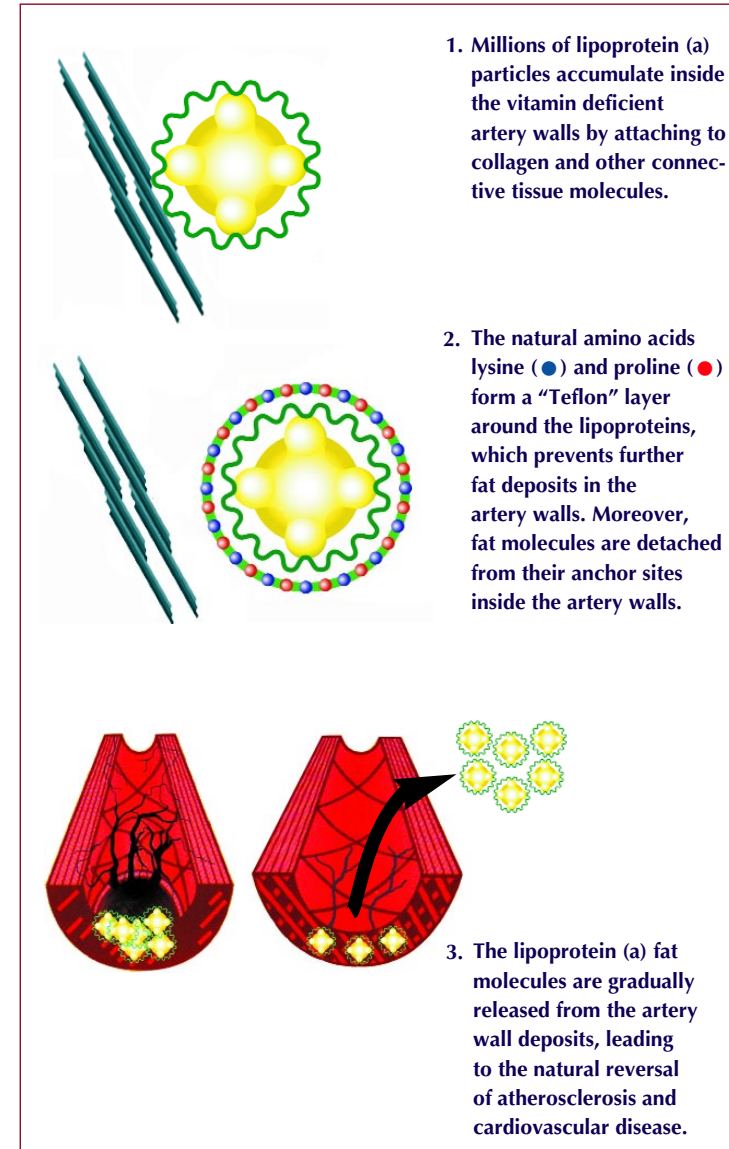
1. Stability of the artery wall through optimum collagen production: The collagen molecules in our bodies are proteins composed of amino acids. Collagen molecules differ from all other proteins in the body in that they make particular use of the amino acids lysine and proline. We already



How atherosclerosis is reversed in a natural way

know that vitamin C stimulates the production of collagen in the cells of the artery wall. An optimum supply of lysine, proline and vitamin C is a decisive factor in the optimum regeneration of the connective tissue in the artery walls and, therefore, the natural healing of cardiovascular disease.

2. **Decrease of the smooth muscle cell tumor in the artery wall:** With an optimum supply of essential nutrients, the smooth muscle cells of the artery wall produce sufficient amounts of functional collagen, thereby guaranteeing optimum stability of the wall. In contrast, vitamin deficiency leads to the production of faulty and dysfunctional collagen molecules by the arterial muscle cells. Moreover, these smooth muscle cells multiply to form an atherosclerotic tumor. My colleague Dr. Aleksandra Niedzwiecki and her research team investigated this mechanism in detail. They found that vitamin C, in particular, can inhibit the growth of the atherosclerotic “tumor.” In the meantime, other studies have shown that vitamin E also has this effect.
3. **“Teflon” protection of the artery wall and reversal of fatty deposits in the artery wall:** Lipoproteins are the transport molecules by which cholesterol and other fat molecules circulate in the blood and attach to the artery wall. For many years, it has been thought that the primary transport molecule responsible for the deposit of fat in the artery walls is LDL (low-density lipoprotein or “bad cholesterol”). Today, we know that the most dangerous fat transport molecules are not LDL molecules, but a variant called lipoprotein (a). The letter (a) could stand for “adhesive,” as it characterizes an additional sticky protein that surrounds LDL molecules. By means of this sticky protein, the lipoprotein (a) molecules accumulate inside the artery walls. Thus, it is not the cholesterol or LDL cholesterol level that determines the risk for cardiovascular disease, it is the amount of lipoprotein (a) molecules. In the next chapter, I will discuss this new risk factor in detail.



The world's first patented therapy for the natural reversal of atherosclerotic deposits

The primary therapeutic aim for preventing fatty deposits in the artery wall is, therefore, to neutralize the stickiness of the lipoprotein molecules and prevent their attachment to the inside of the artery walls. This can be achieved by means of “Teflon” substances for the artery walls. The first generation of these Teflon agents has been identified. They are the natural amino acids lysine and proline. They form a protective layer around the lipoprotein (a) molecules, which has a twofold effect: preventing the deposit of more fat molecules in the artery wall and releasing lipoprotein molecules that have already been deposited inside the artery walls. Releasing fat molecules from the atherosclerotic deposits leads to a natural reversal of cardiovascular disease. Molecule by molecule is released from the atherosclerotic plaques into the bloodstream and transported to the liver, where these molecules are burned. It is important to understand that this is a natural process, and the complications that frequently accompany angioplasty and other mechanical procedures do not occur.

- 4. Antioxidant protection in the bloodstream and artery walls:** An additional mechanism accelerating the development of atherosclerosis, heart attacks and strokes is biological oxidation. Free radicals, aggressive molecules found in cigarette smoke, car exhaust and smog, damage the lipoproteins in the bloodstream and the tissue of the artery walls. By doing so, they further increase the size of atherosclerotic plaques. Vitamin C, vitamin E, beta-carotene and other components of Dr. Rath’s Cellular Health recommendations belong to the strongest group of natural antioxidants and protect the cardiovascular system from oxidative damage.

The reversal of fatty deposits in the artery wall is a process common in nature. Bears and other hibernators, for example, use it regularly. During several months of winter sleep (hibernation), these animals do not eat and, therefore, get no vitamins from the diet. Moreover, during hibernation,

the vitamin C production in their bodies decreases to a minimum. As a consequence, fat molecules and other factors in their blood are deposited in the artery walls and lead to a thickening of these walls. In the spring, after these animals rise from hibernation, their vitamin supply increases dramatically from their diets and their bodies’ vitamin production. With this increased vitamin supply, the fatty deposits in the artery walls of these animals gradually reverse, and the artery walls retain their natural stability and function.

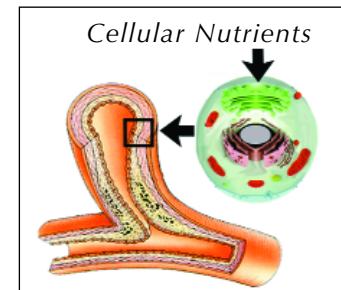
The solution to the puzzle of human cardiovascular disease is another striking example of how a close look at nature can help us to find solutions to human diseases.

Current Conventional “Repair” Medicine



Conventional Medicine: Until today, bypass surgery and other mechanical procedures have been the method of choice to treat cardiovascular disease.

Future Cellular Medicine



Cellular Medicine: From now on — and for all future generations — the understanding of the cellular origin of this disease will allow the natural prevention, treatment and, eventually, eradication of it.