

# Cellular Health™ Offers Natural Solutions to Cardiovascular Disease

## Results of Clinical Studies Using Defined Vitamin Programs in Cardiovascular Disease

### Scientific Abstract

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**Title:** Nutritional Supplement Program Halts Progression of Early Coronary Atherosclerosis Documented by Ultrafast Computed Tomography

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**Summary:** The objective of this study was to determine the effect of a defined nutritional supplement program on the natural progression of coronary artery disease in 55 patients (50 men and 5 women) between the ages of 44-67 with coronary artery disease as documented by Ultrafast Computed Tomography. This was a before and after trial (BAT) that included individuals with early (CAS score below 100) and advanced coronary calcifications.

The nutritional supplement program consisted of vitamins, amino acids, minerals, and trace elements that included a combination of essential nutrients patented for use in the prevention and reversal of cardiovascular disease\*. During the course of the 12-month nutritional supplement program, the rate of coronary artery calcification decreased in all patients by an average of 15 percent. In a subgroup of patients with a low CAS score (below 100), the progression of coronary calcification was stopped. In some individual cases, the reversal of atherosclerosis and the complete disappearance of previously existing coronary calcified deposits were also documented.

This is the first clinical study documenting the efficacy of a defined nutritional supplement program in halting and even reversing early forms of coronary artery disease. The nutritional supplement program tested here can be considered an effective and safe adjunct therapy for cardiovascular disease.

\*U.S. Patent 5,278,189

## The Cellular Health™ Approach to Naturally Reversing Atherosclerosis

### Patient Criteria

55 patients (50 men and 5 women) between the ages of 44-67 with coronary artery disease as documented by Ultrafast Computed Tomography.

### Treatment

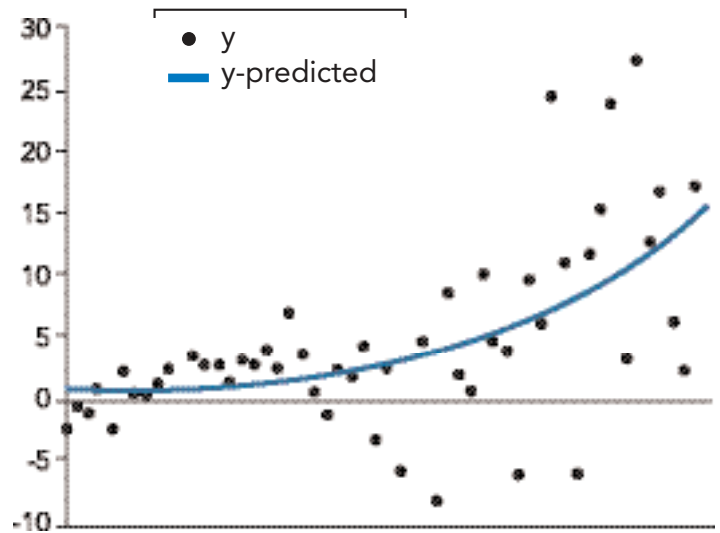
Patients followed a Cellular Health nutritional supplement program using the following daily dosages of nutrients for a 12-month period.

Vitamins		Minerals		Amino Acids		Coenzymes and Other Nutrients	
Vitamin A	7,500 IU	Magnesium	180 mg	L-Proline	450 mg	Folic Acid	390 mcg
Vitamin C	2,700 mg	Calcium	150 mg	L-Lysine	450 mg	Biotin	300 mcg
Vitamin D	600 IU	Potassium	90 mg	L-Carnitine	150 mg	Inositol	150 mg
Vitamin E	600 IU	Phosphate	60 mg	L-Arginine	150 mg	Coenzyme Q-10	30 mg
Vitamin B-1	30 mg	Zinc	30 mg	L-Cysteine	150 mg	Pycnogenol	30 mg
Vitamin B-2	30 mg	Manganese	6 mg			Citrus Bioflavonoids	450 mg
Vitamin B-3	195 mg	Copper	1,500 mcg				
Vitamin B-5	180 mg	Selenium	90 mcg				
Vitamin B-6	45 mg	Chromium	45 mcg				
Vitamin B-12	90 mcg	Molybdenum	18 mcg				

### Results

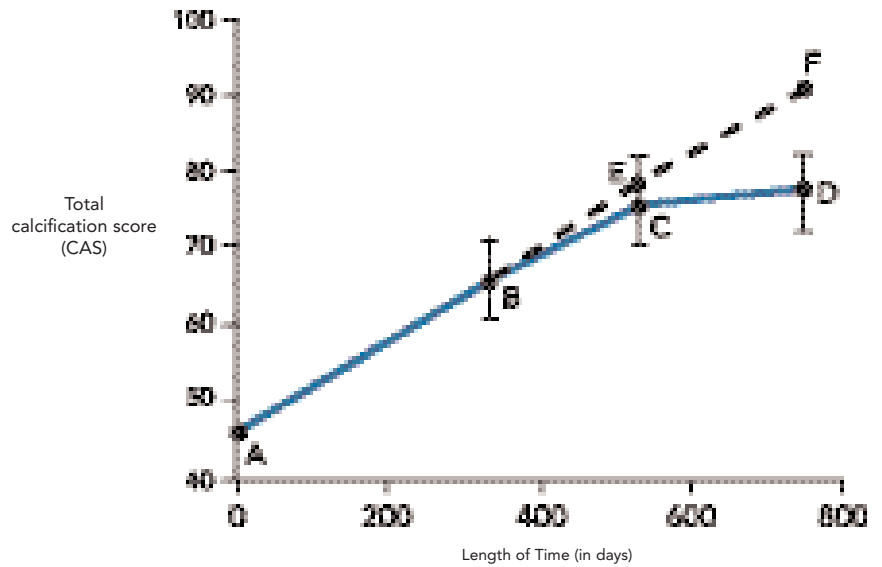
The monthly progression of calcifications in the coronary arteries of all 55 patients (in relation to their CAS scores), prior to nutritional supplementation, was documented. The average annual increase in the size of calcified deposits was 44 percent.

Change in total calcification score per month before intervention



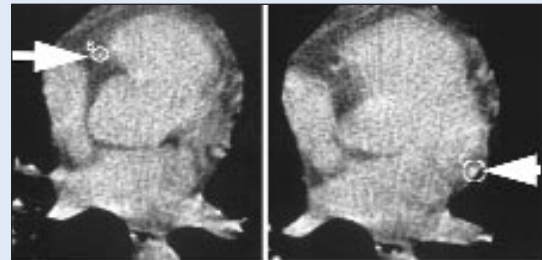
### Results (continued)

The actual progression of coronary calcification areas and CAS scores were documented before and during one year of nutritional supplement intervention in a subgroup of patients with initial stages of coronary calcification (CAS <100), compared to calculated progression without intervention (dotted line). Each data point represents the mean value +/- SEM.



Ultrafast CT scans of a 51-year-old patient with asymptomatic coronary artery disease before the start of the nutritional supplement program. Calcium deposits in the left descending and right coronary arteries appear as white spots.

**Without vitamin program**  
Deposits in two coronary arteries



Approximately one year later, the calcium deposits in both arteries were no longer present following the nutritional supplement program.

**With vitamin program**  
Deposits in both arteries disappeared naturally



### Conclusions

The Cellular Health nutritional supplement program for optimizing vascular wall function was effective in significantly slowing or stopping the progression of coronary calcifications, and in some cases, even reversing them.

## The Cellular Health™ Approach to Normalizing Cholesterol Levels and Optimizing Fat Metabolism

### Rationale

Cholesterol, LDL, and lipoprotein(a) are repair factors for the vascular wall, and their plasma levels respond to weakened artery wall structure as a result of long-term vitamin deficiency. The build up of these factors potentiates the risk for cardiovascular disease. Stabilizing the artery wall and optimizing cholesterol metabolism through the use of essential nutrients can normalize the plasma levels of cholesterol and other risk factors (e.g. homocysteine).

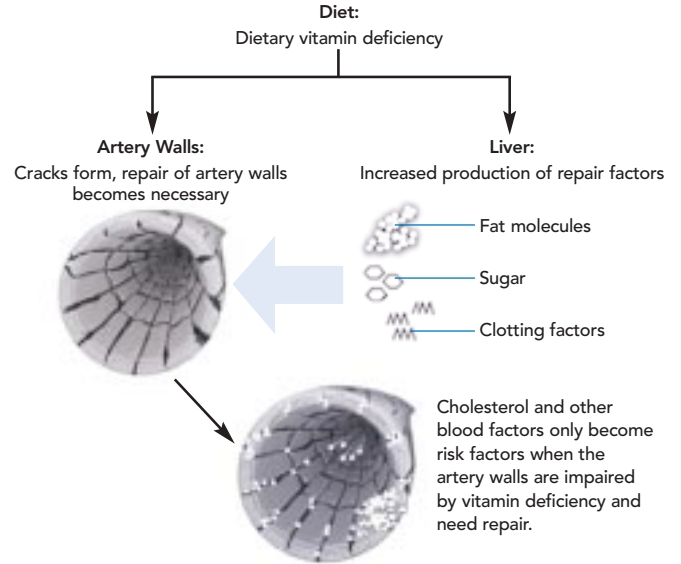
### Patient Criteria

14 patients between the ages of 34-68.

### Treatment

Patients were placed on a Cellular Health nutritional supplement program for a three-month period.

### Vitamin Deficiencies and High Cholesterol



Vitamins		Minerals		Amino Acids		Coenzymes and Other Nutrients	
Vitamin A	1,665 IU	Calcium	52 mg	L-Lysine	110 mg	Coenzyme Q-10	7 mg
<b>Vitamin C</b>	<b>3,151 mg</b>	Phosphorous	15 mg	L-Proline	110 mg	Pycnogenol	7 mg
Vitamin D3	130 IU	Magnesium	40 mg	L-Arginine	40 mg	Inositol	35 mg
<b>Vitamin E</b>	<b>230 IU</b>	Zinc	7 mg	L-Cysteine	35 mg	Pantothenic Acid	90 mg
Vitamin B-1	17 mg	Selenium	20 mcg	L-Carnitine	135 mg	Citrus Bioflavonoids	550 mg
Vitamin B-2	17 mg	Copper	330 mcg			<b>Betaine HCL</b>	<b>170 mg</b>
<b>Niacin</b>	<b>395 mg</b>	Manganese	1.3 mg			Biotin	165 mcg
<b>Vitamin B-6</b>	<b>20 mg</b>	Chromium	10 mcg				
<b>Folic Acid</b>	<b>490 mcg</b>	Molybdenum	4 mcg				
Vitamin B-12	50 mcg	Potassium	20 mg				

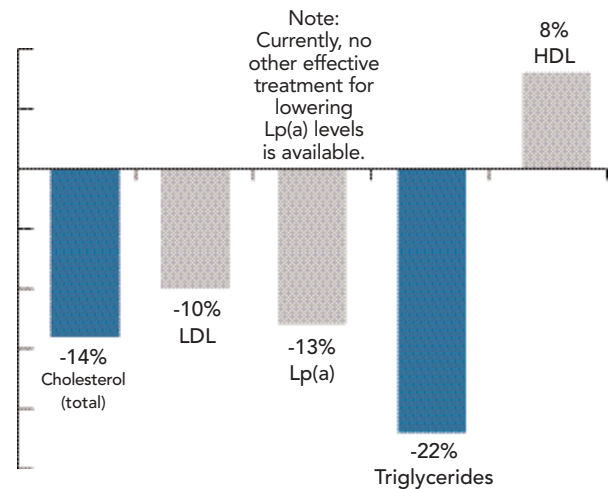
Bolded nutrients represent key factors in program results.

### Results

Patients on a three-month Cellular Health nutritional supplement program experienced improved blood plasma lipid profiles, including decreases in total cholesterol, LDL, lipoprotein(a), and triglycerides, and increased levels of HDL.

### Conclusions

The results of this clinical study indicate that high blood cholesterol and other lipid levels can be controlled naturally. The Cellular Health nutritional supplement program is able to naturally stabilize the artery walls and thereby normalize cholesterol and other lipid levels.



## The Cellular Health™ Approach to Normalizing Blood Pressure

### Rationale

In most cases, high blood pressure (essential hypertension) develops as a result of chronic deficiency of essential nutrients in the artery wall cells. This results in the impaired production of "relaxing factors," which decrease vascular tension to keep blood pressure in a normal range. Chronic deficiency of nutrients can result in spasms and thickening of the blood vessel walls, which can eventually elevate blood pressure. Supplementation with essential nutrients is the most effective and safe way to restore vascular wall function and normalize blood pressure.

### Patient Criteria

15 patients between the ages of 32-69 with severe hypertension.

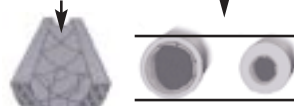
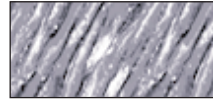
### Treatment

Patients followed a Cellular Health nutritional program using the following daily dosages of nutrients for 32 weeks.

### Vitamin Deficiencies and High Blood Pressure

#### Primary Cause

Vitamin deficiency in millions of blood vessel wall cells



Thickening and spasms of artery wall

High blood pressure



Accelerated buildup of atherosclerotic deposits

Heart attacks and strokes

#### Basic Prevention and Treatment

Optimum dietary intake of essential nutrients

- Vitamin C
- Magnesium
- Arginine
- Coenzyme Q-10

Refills

Helps prevent and correct

Helps prevent and correct

Helps prevent and correct

Helps prevent

Vitamins	Minerals	Amino Acids	Coenzymes and Other Nutrients
Vitamin A 1,665 IU	Calcium 235 mg	L-Lysine 110 mg	<b>Coenzyme Q-10 7 mg</b>
<b>Vitamin C 1,600 mg</b>	Phosphorous 15 mg	L-Proline 110 mg	Pycnogenol 7 mg
Vitamin D3 130 IU	<b>Magnesium 440 mg</b>	<b>L-Arginine 790 mg</b>	Inositol 35 mg
Vitamin E 230 IU	Zinc 7 mg	L-Cysteine 35 mg	Pantothenic Acid 40 mg
Vitamin B-1 7 mg	Selenium 20 mcg	L-Carnitine 35 mg	Citrus Bioflavonoids 200 mg
Vitamin B-2 7 mg	Copper 330 mcg		Biotin 65 mcg
Niacin 45 mg	Manganese 1.3 mg		
Vitamin B-6 10 mg	Chromium 10 mcg		
Folic Acid 90 mcg	Molybdenum 4 mcg		
Vitamin B-12 20 mcg	Potassium 20 mg		

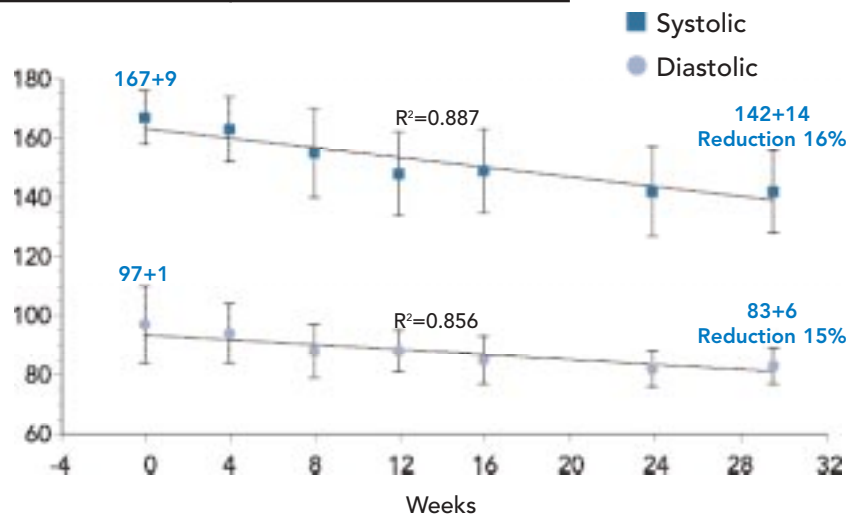
Bolded nutrients represent key factors in program results.

### Results

Patients on an eight-month Cellular Health nutritional supplement program experienced reductions in blood pressure levels and improvements in overall health.

### Conclusions

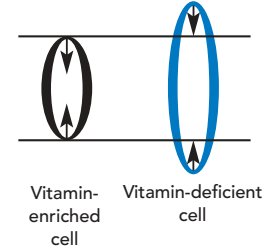
The results of this clinical study indicate that the Cellular Health nutritional supplement program supporting the function of the vascular cells is effective in optimizing blood pressure levels.



## The Cellular Health™ Approach to Optimizing Heart Muscle Function

### Rationale

The primary cause of heart failure is a deficiency of vitamins and other essential nutrients that support bioenergy production in the heart muscle cells. This results in physiological dysfunction of the heart muscle's performance. Nourishing the heart muscle cells with essential nutrients is important for optimizing heart muscle function.



The heart muscle cells are responsible for the contraction of the heart and for optimal pumping of blood. Nutrient deficient heart muscle cells do not produce enough cellular energy to support optimal contraction of the heart muscle.

### Patient Criteria

10 patients with heart failure, ranging from one to four on the New York Heart Association Scale (NYHA).

### Treatment

Patients were placed on a Cellular Health nutritional supplement program over a six-month period.

Vitamins		Minerals		Amino Acids		Coenzymes and Other Nutrients	
Vitamin A	1,665 IU	Calcium	48 mg	L-Lysine	110 mg	<b>Coenzyme Q-10</b>	<b>27 mg</b>
<b>Vitamin C</b>	<b>1,300 mg</b>	Phosphorous	15 mg	L-Proline	110 mg	Pycnogenol	7 mg
Vitamin D3	130 IU	Magnesium	40 mg	L-Arginine	40 mg	Inositol	35 mg
Vitamin E	200 IU	Zinc	7 mg	L-Cysteine	35 mg	Pantothenic Acid	80 mg
Vitamin B1	22 mg	Selenium	20 mcg	<b>L-Carnitine</b>	<b>195 mg</b>	Citrus Bioflavonoids	100 mg
Vitamin B2	22 mg	Copper	330 mcg	Taurine	200 mg	Biotin	195 mcg
Niacin	75 mg	Manganese	1.3 mg				
Vitamin B6	14 mg	Chromium	10 mcg				
Folic Acid	90 mcg	Molybdenum	4 mcg				
Vitamin B12	27 mcg	Potassium	20 mg				

Bolded nutrients represent key factors in program results.

### Results

Patients on a six-month Cellular Health nutritional supplement program experienced a reduction in heart failure symptoms and an improved heart failure classification ranking according to the New York Heart Association Scale. The function of the heart muscle was improved in 80 percent of patients with heart insufficiency.

Note: Two patients that did not respond were not compliant with the study program.

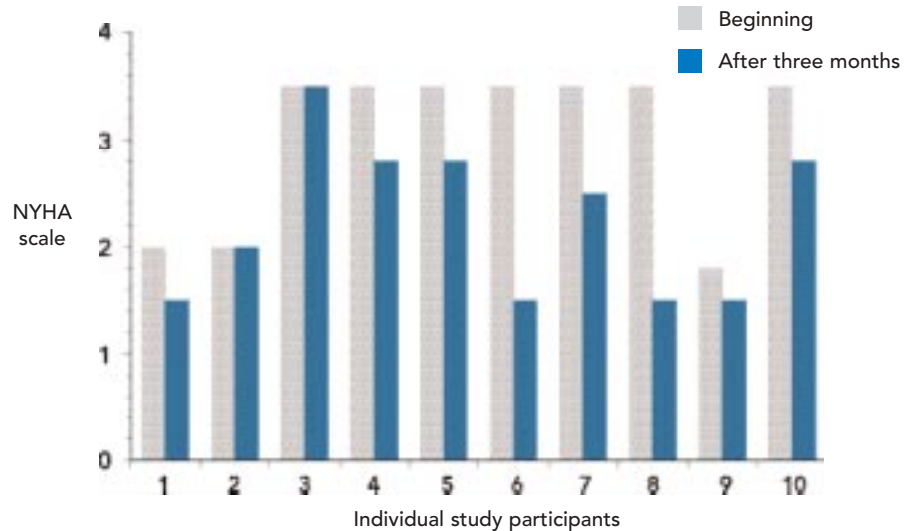
### Conclusions

The results of this clinical study indicate that the Cellular Health nutritional supplement program is effective in optimizing the function of the heart muscle.

#### Heart failure classification according to the New York Heart Association (NYHA)

- 1 — No problems with normal physical activity
- 2 — Moderate limitation of physical activity
- 3 — Extensive limitation of physical activity
- 4 — Bed ridden

#### Changes in classification of heart failure in patients at the beginning and end of study



## Elevated Cholesterol Levels Are Not the Cause, But a Consequence of Cardiovascular Disease

### Research Support:

Cholesterol, LDL, Lp(a), and other metabolic products are ideal repair factors for the weakened vascular wall. Their production in the liver increases as a result of chronic deficiency of vitamins (in particular, vitamin C) and other nutrients causing dysfunction of blood vessel walls, rendering them risk factors for CVD. The primary measure for lowering these blood risk factors is to stabilize artery walls, thereby reducing the metabolic demands for their production.

### Selected studies supporting this view:

#### Mimicking an Evolutionary Event — The Loss of Vitamin C Synthesis — Triggers Vascular Pathogenesis

Mice, like a vast majority of other animals, synthesize vitamin C in the liver. Recently developed mice strains with an inactive gene for L-gulonolactone oxidase, a key enzyme in ascorbic acid synthesis, showed that sub-optimal dietary vitamin C supplementation caused potentially profound effects on the pathogenesis of vascular diseases, such as: increases in total cholesterol and decreases in HDL cholesterol and alterations in the aorta wall as evidenced by the disruption of elastic laminae, smooth muscle cell proliferation, and focal endothelial desquamation of the luminal surface. Proper supplementation with vitamin C prevented these pro-atherosclerotic effects.

- Maeda N, Hagihara H, Nakata Y, et al. Aortic wall damage in mice unable to synthesize ascorbic acid. *Proc Natl Acad Sci. USA* 2000, 97:841-846.

#### Ascorbic Acid Regulates Cholesterol Levels Through the "Statin Effect"

Ascorbic acid acts as a natural statin; it is an inhibitor of HMGCoA reductase, the regulatory enzyme in the cholesterol synthesis pathway that statins regulate.

- Harwood Jr JH, Greene YJ, Stackpoole PW. Inhibition of human leucocyte 3-Hydroxy-3-methylglutaryl Coenzyme A reductase activity by ascorbic acid, *J.Biol.Chem.* 1986, 261:7127-7136.

#### Ascorbic Acid Normalizes Plasma Cholesterol Levels

The review of various clinical studies confirm the important role of vitamin C in normalizing plasma cholesterol levels.

- Hemila H. Vitamin C and Plasma Cholesterol. *Critical Reviews in Food Science and Nutrition.* 1992, 32:33-57.

#### Additional References

- Ness AR, Khaw KT, Bingham S, Day NE. Vitamin C status and serum lipids. *Eur J Clin Nutr.* 1996, 50:724-9.
- Ginter E, Zdichynec B, Holzerova, O, et. al. Hypocholesterolemic effect of ascorbic acid in maturity-onset diabetes mellitus. *Int J Vitam Nutr Res.* 1978, 48:368-73.
- Toohey L, Harris MA, Allen KG, Melby CL. Plasma ascorbic acid concentrations are related to cardiovascular risk factors in African Americans. *J Nutr.* 1996, 126:121-8.
- Gatto LM, Hallen GK, Brown AJ, Samman S. Ascorbic acid induces a favorable lipoprotein profile in women. *J Am Coll Nutr.* 1996, 15:154-8.

*Continued on the next page.*

## Research Support (continued)

### Aggressive Lipid Lowering Without Improving Vascular Wall Structure Can Delay, But Not Alleviate, Future Coronary Events

Aggressive lipid-lowering treatment (lovastatin/niacin/colestipol) in patients followed up for 10 years resulted not in the elimination, but the replacement of the lipid core area of coronary deposits with calcium deposits, effecting minimal change of the fibrous tissue area of the plaque. Extent of coronary calcifications is a recognized predictor of future heart attacks. This result indicates that mechanical lowering of cholesterol without stabilizing arterial structure results in the replacement of soft plaques (fissure vulnerable) with hard (more stable) plaques, which delays but does not eliminate coronary events.

- Xue-Qiao Zhao, Chun Yunan, TS Hatsukami et al., Effects of prolonged intensive lipid-lowering therapy on the characteristics of carotid atherosclerotic plaques in vivo by MRI. A case-control study. *Atheroscler Thromb Vasc Biol.* 2001, 21:1623-1629.

### Vitamin C Regulates Smooth Muscle Cells Proliferation Through Direct and Extracellular Matrix-Mediated Effects

Proliferation of SMC and deposition of extracellular matrix are important hallmarks of atherosclerotic plaque formation. The results demonstrate that vitamin C can inhibit pathologically induced growth of vascular SMC by direct cellular effect and by changing composition and properties of ECM synthesized and deposited by SMC.

- Ivanov VO, Ivanova SV, Niedzwiecki A. Ascorbate affects proliferation of guinea pig vascular smooth muscle cells by direct and extracellular matrix-mediated effects. *J Mol Cell Cardiol.* 1997, 29:3293-303.

## About Matthias Rath, M.D.



Matthias Rath, M.D.

A preeminent authority on cardiovascular health and disease, Matthias Rath, M.D. made the medical discovery that the onset of cardiovascular disease is actually caused by long-term vitamin deficiency. Dr. Rath introduced Cellular Health™ the understanding that optimal nutrition for the body's cells is a natural prophylactic for preventing disease.

A close research associate of the two-time Nobel Laureate Linus Pauling, Dr. Rath was appointed as the first Director of Cardiovascular Research at the Linus Pauling Institute in California. He later founded Matthias Rath, Inc., an international nutritional research and development company.

Dr. Rath's discovery has led to the ongoing Cellular Health research being conducted by scientists at the Matthias Rath, Inc. research facility on the nutritional aspects of many chronic diseases, including cancer.

Dr. Rath is the respected author of the Cellular Health series, a collection of health books that explain in simple language what people can do to enhance their health using natural therapies. His scientific findings have been published in prestigious medical journals, including *Proceedings of the National Academy of Sciences* and *Arteriosclerosis*.

For more information about Dr. Rath's research,  
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