The American Journal of Cardiology

Introduction: More Than Coronary Artery Disease

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[There is] an unreasonable gap between the medical enthusiasm devoted to acute interventions and the meager efforts currently devoted to secondary prevention.

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Pioneer of Coronary Artery Bypass Grafting

Interventional cardiology is symptomatic treatment. The late Dr. Lewis Thomas referred to this approach as "half-way technology," meaning that basic mechanisms of disease were not identified or treated. The bypass operation has significant mortality and morbidity, including further heart damage, stroke, and brain dysfunction. The benefits are at best temporary, since most grafts eventually close, and the patient faces further intervention or a life of progressive disability and death from the disease. Angioplasty has a 40% failure rate after 6 months,[1] as well as significant mortality and morbidity and, frequently, further heart damage.[2] Variations to prevent restenosis include stenting with a wire cage, radiation to the balloon-fractured artery to compromise the inflammatory response, or use of a $1,400-per-dose drug to decrease the likelihood of thrombosis.

The futility of intervention as a strategy to avoid future acute coronary events or mortality is well recognized. The lesions targeted for intervention—those with >70% stenoses—infrequently account for subsequent coronary events; this was documented recently by serial angiography before and after coronary events.[3] Furthermore, elective angioplasty does not decrease the risk of myocardial infarction or death. Bypass surgery does not decrease the risk of myocardial infarction, and it benefits survival only in high-risk subsets.[4]

So, it seems we have an enormous paradox. The disease that is the leading killer of men and women in Western civilization is largely untreated. The juggernaut of therapy that has evolved for treating its symptoms consumes the lion's share of the available health-care dollars.[5] The benefits achieved through great financial cost, morbidity, and mortality are at best temporary and erode over time, with most patients eventually succumbing to their disease. In cancer management, we refer to that approach as palliation. I refer to the present treatment of coronary artery disease as "palliative cardiology."

Why does the juggernaut persist? Because physicians generally lack understanding of the techniques of lipid reduction through diet and medication. The belief also still prevails that the "quick fix" surgical repair of the major stenotic lesions will make things right. Finally, performing interventions has the potential for enormous financial reward. But the question remains: Aren't there other options?

SHIFT TO ARREST-AND-REVERSAL TREATMENT

This summit demonstrated to the medical community and public that there are other options—that successful arrest-and-reversal treatment (ART) therapy has been born, mandating a requiem for palliative cardiology.

At this conference, Dr. Colin Campbell reported the results of a major epidemiologic study demonstrating that plant-based nutrition avoids cardiovascular and other "Western" diseases. Drs. William Roberts, Erling Falk, and Greg Brown reviewed the latest discoveries in the pathophysiology of atherosclerosis and how lowering lipids affects it. Drs. Frank Sacks, Donald Hunninghake, Terje Pedersen, and James Shepherd—the leaders of 4 major lipid-reduction trials with 3-hydroxy-3-methylglutaryl coenzyme A (HMG-CoA) reductase inhibitors, or "statins"—dem-

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0002-9149/98/$19.00
PII 0002-9149(98)00715-2

onstrated that lipid lowering decreases deaths, cardiac events, and surgical interventions, even for people with "average" cholesterol levels. Dr. William Castelli explained the new understanding of heart disease mechanisms and risks.

Dr. Dennis Sprecher outlined the preventive strategies being implemented at the Cleveland Clinic. Dr. Dean Ornish showed how a plant-based diet can arrest and reverse coronary disease within 1 year. Dr. Hans Diehl demonstrated the measurable cardiac improvement gained with a community-wide nutrition lifestyle approach. Dr. Sidney Smith outlined what we need to do to implement aggressive intervention and prevention strategies.

Drs. Gerald Berenson and Henry McGill demonstrated that atherosclerosis risk and disease begin in childhood. Dr. Charles Attwood outlined a safe, nutritious plant-based diet for children and adolescents. Dr. Antonia Demas's success with her nutrition program in schools in several diverse economic and cultural settings destroyed the myth that children will not eat healthy plant-based food.

My own data with a similar diet have extended these findings over 10 years. I remain involved in a small study, begun in 1985, of 23 patients with triple-vessel coronary artery disease.[6] We have 11-year follow-up data for 21 patients and 9-year follow-up data for 2 patients. The goal of the study was to achieve, through plant-based nutrition and cholesterol-lowering agents, a serum cholesterol $<$150 mg/dL as seen in cultures where coronary artery disease is virtually absent. Five nonadherent patients were released from the study after 12 and 15 months, and all have had further coronary events. Of 18 adherent patients with a history of 49 coronary events during the 8 years before the study, all but 1 have had no events since the study began. The exception was off-study for 2 years and experienced angina. He has since resumed adherence, and his angina has disappeared. Those available for data analysis had a prestudy mean total cholesterol of 246 mg/dL. During the study, their mean total cholesterol has been 132 mg/dL, and their low-density lipoprotein (LDL) cholesterol level, 71.1 mg/dL. Seventy percent experienced angiographically documented regression of stenotic lesions. Homocysteine levels are presently in the lowest category—8.5 μmol/L. We have not measured LDL oxidation, but we know that a plant-based diet generates few free radicals and has plenty of antioxidants with which to minimize the oxidation of the low LDL levels.

These patients' success resulted from adherence to a regimen that amply treated the critical factors of cholesterol, homocysteine, and oxidized LDL. Treatment strategies consist of an initial in-depth physician interview with patient and spouse, bimonthly visits to review a diet diary and obtain serum cholesterol measurements, and physician participation in quarterly group gatherings. The treatment strategy involves no relaxation, meditation, or structured exercise but focuses entirely on plant-based nutrition and cholesterol reduction. Despite skepticism about patients' willingness to adhere to this diet, the patients in this study are empowered by the knowledge that they are in control of the disease that formerly was destroying their lives.

We also have preliminary data from a more recent short-term experiment using the same diet and cholesterol-lowering drugs in cardiac patients. These data show that one can achieve rapid reperfusion of ischemic myocardium via prompt cholesterol reduction with diet and drugs, without mechanical intervention, as early as 3 weeks after the start of treatment. We are able to decrease a total cholesterol of 240–290 mg/dL to $<$140 mg/dL within 10 days.

Precise mechanisms for this reperfusion remain speculative, but the results speak for themselves. This technique—with no mortality, no morbidity, and minimal expense—can achieve the benefits of reperfusion in patients who will continue to improve rather than erode.

"RECTANGULARIZING" LIFE'S JOURNEY

What we can achieve through "ART therapy" is to "rectangularize" life's journey. It is an optimistic long-range view of health for the US population I would like to share, with thanks to Dr. James Fries and Dr. Lawrence Crapo, authors of *Vitality and Aging*,[7] for some of the following concepts.

Most survival curves show a simple exponential decay. Data from 1840–1980 reveal that our life *expectancy* has greatly increased (Figure 1), but the life span of our species remains stable. It has remained the same for $>$100,000 years. Of 10,000 persons who survive to 85 years of age, one will make it to 100 years old. During the past 140 years, however, the right tail of the curve has shifted to become more rectangular. If premature deaths were prevented, 95% of all deaths would occur between the ages of 77 and 93 (Figure 2).

Significant reduction of deaths in the young and from infectious disease have shifted the curve to the right. We need to overcome chronic diseases if we are to shift the curve much farther to the right. Without chronic diseases and trauma, "natural deaths" would occur more often. For example: (1) an 88-year-old neighbor has not seemed to be himself in recent months and, one night, dies quietly in his sleep; (2) an 85-year-old schoolteacher who has always seemed fragile, contracts an upper respiratory infection during winter flu season, and dies within 3 days; (3) a 103-year-old retired industrial chief executive officer falls, breaks his humerus, contracts pneumonia, and dies 3 days later.

We can all think of similar examples from our practices. The point is that society's expenditure on health care is significantly lessened as survival curves become more rectangular (Figure 3). Youthful vigor is maintained up until the final brief illness, which does not require—and perhaps does not merit—expensive heroic intervention. I am reminded of an 80-year-old man whose daughter believed him to be too old for the recommended coronary bypass surgery. I was asked to intervene with arrest and reversal nutrition therapy,

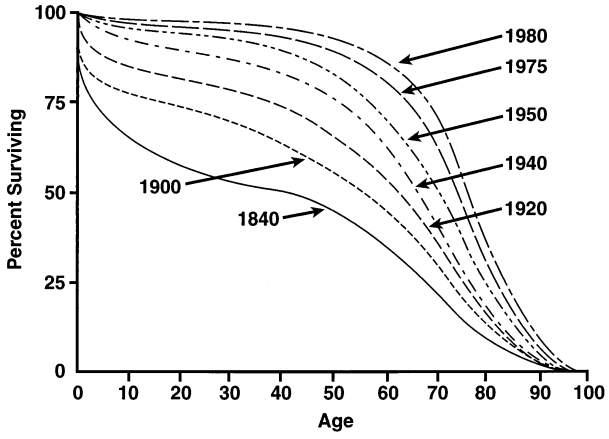

FIGURE 1. Survival curves, 1840–1980, reveal that our life expectancy has greatly increased but our life span has remained unchanged. (Reprinted with permission from *Vitality and Aging. Implications of the Rectangular Curve.*[7])

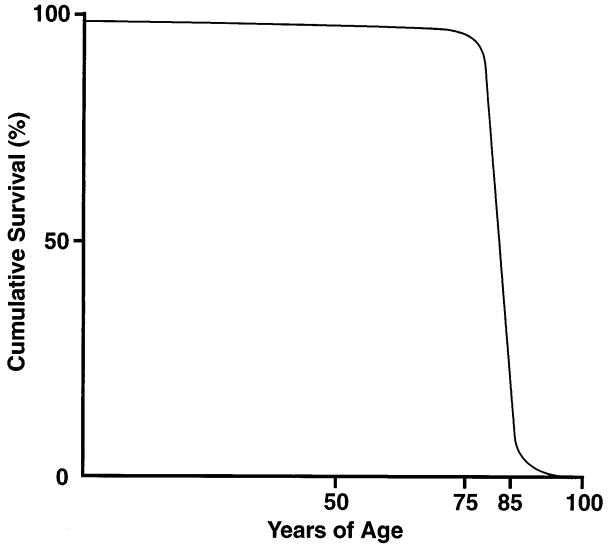

FIGURE 3. If we are to shift the survival curve significantly to the right, for a rectangular survival curve, we need to overcome chronic diseases. (Reprinted with permission from *Vitality and Aging. Implications of the Rectangular Curve.*[7])

FIGURE 2. If we could prevent premature deaths, 95% of all deaths would occur between the ages of 77 and 93. (Reprinted with permission from *Vitality and Aging. Implications of the Rectangular Curve.*[7])

which he embraced and which eliminated his angina. He celebrated his 91st birthday in April.

We have learned sadly and expensively that treatment of disease will not be effective in shifting the curve. Despite coronary artery bypass surgery, angioplasty, stenting, and atherectomy, the epidemic of coronary atherosclerosis continues unabated. Dr. John Bailar succinctly summarized the futility of the billions spent on chronic disease—specifically cancer—in a May 1997 *New England Journal of Medicine* editorial: "Cancer Undefeated."[8] Likewise, hip replacement for osteoporotic fractures, lung reduction surgery for emphysema, liver transplantation for alcoholic cirrhosis, drugs for obesity (which can cause brain dysfunction, diarrhea, vitamin deficiency, and irreversible cardiac injury), and fad diets that cause sudden death have not been the answer. Antihypertensive medication may accelerate atherosclerosis and promote cancer, sudden cardiac death, or impotence. Hypoglycemic agents can be helpful, but they do not eliminate the complications of diabetes.

Medical treatment is not an effective way to approach this national health problem, and it does nothing for the unsuspecting who are about to become the next victims of the disease. Only through preventive strategies can we eliminate and delay chronic disease.

It appears that the 20th century has been a great step backward in nutrition. Millions of years of evolution have not designed our species to consume the modern Western diet. This conference has defined the need for plant-based nutrition, not only to prevent atherosclerosis, but also to decrease our risk of cancer and of many other chronic diseases.

We have strong evidence-based research showing that dietary change can eliminate, not only atherosclerosis, but other "Western" diseases as well. Breast cancer was rare in Japan in the 1950s, when the Japanese diet was <15% fat. Kenya, with a similarly low-fat diet, has a breast cancer prevalence 20 times lower than that in the United States. Prostate cancer was rare in Japan in the 1950s and has since been strongly correlated with dietary fat.[9] Colon and rectal cancer rates are also linked directly to fat intake. A similar relation is seen for type 2 diabetes. The Pima Indians of the southwestern United States were healthy and nondiabetic on their native diet of grains, beans, and vegetables; since adopting a high-fat Western diet, one-third have become diabetic. We can see

that, like cirrhosis, emphysema, and obesity, diseases such as coronary artery disease and type 2 diabetes can be controlled through education and personal lifestyle changes. Technology is not the answer.

MAKING THE CHANGE

Medicine must focus, as never before, on how to support personal behavior modification. Exercise, smoking cessation, and moderation in alcohol consumption are integral parts of this strategy, but space permits me to focus only on diet.

With its lack of fiber and antioxidants, and its emphasis on animal protein, fat, and extreme free-radical production, the US diet is largely responsible for the bitter harvest of diseases mentioned above. Dr. Robert Kradjian has said that our single most important interface with our environment is the cell membrane, which is 1 one-thousandth of 1 micrometer (10^{-8} m) thin.[10] This delicate interface is subjected to irreversible metabolic injury with each and every Western meal. We define this summation of injury as a disease, whether it be cancer, vascular disease, diabetes, or some other condition.

How will we get this message to the public? In the case of smoking cessation, physician behaviors have been admirable, and as a group, we have contributed greatly to the reduction of tobacco consumption. Whether we can achieve these same inroads with plant-based nutrition remains to be seen.

One great stumbling block has been the government and national health organizations that support the target of 30% dietary fat and a cholesterol level $<$200 mg/dL. The First National Conference on the Elimination and Prevention of Coronary Artery Disease concluded that these guidelines did not offer the best chances to arrest and reverse coronary artery disease, essentially corroborating what the government's own scientists had said in the 1989 epic *Diet and Health*. Namely, greater health benefits would be derived from even less fat than the 30% recommendation. The reason given for not advocating lower levels was that it might frustrate the public, who would have difficulty maintaining a lower level. It seems to me that the public's greatest frustration would come from not being informed of the optimal diet for health.

Now, at this second conference 6 years later, there is additional support for the need for further lipid reduction. It is time for these organizations to re-evaluate their recommendations of a cholesterol level $<$200 mg/dL and a diet composed of $<$30% fat. It is time for a concerted and consistent effort to inform the public and the medical profession of what the existing data show will be most optimal.

In many cultures, coronary disease is practically unheard of when total serum cholesterol levels are 90–150 mg/dL. We cannot continue to have public and private organizations on the forefront of health leadership recommend to the public a dietary plan that guarantees that millions will perish from the very disease the guidelines were supposed to prevent. If we are to truly shift the paradigm from only technologic intervention to prevention, then significant lifestyle changes are needed and justified.

I am acutely aware of the castigation that accompanies recommending a plant-based diet—namely that the recommendation will be met with skepticism and hostility on the part of the general public. This attitude is peculiar, because many cultures sustain themselves with such a diet, enjoying its taste, texture, and variety, as well as its health-promoting qualities. However, diet preference is deeply personal, and one can easily be offended. Nevertheless, the public has a right to know the truth as understood by experts in nutritive biology about what constitutes the safest and healthiest diet.

Some criticize this exclusively plant-based diet as extreme or draconian. Webster's dictionary defines draconian as "inhumanly cruel." A closer look reveals that "extreme" or "inhumanly cruel" describes not plant-based nutrition, but the consequences of our present Western diet. Having a sternum divided for bypass surgery or a stroke that renders one an aphasic invalid can be construed as extreme, and having a breast, prostate, colon, or rectum removed to treat cancer may seem inhumanly cruel. These diseases are rarely seen in populations consuming a plant-based diet.

We are presently witnessing a meltdown of the tobacco industry. Science and the public are aware that using addictive tobacco products exactly as advertised often leads to irreversible illness and death. The data of Drs. Berenson and McGill, defining the ravages of atherosclerosis in the young, tempt one to place cheeseburgers, steak, and cold cuts under similar scrutiny, since these and similar foods' composition destroy the vascular health of the young, as well as of adults.

The next step toward rectangularization of the survival curve involves personal lifestyle changes—paramount being a plant-based diet. This is not vegetarianism. Vegetarians often consume oils, margarine, and animal products such as milk, cream, butter, cheese, ice cream, and eggs. This new paradigm is exclusively plant-based nutrition.

Technology will have little place in this new preventive paradigm. It will be people—physicians and allied health personnel with the knowledge, patience, powers of persuasion, and communications skills—who will enable this transition. Assistance in this endeavor from government agencies, national health organizations, insurance companies, and culinary institutes is welcome and needed. The very foundation of the healing arts, a bastion of integrity, mandates that we define for our patients and the public this opportunity to avoid these common chronic and killer diseases through practical, achievable personal choices.

1. Bittl JA. Advances in coronary angioplasty. *N Engl J Med* 1996;335:1290–1302.
2. Kong TQ, Davidson CJ, Meyers SN, Tauke JT, Parker MA, Bonow RO.

Prognostic implication of creatinine kinase elevation following elective coronary artery interventions. *JAMA* 1997;277:461–466.
3. Ambrose JA, Fuster V. Can we predict future coronary events in patients with stable coronary artery disease? *JAMA* 1997;277:343–344.
4. O'Keefe JH, Conn RD, Lavie CJ, Bateman TM. The new paradigm for coronary artery disease: altering risk factors, atherosclerotic plaques, and clinical prognosis. *Mayo Clin Proc* 1996;71:957–965.
5. Braunwald E. Shattuck Lecture—cardiovascular medicine at the turn of the millennium: triumphs, concerns, and opportunities. *N Engl J Med* 1997;337: 1360–1369.
6. Esselstyn CB Jr, Ellis SG, Medendorp SV, Crowe TD. A strategy to arrest and reverse coronary artery disease: a 5-year longitudinal study of a single physician's practice. *J Fam Prac* 1995;41:560–568.
7. Fries JF, Crapo LM. *Vitality and Aging. Implications of the Rectangular Curve*. San Francisco: WH Freeman and Company; 1981.
8. Bailar JC III, Gornik HL. Cancer undefeated. *N Engl J Med* 1997;336:1569–1574.
9. Araki H, Mishina T, Miyakoda K, et al. An epidemiologic survey of prostatic cancer from the annals of the pathological autopsy cases in Japan. *Tohoku J Exp Med* 1980;230:159–164.
10. Kradjian R. *Save Yourself from Breast Cancer*. New York: Berkley Books; 1994.