Alton Blakeslee, on the staff of The Associated Press, is one of the country's outstanding medical science writers. The latest of the many honors he has received for his writing is the 1965 Lasker Award (his third) for Medical Journalism. He is noted for a concise style that presents complex subjects in a popular and meaningful manner. His previous books are: POLIO AND THE SALK VACCINE and HEART DISEASE: WHAT YOU SHOULD KNOW ABOUT IT.

Jeremiah Stamler is a physician and Director of the Division of Adult Health and Aging and the Heart Disease Control Program, Board of Health, Chicago, Illinois. Dr. Stamler is also Assistant Professor, Department of Medicine, Northwestern University Medical School. Recently appointed Chairman of the Council on Arteriosclerosis of the American Heart Association, Dr. Stamler is an outstanding contributor to research in the fight against heart disease.

YOUR HEART HAS NINE LIVES

♥

NINE STEPS
TO HEART HEALTH

♥

by
ALTON BLAKESLEE
and
JEREMIAH STAMLER, M.D.

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DEDICATED

To the thousands of men and women in research and medicine throughout the world whose skills and efforts are bringing control over the plague of heart disease

When a man dies, he does not just die of the disease he has; he dies of his whole life.

CHARLES PIERRE PEGUY

Authors' Preface
to the Professional Edition

About two and a half years have passed since we originally wrote this book. This time period covers a particularly active area of medical research. Yet we believe that no changes in the text are necessary. The principles of reducing risk from heart attack are the same today as they were in 1963.

Within the past year the American Heart Association noted that "The development of atherosclerotic coronary heart disease, the basis of most 'heart attacks,' is influenced by several factors. Scientific studies have provided increasing evidence that diet is one of the more important of these factors. . . . The public is therefore advised:

1. To eat less animal (saturated) fat;
2. To increase the intake of unsaturated vegetable oils and other polyunsaturated fats, substituting them for saturated fats wherever possible;
3. To eat less food rich in cholesterol;
4. If overweight, to reduce caloric intake so that desirable weight is achieved and maintained;
5. To apply these dietary recommendations early in life;

6. To maintain the principles of good nutrition, important with any change in the diet. Profe: tritional advice may be necessary in order to correct adherence to the diet will not result i balance or deficiency;
7. To adhere consistently to the above dietary recommendations, so that a decrease in the concentration of blood fats may be both achieved and maintained;
8. To make sound food habits a 'family affair,' so that the benefits of proper nutritional practices—including the avoidance of high blood fat levels—may accrue to all members of the family.

"Other factors may increase the risk of developing coronary heart disease. These include hypertension, diabetes mellitus, cigarette smoking, lack of exercise, and others. As in the case of diet, these factors may be corrected or controlled by programs based upon advice from the family physician. . . ."

Also in 1965, the American Medical Association Council or Foods and Nutrition recommended that ". . . physicians should counsel young men on the advisability of diet modifications, to prevent the rise of serum-cholesterol and other lipids that occurs with increasing age. . . . The presence of other factors that further increase the risk of coronary heart disease, such as hypertension, obesity, or a positive family history of coronary atheroma, would make regulation of the diet more desirable." These statements affirm that the principles set forth in this book are in accord with generally accepted medical concepts and practices at the present time.

—ALTON BLAKESLEE
JEREMIAH STAMLER, M. D.
Chicago, Illinois
April 25, 1966

Acknowledgments

WE ARE DEEPLY INDEBTED TO THE PIONEERING INVESTIGAtors whose research achievements have made this book possible. We have drawn extensively upon their published scientific papers, reviews and monographs, as well as personal conversations with many of them. We regret only that it is not possible, because of space limitations, to give proper credit to all those whose relevant work has not been mentioned in the text or bibliography.

We are especially grateful for the Introduction written by the dean of cardiologists—a great and beloved clinician, teacher, researcher, leader and humanist—Paul Dudley White, M.D.

We wish also to pay tribute to the agencies that have rendered financial support to medical research in recent years, particularly the American Heart Association and its affiliates, and the National Heart Institute, National Institutes of Health, U.S. Public Health Service. Their enlightened research policies and their wise allocations of research funds have played a key role in making possible the sustained and many-sided investigative assault on the atherosclerosis problem that has yielded such rich results.

The medical co-author wishes to express his gratitude for the valuable advice and guidance over the years of George Wakerlin, M.D., Medical Director of the American Heart Association, Louis deBoer, Executive Director of the Chicago Heart Association, James Watt, M.D., formerly Director of the National Heart Institute, U.S. Public Health Service, and Franklin Yeager, Ph.D., Chief of Grants and Training of the National Heart Institute.

Since this book draws particularly upon research findings of its medical co-author, it is appropriate also to acknowledge the significant research support not only from the American Heart Association and the National Heart Institute, but also from the Chicago Heart Association, the Corn Products Institute of Nutrition, the Albert D. and Mary Lasker Foundation, the National Dairy Council, and the Wesson Fund for Medical Research. He wishes also to express his profound gratitude for the cooperation and support of Samuel L. Andelman, M.D., M.P.H., Commissioner of Health, City of Chicago, and Eric Oldberg, M.D., President, Chicago Board of Health, the entire Board of Health and its several divisions cooperating in research.

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The medical author is happy to pay tribute to the entire staff of the Heart Disease Control Program, Division of Adult Health and Aging, Chicago Board of Health, participating in research on the natural history, epidemiology, causation, prevention and treatment of atherosclerotic coronary heart disease —particularly to his closest professional colleagues and investigative collaborators, David M. Berkson, M.D., Howard A. Lindberg, M.D., Yolanda Hall, M.S., Joseph Mastropaolo, Ph.D., Wilda Miller, M.P.H., Louise Mojonnier, Ph.D., and Rose Stamler, M.A.

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It is also a pleasure for the medical author to pay tribute to his colleagues in the ongoing cooperative National Diet-Heart Study, including the chairman of the National Executive Committee on Diet and Heart Disease, Irvine H. Page, M.D., the members of the Committee, and his colleagues—Benjamin Baker, M.D., Joseph H. Bragdon, M.D., Helen B. Brown, Ph.D., Jerome Cornfield, Ivan D. Frantz, M.D., Jerome G. Green, M.D., Ancel Keys, Ph.D., Laurance W. Kinsell, M.D., Eldon E. Rice, Ph.D., Joseph Schachter and Frederick J. Stare, M.D.

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Finally, it is a particularly gratifying pleasure to acknowledge the indispensable contribution of our wives, to Virginia Blakeslee for hours of typing, reading and assistance, and to Rose Stamler, who also read the successive drafts of the manuscript and made many helpful suggestions.

Needless to say, the authors take sole responsibility for all inferences, interpretations and conclusions in this book, and for any inadequacies and errors.

When Dr. White reviewed this book, he also wished to recognize the contributions of many individuals and organizations with whom he has been closely associated in the unfolding of the story of the heart disease research, and we are happy to append his own personal acknowledgments:

"It has," he said, "been for me a great privilege and a great satisfaction to have been associated in one way or another during the last decade with so many of the leading investiga-

tors in this field, including the medical author of this book and his former mentor Louis Katz and associate Ruth Pick, as well as Ancel Keys and his wife, Fred Stare, Irvine Page, Oglesby Paul, Robert Levy, Cowles Andrus, Herrman Blumgart, Earle Glendy, Mike DeBakey, Ivan Frantz, the members of the American Heart Association's Committee on the Effect of Strain and Trauma on the Heart and Blood Vessels including Howard Sprague, Milton Helpern and his young associates Mike Lyons and Gilbert Grossman; Arthur Master, Norman Plummer, Harry Ungerleider, James Paterson (of London, Ontario), Irvin Klein, Leo Price, and Meyer Texon; the team who in Boston some 10 to 15 years ago made a detailed study of 100 cases of Coronary Heart Disease in Young Adults (under the age of 40 years) and who included Samuel Levine, Howard Sprague and Edward Bland, my own close associates for many years: Jacob Lerman, Menard Gertler, and Stanley Garn; those particularly interested in rehabilitation with me, namely Tom Mattingly, Howard Rusk, Bryan Williams, Philip Lee, Wilhelm Raab, and Richard Clark; and our own cardiac group at the Massachusetts General Hospital including in the first place Howard Sprague and Edward Bland, already referred to, Gordon Myers, Allan Friedlich, Conger Williams, Edwin Wheeler, James Currens, and Frederick Hatch.

"Some fellow members of epidemiological teams with whom I served abroad in the search for causes of atherosclerosis were from many different lands; the ones I remember best have been Bronte Stewart of South Africa, Noboru Kimura of Japan. Gunnar Biörck and Haqvin Malmros of Sweden, Vittorio Puddu and Flaminio Fidanza of Italy, A. D. Dontas and Christos Aravanis of Greece, Jacques Carlotti of France, J. N. Morris of England, M. Karvonen of Finland, Ratko Buzina of Yugoslavia, Joseph Doyle of Albany, and Henry Taylor and Henry Blackburn of Minneapolis.

"Cooperating in atherosclerotic researches at the Massachusetts General Hospital I have greatly enjoyed my associations with Ira Gore and Ben Castleman. Miller Fisher, neurologist, and two research workers from Japan, Dr. Nakashima and Dr. Okabe. I wish also to express my appreciation of the conferences in which I have participated with Professors Miasnikov, Kipshidze, and Vickert of the U.S.S.R.

"The American Heart Association and the National Heart Institute have always been very generous with their support of atherosclerosis studies and we hope that the International Cardiology Foundation will do likewise.

Last but not least I would pay tribute to the Blakeslees, father and son, Howard and Alton, who have done so much to establish the high level of medical science writing."

Contents

YOUR
HEART
HAS
NINE
LIVES

"I am delighted that this book is being brought out now in a Pocket Books edition, to make it available to many more people whose health will be greatly benefited by it.

"The professional awards it has won are further testimony of its value as a careful, popular documentation of where we stand in our efforts to overcome heart disease. I regard it as the best book of its kind available today."

P.D.W.
March, 1966

Introduction

When I was asked by the authors of this book to prepare an introduction I at once assented, for two reasons. In the first place, the book was to present in all its aspects the most important challenge to life in this country today, and secondly, having known the authors for years as two of the ablest workers in their respective fields of cardiovascular disease research and of medical science writing respectively, I was sure that as a team they would produce a masterpiece of interpretation of our great modern epidemic of atherosclerosis for the public at large, not only in this country but all over the world. And this has come to pass. It is my hope that this volume may be available in translations in many countries which already face the threat of this disease and in other countries which have not yet become prosperous enough to acquire it except in a very small minority of its citizens, but where the book may serve as a warning.

I took up the galley proof this hot Sunday morning in our cottage in the country whence I commute to Boston to work during the week, expecting simply to read the chapter titles and interspersed headings and to skim the text quickly since I am well acquainted with the subject matter, but now late in the afternoon I have just completed reading the entire book, unable to put it down because of the compelling interest of the writing and the unfolding of its dramatic message. It should be in the hands of every young couple particularly, and of middle-aged and older folks too. It will establish a solid basis for a book which I am helping to edit and which is due to appear next spring (1964) entitled *Fitness for Young Families,* in which in the first chapter my own contribution concerns in particular this same hazard of atherosclerosis.

As Jerry Stamler and Alton Blakeslee say, it is the establishment of unhealthy habits of overnutrition, physical lethargy, and excessive cigarette smoking in the twenties that sets the stage for the prevalent and crippling or fatal atherosclerotic diseases of heart and brain, legs and kidneys which suddenly appear in middle age. In fact in a recent postmortem study of 350 patients over the age of 20 years who died of all kinds of diseases at the Massachusetts General Hospital not a single one showed wholly smooth coronary arteries in contrast to the finding of a good many with smooth coronary arteries over the age of 20 years in a comparable group of the same size studied in southern Japan. This means that the disease actually starts with us in childhood, especially in the teenager, again doubtless dependent on these same bad habits established very early in life. This finding was one of many reasons responsible for the establishment of a new national institute of health under the U.S. Public Health Service, called the National Institute of Child Growth and Human Development. We must stop the development of this menace of atherosclerosis at its very beginning in our youngsters.

Although heredity is one of the nine hazards considered by the authors, they do not believe it to be at all insuperable, and undoubtedly the protective measures recommended apply particularly to hereditary candidates many of whom can be identified in their youth by family history, the finding of diabetes or a high blood serum cholesterol count, an increased blood pressure, and other signs.

Quite rightly, much research must still be carried out on all nine probable or possible factors but the authors wisely advise the common sense application of positive health measures which are already clearly shown to favor good health and longevity even though their direct relationship to atherosclerosis may not in every case have been 100 per cent proved. And the adoption of these favorable health habits is applicable not only to the young, especially to the male candidates, but also to most of the survivors of coronary heart attacks and of angina pectoris. In other words, it is rarely too late to mend.

Before closing I would bear witness that my own medical experience since my graduation from medical school in 1911 is in complete accord with the conclusions of Dr. Stamler and Mr. Blakeslee. Our diet was much less rich then and we were obliged fortunately to use our legs a great deal more than now, although we were not then aware of this good fortune of ours. At the same time angina pectoris, although well-recognized, was not common and coronary thrombosis had not yet been invented as a term although undoubtedly it explained some of the attacks of "acute indigestion" which sometimes were fatal and in other instances were survived. However, when acute coronary thrombosis began to be clearly recognizable in the early 1920s, there were as yet not many cases. In my own experience and that of many others the frequency of this complication of atherosclerosis paralleled the great change in our way of life during the past generation, a change which was undoubtedly greater than in any other period of history.

PAUL DUDLEY WHITE, M.D.

Boston, Massachusetts

PART I

THE HEART IN DANGER

1

Today's Great Challenge

EVERY HOUR THE ROSTER LENGTHENS, NAME BY NAME.

Stouffer . . . Jones . . . Baker . . . Sullivan . . . Wendt . . . McFadden . . . Radcliffe . . . Cohen . . . each dead of a heart attack.

His life was numbered with the year 43, 52, 61, 40, or 38, 47, 60, 56. He was a salesman, artist, TV repairman, teacher, bus driver, physician, butcher, lawyer.

None died from either a bug, bullet or bomb. His way of life was to blame. Each *had lived his way* into a premature heart attack. By habit or choice, each had run certain risks that raised his chances of being stricken. Yet—had he known and had he acted—each could have reduced any of nine risk factors which, by all we know, make a man more susceptible to a heart attack far too early in life.

He could have acted . . . and you still can.

Our great hope and challenge lie in the very fact that *everyone can control the way he lives with these nine risks.* Control one of these hazards, and you take a step to boost your chances for longer life. Control them all, and then in a sense your heart has nine lives. At any time, you can begin counterattacking against the quiet assassins of the human heart. In a month or a few months' time, you can reduce your risks, as thousands of men and women already are doing.

How you live and what you do now may well determine whether your name is posted on the long, long roster.

Like A Bolt of Lightning

On a golden sunny morning he lay where he had fallen at the top of the stairs. The ambulance need not hurry.

"Heart attack, I guess," said his stunned friend as commuters eddied around the dead man, almost paused, then moved along. "We were talking and joking, then he just keeled over like he was struck by lightning."

Joe McFadden was 47 years old, the head of a sales department, he had one son in college, a son and daughter in high school, a suburban home nearly paid for. He had been in seemingly good health, although a good deal more than a bit overweight, and stairs made him puff, and he had gone several years without any physical checkup, but the "sudden" massive heart attack hit without warning.

In real fact, his fatal attack had been building up to crisis for years, much as the buildup of electrical charges spawns the lightning bolt that smashes a tree. Joe McFadden really was not killed suddenly. He died as a result of the way he lived for years.

In one terrifying moment, a jet airplane crashes and 130 human beings perish. Properly, we ask why? And what can be done to prevent future disasters?

For the man dead by the stairs, his family and friends asked why. Why should a man in his prime of life be killed as viciously as if his assassin had used a knife or a gun? The question torments scores of thousands of American families.

Each day on the average, this assassin kills not one person, not 130, but 1,400 Americans through heart disease. The lives of 500 more are lost each day from cerebral brain strokes. In total, the toll is more than a life a minute, and uncounted hundreds of thousands are crippled every year.

The Syndicate

We know the name of the killer. It is atherosclerosis, the hardening and thickening, the clogging and narrowing of the vital arteries carrying nourishing blood to the muscle tissue of your heart, and to the cells of your brain demanding life-sustaining oxygen. It was atherosclerosis which brought on President Eisenhower's heart attack in 1955, and very likely the brain stroke suffered in 1961 by Joseph P. Kennedy, father of President John F. Kennedy.

Secondly, we know—from half a century and more of brilliant medical detective work—that atherosclerosis really is due to a conspiracy of factors. There is no one single cause, but rather a constellation of causes. Now we know the chief suspects in this deadly syndicate, and no major newcomer has been uncovered in the last few years of intensive research.

Look to the roll call:

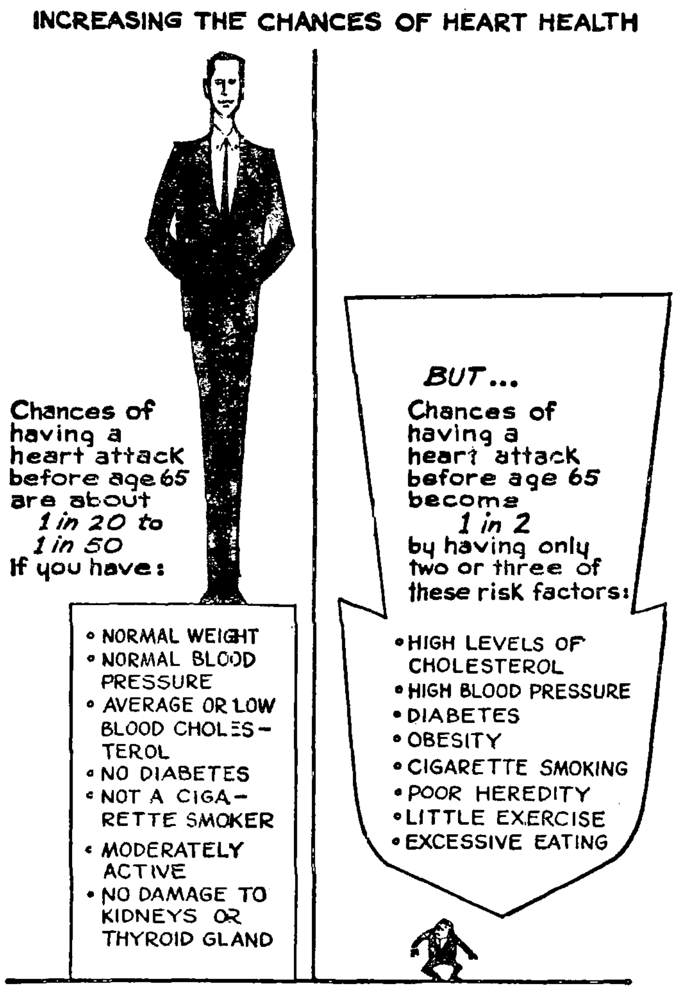
High blood pressure.
High levels of cholesterol, a particularly dangerous fatty material, in the bloodstream.
Overweight.
Excessive eating, especially of certain types of fats and cholesterol.
Too little exercise and physical activity.
Diabetes.
Excessive cigarette smoking.
Tension and stresses.
Heredity.

If you are beset by any one of them, your risk of a premature heart attack is boosted two to six times above the risk of the person free of such a burden. With a combination of factors, your risk is far higher.

A man's chances of having a heart attack before age 65 are about 1 in 20 to 1 in 50 *if* he has normal weight, normal blood pressure, average or low levels of blood cholesterol, no diabetes, is not a heavy cigarette smoker, is moderately active, has a normal electrocardiogram, and has no damage to his kidneys or thyroid gland. He is a good risk man.

His chances rise to 1 in 2—or 50 per cent—if he is being shadowed by two or three of the syndicate members, such as high blood cholesterol, high blood pressure, or obesity. He is a poor risk man. These odds are not drawn from a hat. They are based upon what actually happened to apparently healthy middle-aged men who lived with one or more of these risk factors.

But you are not helpless. You need not be an unwilling victim. You can do something about each of these risks that millions of us are running.


INCREASING THE CHANCES OF HEART HEALTH
Chances of having a heart attack before age 65 are about 1 in 20 to 1 in 50 If you have:
• NORMAL WEIGHT
• NORMAL BLOOD PRESSURE
• AVERAGE OR LOW BLOOD CHOLES-TEROL
• NO DIABETES
• NOT A CIGA-RETTE SMOKER
• MODERATELY ACTIVE
• NO DAMAGE TO KIDNEYS OR THYROID GLAND
BUT...
Chances of having a heart attack before age 65 become 1 in 2 by having only two or three of these risk factors:
• HIGH LEVELS OF CHOLESTEROL
• HIGH BLOOD PRESSURE
• DIABETES
• OBESITY
• CIGARETTE SMOKING
• POOR HEREDITY
• LITTLE EXERCISE
• EXCESSIVE EATING

Most men and women plan careers, and look ahead, making decisions to assure their best chances of reaching their goals in jobs, with family, with life. You also can plan to live. You can use new knowledge to reduce your risks of having life cut suddenly short from heart attacks. You can plan to enjoy a longer life. The main offenders in the conspiratorial gang have been identified. Effective ways have been found to knock them out, or at least tie one hand behind their backs.

With diet, or diet combined with drugs, we can control high blood pressure and diabetes, to reduce their dangers. The heavy smoker who quits his habit finds his risk falling toward that of the non-smoker. The obese man who reduces begins paying the standard rate for his life insurance, instead of the extra fee demanded when he was greatly overweight. He is no longer a very high risk man. The amount of cholesterol in the blood can be reduced through moderate changes in what we eat.

Your Part in the Counterattack

We may well be on the threshold of a great breakthrough against this tragic epidemic of heart disease, which in every four months of time claims more American lives than were lost in all of World War II. You can start right now your counterattack against *each* member of the syndicate. We have, now, a very solid foundation of scientific knowledge from which to fight back against the toll of premature heart attacks and strokes, especially among the middle-aged. We have strong prospects of saving hundreds of thousands of lives and adding ten to twenty more years to our lives.

But, and we must be entirely frank, there is as yet no ironclad guarantee that you or anyone else can escape or postpone heart disease by reducing each major risk or many of them. All the evidence points that way, however, and it is compelling enough to call for altering some habits even before the final proof is nailed down. There is no doubt, for example, that cholesterol is involved in the cause of atherosclerosis. The definitive proof that middle-aged men who reduce their blood cholesterol will actually have far fewer heart attacks waits upon diet studies now in progress (Chapter 28). Possibly, their diet changes will have no effect in preventing heart attacks. But massive evidence from human and animal studies gives every promise that they will.

This great dietary testing, which ultimately may involve 100,000 men, will not deliver the objective verdict for five to ten years. In that time, two or three to five million Americans will die from coronary heart disease. How many, we must ask, will die unnecessarily?

The vital choice and question for us all is simply this: Should we sit by and wait for the last "i" to be dotted and "t" crossed before we act? Or should we begin now to adopt changes that very probably will protect us—changes in our way of life that cannot do any harm?

Yours is the decision. Our purpose in this book is to present the evidence, to try to resolve some of the confusion of conflicting opinions and reports, and offer some guidance to the reader so he can become informed, and judge for himself.

The Case for Action

Take careful account of these primary facts:

Coronary heart disease today is our leading killer, and the toll is increasing.

The very *first* attacks are fatal to almost 40 per cent of victims, either immediately or within six weeks time. Almost 20 per cent die in the *first hour.*

Millions of us live with dangerously high risks.

There is no germ or bug that causes heart attack.

Its causes involve the way we've been living.

These causes can be remedied by safe and simple means.

Coronary heart disease kills more than 500,000 American men and women each year, and almost 200,000 more die from strokes, both largely brought on by the "rust" of atherosclerosis. Far more grimly, coronary disease accounts for about 30 per cent of all deaths of American men aged 45 to 54. The rate of heart deaths per 100,000 men becomes much worse with each five year increase of age.

At middle-age now, if a man appears healthy and has even passed a medical checkup, he has one chance in five of suffering a heart attack before he reaches age 65 to enjoy his retirement. His chance of dying from an attack before 65 is 1 in 15. Among women, the fatal heart attack rate is about one-sixth that for men until after menopause or "change of life," when it begins to climb and ultimately approaches that of older men.

Far from being on any downswing, the death rate from coronaries among men aged 45 to 64 rose slightly between 1950 and 1960. All this is cause for grave concern if not alarm.

Heart disease has risen to tragic prominence at a time when so many Americans are enjoying the "good life" and prosperity. The horrid thought is inescapable that somehow this epidemic is fundamentally due to aspects of our new modern way of life. Some experts call it the "disease of prosperity," and blame it particularly upon the *abuse* of our prosperity. Our life habits and customs have changed remarkably in the last forty to fifty years, and we've heartily welcomed most of them. But, as later chapters will specify, many of these new habits and boons are associated with our high rate of premature death from heart attacks.

No disease really operates on a simple one-cause-and-one-effect basis. Germs do of course cause many diseases. But you don't get an infection every time you cut your finger with a germ-laden knife, or step on a rusty nail, nor a cold every time someone sneezes in your face. Nor do you inevitably fall ill from an exposure to polio viruses, or tuberculosis germs.

The history of tuberculosis, in fact, provides a revealing parallel. TB has been prevalent throughout human history. It exploded into the Great White Plague only after the Industrial Revolution when people were crowded together into cities and towns, when they were often poorly nourished, weakened by overwork, poverty and bad sanitation. In the late nineteenth and early twentieth centuries, TB was the greatest slayer among all diseases in this and other newly industrialized countries.

It raced through the population *only after man's way of life had changed,* so the tubercle bacillus could find fertile ground. It was brought under fair control—before wonder drugs such as isoniazid—by improved sanitation, better standards of living and better general health giving people more resistance to this germ. Dr. Rene Dubos of the Rockefeller Institute points out that improved sanitation began to retard the Great White Plague even before the germ theory of disease had been evolved, and before the TB germ had been isolated. TB is still not fully whipped, and some thirty million Americans harbor the germ, the National Tuberculosis Association estimates. It still kills 10,000 of us each year, taking the highest toll among those who are poorly nourished and most exposed to poor health conditions.

Vast changes in our way of life have paralleled the rise of the heart plague. It flourishes in those countries, like ours, where modern urban industrial life is most developed, where the changes from a rural agricultural society—in habits of eating, exercising, working, and smoking, and other ways—have been most profound.

Our Mixed Blessings

Only by hindsight can we perceive the medical and health consequences of great inventions and developments in our civilization. When a Rockefeller began producing oil, and a Henry Ford introduced mass production of automobiles, who could have foreseen the public health problem of 40,000 persons dying each year on our highways, and two million others being hurt? Who could have foreseen the health problem of polluted air from gasoline engines and concentrated factories? When an Einstein derived his formulas, who could have foreseen the birth of atomic energy with all its threats and blessings?

In the 1960's, we do have a vantage point from which to assess the influence and meaning of recent sharp changes in our customs. And it has helped identify the causes of the heart plague, although the full story is not yet completely documented.

But we have not always needed the full story in all its detail in order to counter disease with striking effect.

Caution, Yes! But . . .

In medical history, the epochal life-saving steps have not been withheld until everyone in the house of medicine was convinced and satisfied the action would be effective. Physicians have had no hesitancy in using many drugs whose mechanism of action was not fully understood. Aspirin, digitalis and cortisone are good examples. Doctors have been primarily concerned that the medicines produce good results, without doing harm.

Doctors began using drugs to bring down blood pressure without knowing precisely how they worked, and without advance assurance that lives would be saved if they *did* reduce the pressure. They knew that elevated pressure did boost the risk of heart disease, stroke, and vascular disease, and that it was associated with shorter life. The full justification for going ahead with drugs has only recently been demonstrated, through national vital statistics showing a 44.6 per cent reduction in death from hypertension and hypertensive heart disease during the ten years from 1950. Use of the drugs prevented thousands of premature deaths. There was no waiting until every element involved was fully understood.

Had that criterion been demanded in the past, Jenner would never have vaccinated against smallpox, at a time when he did not know viruses even existed. Decades passed before it was learned why an inoculation with cowpox would protect against smallpox.

Pasteur would never have warred on rabies if he had first been required to prove his tactics would succeed. The British physician Lynd long ago noticed that scurvy was prevented if sailors of the Royal Navy had lemons or limes in their diet. Not until thirty years ago was vitamin C discovered, and the full story of scurvy was explained still later. Insulin was put to work saving diabetics for forty years before its chemical structure was worked out. Its mechanism of action and the nature of diabetes itself are still not fully clear.

Some argue we should wait because much of the evidence incriminating the suspects in atherosclerosis is statistical and epidemiologic. But this type of study is one of the greatest tools of science. It was statistical and epidemiologic analysis that enabled the Public Health Service sleuth Joseph Goldberger to prove that pellagra was due to a deficiency in the diet of poor people in the South, a deficiency later found to be one of the B vitamins, nicotinic acid. Pellagra is no longer a scourge, thanks to this "statistical" research. Virtually all scientists in biology, physics, astronomy, chemistry and medicine deal with "probabilities" in studying complex systems, and from this gain new insights. Great sections of science rest upon inferences drawn from observed facts. In research, it is often impossible to make direct observations proving the cause of a given phenomenon. Cause and effect relationships must then be derived from careful assessment of associations.

Our concepts of the atom, and the development of the universe, have stemmed largely from this kind of observation and reasoning based on it. No one has seen the inside of an atom, nor was anyone around to observe the evolution of our solar system, our planet and life on it, but our knowledge of these phenomena nonetheless is accepted as valid and essentially proved.

Industry bases its plans on statistical estimates of demand, population growth, and many other factors, and generally does not ask for 90 per cent certainty that a new product will sell. Huge insurance companies are also based on statistical prediction. As Dr. Ancel Keys of the University of Minnesota, one of the leading researchers in atherosclerosis, has remarked: "The absence of final, positive proof of a hypothesis is not evidence that the hypothesis is wrong."

And let us not forget that the statistical evidence concerning coronary heart disease involves a very special kind of statistic—a living, breathing human being, maybe yourself.

We must narrow the gap between the gaining of new knowledge from research, and its use for saving lives. If we do nothing about coronary disease, at least 30 per cent of middle-aged American men are committed to continue being high risks for premature death.

An End to Indifference

But we *can* do something, a very great deal. We need not wait vainly for some magical formula or incantation, or some cure-all pill to swallow on some far distant day if indeed such a pill ever could come. What we can do is to recognize and act against each member of the heart conspiracy. And none of these steps can hurt us in any way. Rather, you will very likely feel better and be healthier. They do not call for the rigors of any spartan existence—far from it—and they are quite within your reach and ability to achieve. The evidence is all consistent that we can start actively to realize this new possibility of preventing premature heart attacks and strokes.

The time to begin is now, whether you are 20 or 60, a young man or woman, husband or wife, or parents of young children whose lives might be lengthened by twenty to thirty years because of habits being formed and followed now.

2

Myths and Misconceptions

In matters of health, everyone from grandmother to a seatmate on an airplane is quick with well-meant advice.

Sometimes it is sound. But unhappily the advice is often dangerous, based on myths or misconceptions, or far outdated since first learned.

Just so, a cloud of myths and misconceptions obscures the facts about coronary disease, and bodes no good for our hearts. To mention some examples:

"Heart attacks happen mostly to big shots and executives." The fact is business executives are no more prone to heart attacks than anyone else, and may have fewer because recently more of them have been taking steps to counter the known risks. It is easy to be misled by newspaper obituaries which have space usually to report the demise and the cause of death only of prominent citizens.

"A new pill cuts down your blood cholesterol, so you don't have to worry about what you eat." There is no safe drug yet available for general use and little prospect of turning up some preventive "penicillin" against coronary heart disease. Furthermore, reducing the cholesterol level involves only one of the high risks for coronary attacks. Medical "magic bullets" will never make it unnecessary to do something for ourselves.

"This new diet melts off extra pounds in two or three weeks. Try it." Be wary. Crash diets may or may not slough off weight, and when they do they may omit essential nutrients your body and heart need. Anyhow, they're boring and hard to stick with. Most importantly, they offer no long-term solution. Sooner or later you have to quit the crash diet. What happens? You go back to eating the only way you know how —your old way—and back come the pounds. You have reduced, but you have not stayed reduced—you have failed. And, as with so many other highly touted diets, the defeat is a source of gnawing discouragement.

"They say calories don't count." Well, they certainly *do* count, and weight gain invariably comes about because we eat more calories than our bodies need. The rest is stored as fat, with one pound of fat representing about 3,500 calories. Consume fifty calories more per day than you need, and in seventy days you can gain a pound, or five pounds in a year. Cutting down food intake puts you on the spending side of the ledger, and a slight reduction can slice off the pounds the way they came, without monotonous diets or dangers of serious malnutrition.

"To avoid a heart attack, you've got to cut out all fats, and can't have any eggs, or butter or anything containing cholesterol." Absolutely untrue. The anti-coronary diets call only for cutting *down* on fats and cholesterol, and *substituting* another kind of fat for some of the hard fats you ordinarily eat. Ample opportunity remains for a varied fare involving almost all foodstuffs. This can become as easy and pleasant a habit as your present diet.

On the other hand, we also hear:

"The human body manufactures cholesterol, so it doesn't matter what you eat." Our bodies *do* manufacture cholesterol. But what we eat can add a lot more than we would otherwise have.

When people go on a diet containing very little fat and cholesterol, their cells make some cholesterol from other molecules, and put it into the blood stream. Therefore a minimum amount is always present.

But the real problem we face is different. For most of us, the question is: When we eat our customary diets high in fat and cholesterol, do our bodies have mechanisms to stop manufacture of cholesterol, speed up the disposal and in that way keep the blood level *down* at an optimal low level? For most of us, the answer is *no*. Consumption of large amounts of fat —especially saturated (hard) fat—and cholesterol results in a steady rise in blood cholesterol during the early years of adult life. Most of us have no effective mechanisms for keeping the level down—except by regulation of our diets.

"Exercise in middle age is dangerous. And exercise can't help you lose weight, you just get hungry and eat more." We do read of men dropping dead on the golf course, or while shoveling snow. It's easy to assume it is exercise that kills or hurts the heart. In truth, about half of all heart attacks occur during rest or sleep, so we might as easily say that lying down is a cause of heart attacks. Leading specialists, like Dr. Paul Dudley White of Boston who prescribed exercise for a famous patient named President Eisenhower, believe exercise and hard work preserve your heart. With exercise, we *spend* calories and can gradually remove fat without becoming ravenously hungry. A ten-minute walk each day—added to present activity—can spend fifty calories without making you eat more. That's enough to lose five pounds in a year.

"Heredity sets you up for a heart attack, and my father and grandfather before him had heart trouble. So I might as well eat, drink, and be merry." Heredity may play a role and affect your risk. But you needn't just shiver in fear over it, or thumb your nose at death, because one parent died of heart disease. How old was he? Dying at 80 from a heart attack is mighty different from dying at 50. If a parent died in middle age from a coronary, it behooves you to think whether this really means a "family tendency" due to genetics or inheritance, or simply reflects habits such as overeating, obesity, and heavy smoking that you adopted willy nilly because that's the way your family lived. A real family history of premature coronary disease should make you more careful concerning members of the coronary syndicate. It should impel you to seek medical advice early—and get on with a systematic thorough-going attack against the conspirators. You owe it to yourself, to your heart and brain, and your family, to make the prevention effort.

"There's really no reason to be careful about smoking, exercise, and eating—look at all the guys who eat all they please, smoke all they please, and never lift a finger in exercise. They live well and long with no heart attack." Some do, true enough, but *how many?* Some escape despite high risk, but too many do develop coronary disease. It is impossible to predict whether you will be one of the lucky few who escape the toll of the risk factors—or whether you will follow the usual course and be victimized prematurely. These differences may in part reflect hereditary variations in resistances and susceptibilities, or other factors less well understood. The artery disease has many causes, and the relative dangers from each of the different risks can vary from person to person.

It's also true that a relatively small number of persons who seem to be controlling all the risks do get hit early by heart attacks. But remember the old saying—so true in these instances—"the exception proves the rule." You have the choice of where you are going to place your own bets against the syndicate—with the odds in your favor, or working against you.

"I'm 25 and perfectly healthy. There's no reason to worry about heart attacks until I reach 40." You may be whistling en route to the graveyard. For atherosclerosis is a systemic disease of the blood vessels that begins quite early in life. It's a long-term process, usually developing slowly and sporadically until the biological rusting closes off a vital artery, or it is blocked by a blood clot. Early stages of the disease are found in the arteries of children, teen-agers and very young men. Among American soldiers killed in Korea, researchers found that a majority already had evidence of coronary atherosclerosis. In age, they averaged 22. It appears likely that *most* young American males have similar "early" artery clogging. Many are dying young, and far more will become prime candidates for heart attacks by age 45 to 55, unless they avoid events along the way that hasten the disease.

"Being a woman, I don't have to worry about heart disease —it's men who are susceptible." As a woman you are relatively free of severe coronary disease, compared with men, until late in middle age. You are not immune even then. And after about age 65, women suffer from heart disease and strokes almost as much as men.

As a last example, one common attitude runs pretty much like this:

"The artery disease is just part of growing old. We have more older people now, so it's only natural more people are dying of heart disease." Well, the artery-rusting process is not an inevitable handmaiden of aging. A certain amount comes with age, but not always. The arteries of some men in their 80's and 90's have been found remarkably free of the rust.

A slight to moderate degree of atherosclerosis is not usually significant. It becomes dangerous and deadly only when it becomes well advanced so it plugs up arteries to the heart, brain, kidneys or legs.

A Look Through the Microscope of Time

Atherosclerosis is no new actor on the stage of human disease. Telltale symptoms have been detected in the arteries of ancient Egyptian mummies, and one story in hieroglyphics depicts what possibly was a nobleman seized with a sudden, severe heart attack. The story from the mummies is perhaps significant. They had been persons of noble blood or high station, and unlike most of their countrymen, tended to be physically inactive and to eat rich diets high in total fats, saturated fats and cholesterol.

Early pathologists, building up their knowledge of the parts and functions of the human body, found the "rust" in arteries, and knew it could be associated with the formation of blood clots and death of part of the heart muscle.

Angina pectoris, the pain brought on by narrowed coronary arteries, has long been known also. Two hundred years ago the great English physician, Dr. John Hunter, knew he was edging near a painful precipice of death whenever he became excited and predicted—all too correctly—that he could fall dead if he became greatly angered.

Atherosclerosis, with its double-edged scythe of heart attack and stroke, marched up through the ages. It was not until fifty years ago that the coronary attack was really recognized as a true clinical entity. Then Dr. James Herrick described all the symptoms—the pain, the pallor, the sudden fall in blood pressure, all the ominous signals of the occlusion or blocking of a major coronary artery.

At that time, heart disease was far less important a cause of death than the widespread infectious diseases. Cholera and smallpox had already been conquered, but typhoid, diphtheria, whooping cough, scarlet fever, measles, pneumonia and tuberculosis filled the hospital beds, and brought physicians riding out on their house calls. If heart disease was a serious problem in those days, physicians did not have the time nor hospital beds to treat it, Dr. White says.

Forty years ago and less, the diagnosis perhaps was often missed, with some real heart disease ascribed to "acute indigestion," which also brings on pallor, sweating, and fall in blood pressure. This happened to no less a personage than President Warren G. Harding, who succumbed to his acute attack in 1923. One treacherous thing about the coronary attack is to decide whether the abdominal pain, retching and nausea are due to a heart attack, or some other disease or severe indigestion. The sick person and his family and friends should beware of self-diagnosis—and summon a physician to make the proper diagnosis.

Several decades ago, the observations of such renowned clinicians as Dr. White, Dr. Samuel Levine of Boston, and others began cutting through much of the mystery surrounding heart attacks. They started wondering about possible causes, and their clinical work added immeasurably to the research in laboratories and among human populations on the underlying causes of atherosclerosis.

Some doctors, for example, noticed a higher frequency of heart disease among obese patients, and among diabetics. Some began to suspect it was a greater hazard for men in sedentary occupations, getting less than average physical activity. High blood pressure and high blood cholesterol also carried a higher risk of heart attacks and strokes, they noted. Such impressions were published as early as the 1920's.

These cardiologists couldn't put down numbers or rate each risk. But their impressions provided take-off points for researchers working with animals, and for epidemiologists studying human populations and their habits and diets. The clinicians, working with patients in their offices and hospitals, gave many leads and generated much enthusiasm for research on the causes of the disease. They stimulated the great detective enterprise. Their work is one reason why cholesterol in the blood rather than its salt content, for example, is one factor under such intensive study.

And these specialists say they did not see as many middle-aged American men with angina and coronary attacks in the decades of the 1920's and the 1930's as they do today. Perhaps this reflects the growth of their specialty to some extent, but they also tell us something very significant: That the heart disease which formerly struck men in their 60's now seems to be hitting more frequently among their sons aged 40 to 50. To a greater degree, the attacks are coming prematurely in the human life-span.

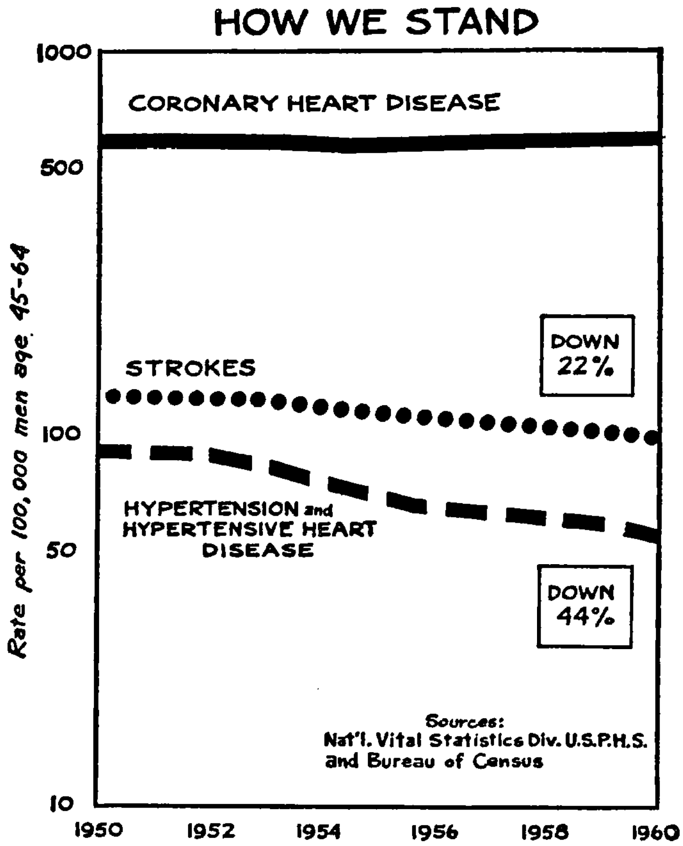
The *incidence* of premature coronary disease among men has increased in past decades, as noted earlier. More seems to be involved than the fact that the nation now has a higher percentage of middle-aged and older men and women, who predictably would be more susceptible to the artery disease. And there is no sign yet that this high rate, particularly that among middle-aged men, will decline in the near future, unless we act to bring it down.

Americans are rather proud of their increasing average longevity, but don't allow the figures to beguile you, particularly if you've walked along the trail of life a fair distance. We have made great progress in the expectation of life at birth, but you weren't born yesterday.

The great boost in average life expectation has come about chiefly because more infants and babies are surviving. Thirty years ago, it was not uncommon to see small coffins being carried to the cemeteries. In fact, in 1900 almost 25 per cent of white children born in the United States died before their 15th birthdays, as did more than 50 per cent of Negro children. These were shocking tragedies. Today the death toll among white children is about 3 per cent, and about 6 per cent among Negro children.

Today the newborn white female can anticipate a life-span of 74 years from birth, the male about 67 years, the female Negro child 66 years of life, and the Negro male baby 61 years. For the average American child, the expectation of life at birth has increased more than twenty years since 1900. This has been due primarily to control of childhood infectious diseases through vaccines and drugs, improved sanitation, nutrition, and better standards of living.

But—if you now are 40 years old, your life expectancy is not much greater than that of the man or woman who had managed to reach a 40th birthday back in 1900! This is



Legend: Despite progress in saving lives from high blood pressure and strokes, the toll from coronary heart disease did not decline during the decade 1950—1960 especially true if you are a man. Your life expectancy is about thirty years—only four more than in 1900. If you are a 40-year-old woman, you are a little better off. You can expect to live about thirty-five more years—almost eight years more than your counterpart of 1900.

If you now are 50 to 60 years old, the added expectation of life—compared with similar age in 1900—is very slight, particularly for men.

One fundamental reason for this is that so many middle-aged persons—men first and foremost—are dying now from the consequences of atherosclerosis. There are increasingly more widows than widowers, and the resulting personal, economic and social problems from this come mainly at the hands of the coronary syndicate.

There now are five times as many Americans aged 65 and over as in 1900, and four times as many aged 45 to 64. But with the savage thinning out among middle-aged men from coronary disease, we cannot expect any significant increase in real longevity—up to a goal, if you like, of 100 years in reasonably good health and vigor—until we succeed in preventing premature coronary disease.

When this century began, the critical question was whether a newborn infant would live to be one year old, five, or fifteen. Today the critical question—at least in countries like our own—is whether the man who is 40 or 50, or the woman who is 60, will live to 65 without a heart attack or brain stroke.

Beyond any doubt, the heart plague, especially among middle-aged men, is a relatively recent development. There never has been an epidemic of this kind before in history. It rages particularly in the most highly developed countries—our own, and in Europe, Australia, New Zealand, Canada, and some others.

The killer, atherosclerosis, begins to afflict most of us early, and continues to worsen with years of living our comfortable modern way. But it is not inevitable. Indeed there is good evidence that even when once started, it need not keep progressing, and in fact can be *reversible*, as is discussed in Chapter 5.

Our defense is to know what happens, why this disease comes along, and then specifically what we can do about it. *For your heart's sake, banish the old myths, and replace them with modern knowledge.*

3

Hearts
Too Good to Die

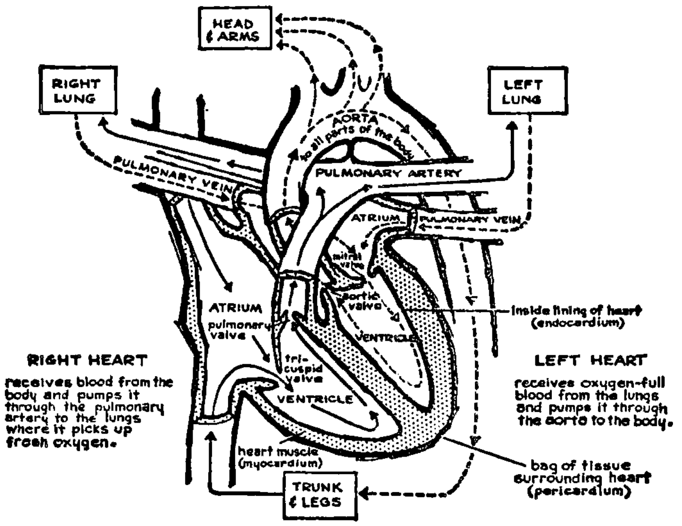
YOUR HEART IS THE STURDIEST, TOUGHEST MUSCLE OF your body.

It is literally a tireless muscle, remarkably designed to beat steadily, day and night, without complaint for a century or longer. Only the size of a man's fist, it contracts and relaxes more than 100,000 times a day, thirty-six million beats a year, regulating the flow of life-giving blood. In a person of average size, the heart sends blood coursing through 60,000 miles of blood vessels and it pumps 4,300 gallons a day.

To perform such prodigious work, the gallant heart has a secret—it rests completely between beats, and actually works only about eight to twelve hours out of every twenty-four. It also stocks up a reserve of chemical fuels, and takes for itself about 5 per cent of all the blood it pumps.

In our epidemic of coronary heart disease, thousands of hearts are stilled which actually are too good, too sound, to die prematurely. The basic cause is interference with the heart's own supply lines, much as the cutting of supply lines can doom an army thrusting into enemy territory. Understanding your heart and its signals of trouble—and also the fact that many heart attacks are "silent" with no pain or outward sign of trouble—can help you keep your heart in health.

YOUR HEART AND HOW IT WORKS



Currents of Life

Your heart really is two separate pumps, working in unison so you feel only one beat.

Blood returning from the highways of veins collects in the upper right chamber or atrium (formerly called the auricle), then courses down through a trap-door valve into the right ventricle or pump. The rhythmic squeezing of the ventricle squirts a little more than two ounces of blood at each beat into the lungs, for red cells to dispose of carbon dioxide and load a new cargo of oxygen.

From the lungs, the blood collects in the left upper chamber or atrium, and is valved down into the ventricle. Its strong contraction pulses blood out through one great artery, the aorta, and from it into hundreds of smaller arteries and then capillaries to service some 300 trillion cells of your body.

The steady pumping is regulated by an electric impulse generated within the heart. The wave of muscular contraction starts in a special structure in the right atrium called the sino-atrial node. It courses through the two atria, reaching another special node of impulse transmitting tissue, the atrio-ventricular node. From there, the impulse speeds along a special branching conduction system reaching both ventricles and pacing them to pump at the same rate.

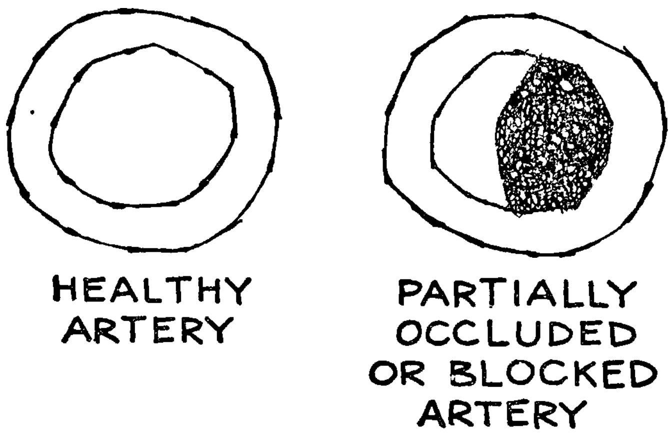
When the heart must work harder, during exercise or excitement, it simply steps up the force and rate of contraction and its output. It draws upon its storehouse of chemical fuels to power all its muscle fibers and cells.

Your heart gets little direct benefit from the gallons of blood flowing through its chambers. For its own nourishment, it receives oxygen-rich blood tapped directly off the aorta moments after the left ventricle sends out a pulse of flow. The first channels off the aorta are the coronary arteries, the right and left, which divide into a network of smaller branches and eventually capillaries, bringing oxygen and chemical nutrients to all parts of the heart muscle.

But there's a catch. For these vital coronary arteries are only about one-eighth of an inch in diameter—about the size of the lead in an ordinary pencil—and they are highly susceptible to atherosclerotic clogging. The flow can become narrowed or completely stopped, and in that case part of the heart muscle tissue may die, or the electrical system of the heart may be knocked out of kilter. The life-or-death decision then depends upon a number of factors, as we will see in a moment. In our favor is the fact that the heart fights for its own survival, and we can help it in several ways.

The arteries can narrow down a good deal before any trouble may occur, for any given area of the heart muscle receives blood from more than one source or artery branch. If one channel is closing off, blood still comes via another route. And as narrowing of one channel progresses, certain arteries expand to help make up for the diminished flow. Regular exercise and activity help develop these extra or collateral channels, since the heart needs more blood whenever it is called upon to work faster and harder.

If a small area of the heart is suddenly deprived of blood, and part of the heart tissue dies, the heart can still often recover, forming scar tissue in the damaged area. Massive destruction of heart tissue is fatal. In many attacks, the heart is still strong enough to recover, "too good to die," as Dr. Claude S. Beck, Cleveland surgeon, puts it. Quick massage of a stilled heart can keep blood flowing to the heart and to the brain, but circulation must be restored within four to five minutes to prevent irreparable damage to the brain or other organs.



The injury may send the heart into wild or uneven electrical action—fibrillation—or completely interrupt its electrical governor. Quick action then can restart the heart, much as a clock resumes ticking if the pendulum is set in motion. As Dr. Bernard Lown, Boston cardiologist, has recently shown, rhythmic direct current electrical shocks can be safely applied from the outside to set the heart's own pacemaker back on correct timing.

To protect our hearts, we can act to reduce the known risks of developing severe atherosclerosis in coronary arteries. By middle-age, most of us have some degree of this clogging. It is the severe form, and its complications, that cause death in more than 90 per cent of cases of coronary heart disease, and in a high percentage of strokes.

The Process of Biological Rust

Pathologists have detailed much of the story now about how atherosclerosis begins, and several mechanisms by which the heart itself is damaged. Atherosclerosis, by the way, is one form of arteriosclerosis or hardening of arteries. *Arteriosclerosis* means thickening and stiffening of arteries, with or without a narrowing of the inner channel. *Athero*sclerosis, however, invariably produces some narrowing or blockage within the artery. The hallmark is a localized excessive accumulation of fatty materials, including that prime suspect, cholesterol.

In the beginning comes an infiltration of fatty materials from the bloodstream into the inner layer, the intima, of the artery channel. A plaque or spot appears, microscopic in size, only a few cells thick, and then it grows as more fatty stuff and cholesterol accumulate, outstripping the ability of the artery cells to dispose of them. The fat-loaded cells then break down, and their components plus the fatty material are released, and then irritate other nearby cells. Scar tissue forms, and the vessel wall thickens and hardens. More fatty material and calcium accumulate and the plaque grows, sticking up above the once-smooth intima. It spreads outward, inward, and sidewise.

This is the biological rust, and it can spread to choke off the flow, or slow it just like rust inside a water pipe so that only a dribble comes from your faucet. The progressive rust, depending upon where it occurs, can interfere with blood flow to the heart, the brain, the kidneys, or the legs. When your heart cannot get enough blood during stress or activity, the resulting chest pain is a cry of danger.

When atherosclerosis has roughened the inner surface of an artery, blood eddies over and around the obstruction, not unlike water in a rapids. The turbulence and wall damage encourage formation of a blood thrombus, or clotlike plug, as the body's system of blood-clotting is triggered into action. Normal clotting is protective in halting hemorrhage, or in healing wounds. But the abnormal thrombus growing inside the artery can bring disaster. It can expand enough to plug the artery.

The flow of life-sustaining blood in the heart's arteries may be dammed in another way. The injured atherosclerotic area can become ulcerated, and part of it may break loose to be propelled downstream in the artery. This is an embolus. Ultimately it lodges in a smaller vessel and blocks it.

The roughened area may also become laced with little capillaries growing from the artery wall into the plaque. These sometimes rupture, producing hemorrhages or blood blisters. This is another serious complication of advanced, severe atherosclerosis. The blood blister further closes or occludes the already narrowed channel or lumen of the artery.

With different mechanisms involved—each stemming from the basic atherosclerosis—coronary heart disease strikes to produce clinical illness in five major forms.

The Five Major Illnesses

One is the sudden *heart attack*—sometimes rapidly fatal—often occurring without warning or premonitory signs. This is usually due to sudden closure of a major heart artery, and is known as a coronary occlusion. Growth of the plaque may produce it. Frequently, occlusion is caused by coronary thrombosis, the growth of a thrombus plugging the artery. It may be due to an embolus breaking loose to blockade a smaller artery in the heart muscle, or to a hemorrhage into the plaque, swelling it and closing off the artery. You probably have also heard the term myocardial infarction. This means death of some tissue of the myocardium or heart muscle, brought on by a thrombus or other cause of shutdown of blood flow.

A second major form is *angina pectoris,* the periodic attacks of chest pain or pressure (as though someone were sitting on your chest) or other distress which means the heart is not getting enough blood through narrowed arteries. Angina may be produced by exertion, by eating too much, by emotional upsets, or excitement.

Third is *acute coronary insufficiency,* meaning a hungry heart is calling out through more persistent pain than in angina attacks. It is usually due to blockage of a smaller artery, with the damage to the heart muscle usually localized rather strictly. It can be verified with an electrocardiogram (ECG), the electrical reading of heart activity. The tracings in acute coronary insufficiency are different from those in the heart damaged by full-blown gross infarction.

A fourth major disturbance that may occur in coronary artery disease is *a significant disturbance of the heart's rhythm.* The beat may cease to be regular. It may beat wildly and sporadically, as in the condition called auricular fibrillation. It may go at a frenzied rapid rate, as in paroxysmal tachycardia. Or it may beat very slowly, less than forty times a minute, so that the brain doesn't get enough blood and the patient faints—so-called Stokes-Adams attacks.

A fifth form of illness from coronary disease is *congestive heart failure.* This means the heart muscle has been diffusely weakened by inadequate blood supply, and so cannot carry on its normal work. One initial sign is shortness of breath. Another is dropsy or edema, a watery accumulation in the lungs, the belly, the legs and other areas of the body. Drugs such as digitalis to stimulate the heart, and diuretics to draw away excess water, are helpful. So is a restriction of the amount of salt consumed. The underlying damage cannot be relieved but the process, due to atherosclerosis, may be stopped, and many patients live comfortably for years under good medical treatment.

In these major ways, then, does the biological rusting take its victims, and every intelligent citizen is aware of the danger. Today, any pain in the chest rockets into worry that a coronary attack is coming on. In reality, a pain in the chest can be due to any of a score of causes, including indigestion, and perhaps only in a minority of cases is a chest pain really a sign of an ailing heart. Rather than worrying, go have a good medical checkup (Chapter 20) to allay the fear. If the checkup does indicate a warning note from the conspirators, you can begin far earlier to assist a heart still too good to die.

The Importance of the ECG

One astonishing fact is that heart attacks can occur silently, with no symptoms whatsoever. Heart specialists estimate that 15 to 20 per cent of initial heart attacks come this way, damaging the heart without any awareness by the person. The evidence often is not uncovered until later during autopsies of persons who died from some other cause entirely, or from another attack.

The silent attack reflects the heart's amazing ability to recover from a small amount of damage. But it holds dangers. Not knowing he has had an attack, a man may go on living as before, driving himself too hard, or oversmoking, or overeating, continuing activities which could be harmful to him. One attack often means higher susceptibility to another one, particularly if a person doesn't take protective steps to reduce his risks of progressive atherosclerosis and its complications.

Fortunately, the silent attack can often be detected through electrocardiograms, even when they are taken months later. A regular medical examination is therefore all the more imperative for the middle-aged man. The ECG may provide the only sign that he has suffered heart damage.

One heart attack is not a sure sentence to another and fatal one. A majority of persons recover, and thousands of men and women have lived for ten to twenty-five years or longer.

But the hazards are high once atherosclerosis has announced its presence through a heart attack. Among middle-aged men who have suffered a single uncomplicated attack, 20 per cent die within five years, mostly from another attack. And 40 per cent or more of those who have had a complicated attack, or repeated attacks, die within five years. After one attack, the risk from death within five years is six times greater than for men in the population at large.

These grim figures stress all the more how essential it is to find ways to prevent *the very first attack.* This goal has enlisted researchers in one of the greatest medical detective efforts of our time.

4

Heart Detectives

ON TELEVISION OR IN A NOVEL THE DETECTIVE INVARIABLY manages to solve some mystery very neatly within prescribed limits of time or words by some tour de force, preferably with the aid or presence of a glamorous female.

The real-life detective, usually only one of the dozens assigned to an investigation or murder, rarely catapults to such good fortune. He knows it is mainly a matter of his own shoe leather, asking interminable questions, following clues as they develop, to track down the guilty or exonerate the innocent.

Medical detectives operate in quite similar fashion, and their "cases" are often more difficult. Most of them live unsung. They use or call upon dozens of specialized skills, many experiments, observations and analyses to build up concepts, insights and understandings, and then put the concepts to further testing to make sure they are so.

The Prime Suspect

So it has been with the story of a medical villain, *cholesterol.*

The word sprang to public prominence soon after President Eisenhower's heart attack. Reading on the run, many people became aware that cholesterol was a something in our food and in our blood and somehow "bad," and somehow linked with our present delectable food habits as a prime culprit in bringing on heart attacks.

Some confusion was unavoidable. The voices of the experts did not always harmonize about diet or cholesterol, for one thing. It was too easy to assume that the only thing necessary to sidestep a heart attack was to avoid *all* food containing any cholesterol or fat. It even seemed that cholesterol (pronounced koh-less-ter-ohl) was a danger that had just been discovered.

And the concern over cholesterol and fats in our food has been termed a fad. Webster's Dictionary defines a fad as a passing fashion, a craze, something of short-term interest. Americans have been victimized by dietary fads repeatedly in the past, and undoubtedly will be victimized again and again as food faddists appeal with blandishments of simple and magical products, usually for sale, usually at some exorbitant price. Your protection against fads is to look behind glib sales appeals, to demand sound evidence as to why and how any special food, or a change from typical habits, could possibly do what is claimed. It ought to stand or fall upon critical, objective analysis, very well documented with no concern for fattening anyone's pocketbook.

These same standards should be applied to judging the role of cholesterol in heart attacks, and the role of our present diet as a suspect in promoting atherosclerosis. The detective story about cholesterol is a basic part of our understanding about causes of heart attacks, and why we know it is an important factor—but not the *only* factor—involved in this great epidemic.

No one denies that cholesterol forms part of the damaging or fatal rust in our arteries. At first glance, there seems to be far less agreement about the role that our diet plays in bringing it on. Only by looking over the shoulders of the medical sleuths can you find the information to act knowledgeably concerning your own heart.

How are these medical investigators unearthing the evidence with regard to the accused—cholesterol? They are proceeding along the same three basic paths that researchers have used to uncover much of what is now common medical knowledge. One is the study of sick people during life, and in post-mortems, to find what happened to them in health or disease. Second is animal experimentation, trying to reproduce the disease in animals, and then trying to prevent, to cure, or influence the disease process. Third is epidemiology, the study and comparison of people living in different countries and groups, with differing habits, customs, diets, geography and climate, all the circumstances which may make them prey or immune to some particular disease. All three of these methods have been applied to the great cholesterol question.

First, let's define the villain itself. Cholesterol is a very natural and quite essential chemical of life. A fat-like waxy material, it is a common constituent of all animal cells and fluids. It is one of the sterols, the family of organic chemicals embracing the sex hormones, vitamin D, bile acids, and other vital chemicals. You positively cannot do without it in your body.

Our bodies manufacture cholesterol continuously, out of simpler substances provided through our food. We also consume some in our food, for it is present in animal tissues such as meats and eggs, but not in grains, vegetables and fruits. If we eliminated all cholesterol from our food, by adhering strictly and exclusively to a vegetarian diet, we would still make cholesterol in our tissues from simple building blocks. The starting material to make cholesterol is acetate, and the carbohydrates, fats, and proteins in food are broken down within our bodies to acetate as a prime raw material to form many chemicals, to build up tissues, and to supply energy.

Our food frequently supplies less cholesterol than our bodies produce. Then why should we be concerned about the amount taken by mouth? The medical detectives have supplied the answer—what we eat can make it easier for our bodies to accumulate an excessive amount of cholesterol and other fatty products. It has been amply proven that what we eat does affect the amount of cholesterol circulating in the blood. Reducing the amount of cholesterol and saturated fats reduces the cholesterol level. A high intake of these fats (Chapter 9) and cholesterol is associated with more cholesterol traveling around in the blood.

Well, how do we know this?

The story begins nearly 200 years ago when a German pathologist, Albrecht von Haller, became curious in 1775 about strange-looking human aortas, the great arteries leading immediately from hearts. Cutting into the surface of "hardened" aortas, he squeezed out a yellow mushy, greasy material from between the inner layers of the artery walls. He suggested this stuff was laid down in the early stages of the hardening and thickening of artery tissues. He thought it all began with a deposit of soft material, leading finally to a hard, scarified spot or plaque.

About a century later, when pathologists had the penetrating eye of the microscope, Rudolph Virchow and his colleagues in Germany took a deeper look. They discovered the mushy, gruel-like material was composed of lipids or fats and fat-like materials, including cholesterol. They recognized atherosclerosis as a specific type of arteriosclerosis. The word *athero-* comes from the Greek word, *athere,* meaning mush.

When does this process all begin, Virchow and others began wondering? Does it have any connection with the fats a person eats, or the amounts in his blood? Some suggested the fatty material laid down in the artery did come from lipids circulating in the blood, and that somehow these fats infiltrated into the smooth, innermost lining of the artery wall and then into deeper layers.

Continuing the laboratory quest, other researchers found excess amounts of cholesterol and other fats in arteries afflicted with atherosclerosis. They also showed this accumulation frequently began as the initial stage of the disease process. Slowly there came the concept that atherosclerosis is a systemic, metabolic disease, meaning that something was going awry in the manner in which the human body and the artery were handling fats and cholesterol.

Also, some sixty to seventy years ago, other detectives began noticing that excessive cholesterol in the blood was a common feature in several diseases such as diabetes, the kidney disease nephrosis, in hypothyroidism when the thyroid gland is "lazy," and in xanthomatosis, when deposits of fat and cholesterol form in the skin and the tendons, as well as in the arteries. Patients suffering from these ailments not only had high levels of cholesterol, but also a marked tendency to severe atherosclerosis comin[illegible]
Often they suffer premature heart at

blood cholesterol was high, the artery rusting tended to develop sooner and to be severe.

The fact that, in these diseases, patients had high blood cholesterol did not indict their diet as the *cause* of their atherosclerosis. Instead, the elevated blood cholesterol seemed to come from some internal (endogenous is the medical term) cause which mainly was *not* related to diet. As was to be concluded later, what a person eats is not the sole, exclusive factor influencing blood cholesterol or atherosclerosis.

But neither, they soon began to suspect, is a person's diet completely blameless—not by any means!

By the 1920's, some investigators noticed that human heart disease was associated with a high blood cholesterol. Middle-aged men who suffered heart attacks usually had more cholesterol and lipids in their blood than men who escaped attacks. Especially if the men were fairly young when their hearts were hit, they generally had greater amounts of blood cholesterol than compatriots who didn't have heart disease. Since then, epidemiologists have associated all this with the kinds of food we generally eat—but that is getting a bit ahead of our detective story.

5

Rabbits, Monkeys and Men

ONE DAY SOME YOUNG RUSSIAN SCIENTISTS CORRALLED some rabbits and began feeding them meat, milk and eggs—and then pure cholesterol and fat.

That experiment produced a major advance toward our present understanding of causes of heart attacks.

At the outset, the man who did the first experiments—A. Ignatowski—wasn't even concerned about heart disease or artery hardening. He was curious as to what effects a high-protein diet had on the kidneys and on high blood pressure. Rabbits seemed good test subjects, since these docile vegetarian creatures do not ordinarily go around chewing up other animals.

Other young men in these research institutes—working for their doctorate degrees back in 1908–1912 in St. Petersburg (now Leningrad)—were good young scientists. So when a curious and unexpected thing happened to Ignatowski's rabbits, they had the wit and wonder to recognize it, and then start some new experiments. Their work is a classic example of how important discoveries come about in basic research aimed at understanding why things are as they are, or work as they do. And the time was ripe for them to ask the right and important question when the rabbits did what they did. But first let's set the stage.

Science on the Track

Once pathologists had described the fatty deposits showing up in human arteries, other scientists had turned to animal experiments to study this peculiar process, to find the fundamental causes. They tried to produce atherosclerotic trouble in animals to learn the reason or reasons for the disease. Then they could more easily begin explorations to follow the disease step by step, to find what things might slow it down, or reverse it, or speed it up. Much of our knowledge about diseases comes from just this kind of research.

The early experimenters wondered whether the atherosclerotic plaques and clogging stemmed from some kind of injury to the blood vessels. To test this idea, they damaged animal arteries in many ways, and found only that they could produce changes or abnormalities, but not atherosclerosis. They tried in vain to produce the artery rusting by creating high or low blood pressure. They tried with drugs, with germs, with toxins, with injections of adrenalin and even nicotine (See Chapter 14 on Smoking)—and they always failed. Whatever they did, they could hurt the arteries, or sometimes bring on a kind of *arterio*sclerosis or stiffening of the arteries, but they could not produce what concerned them most—the atherosclerosis seen in human arteries.

They just kept drawing blanks. But their work was not useless, even if it was negative. Any detective investigating a long list of suspects, or interviewing people on or near the scene of a crime, usually draws many blanks. But his work is valuable, if personally unexciting, for by *elimination* he keeps narrowing down the suspects and that helps disclose the real criminal.

Just so, these investigations of atherosclerosis, during the late nineteenth and early twentieth centuries, had ruled out various agents as being primary or sole factors in causing atherosclerosis. While some agents they studied might exert contributory effects, the main culprits still eluded them. They published their negative findings, and their work did narrow the field in the search for major causes. The question of cause still challenged many scientists.

Against this background, meanwhile, the Russian workers had started their project of learning what a diet of eggs and milk would do to the kidneys and the blood pressure of rabbits. At the end of the experiment, when they looked at the animals' tissues, they found something unexpected: The arteries showed atherosclerosis with plaques much like those in human arteries. And the blood serum was curiously milky. They could have shrugged their shoulders, but instead some of them asked themselves the one great question—Why?

Closing In on the Unknown

Two men—N. Anitschkow and S. Chalatow—went after the whole problem systematically, to get the answer to that "why." They reasoned that the rabbits had been fed not only large amounts of protein, but also sizeable quantities of fat and cholesterol. Had the high intake of protein caused the milky serum and artery disease? Or had the fat and cholesterol been responsible? They set up new experiments to decide. Rabbits were fed pure fat and cholesterol—and developed milky serum and artery plaques laden with fat and cholesterol.

Thus, fifty years ago, a spotlight of suspicion was pointed at dietary fat and cholesterol as factors in producing the rusting disease of arteries. This observation, in retrospect at least, was a challenge to the notion that the hardening and rusting of arteries is an inevitable penalty of growing older—and that there is nothing anyone can ever do about it.

Two scientific detectives had found a fact which applied to rabbits at least. Was it really a significant breakthrough? The road to scientific confirmation, and to human application, turned out to be neither simple nor free of frustrating twists and turns.

Stimulated by the report from Anitschkow and Chalatow—Anitschkow is still living and researching in Leningrad—other experimenters hurried to check and expand upon their work. Many were soon disappointed. Only rarely could they produce the atherosclerotic deposits in animals other than rabbits, and men are scarcely rabbits. Dogs and rats and other animals didn't get the artery disease on the cholesterol-fat diet. And when the atherosclerotic lumps were produced in rabbits, the rabbits didn't go on to have blockage or thrombosis of coronary arteries.

In these early experiments, rabbits were fed large amounts of fat and cholesterol, far greater amounts than humans eat. With this kind of cramming, the rabbits also developed fatty deposits in their skin and other tissues as well as in their arteries. So far as humans were concerned, that only resembled the pretty rare disease of severe xanthomatosis. So what?

The critics quite properly raised another good question. They pointed out that rabbits are herbivores, not meat eaters, so feeding rabbits animal proteins and fats was a rather shocking change from their ordinary diet, a challenge to their metabolism or method of handling customary intake of food. Man, they added, has long been consuming meat and animal products.

In the 1920's and early 1930's, Anitschkow and others helped answer this kind of questioning. They fed rabbits smaller amounts of fat and cholesterol—in the form of milk or lanolin—over longer periods of time. On these diets, the animals developed a moderate increase in blood cholesterol, and after many months developed atherosclerosis without any deposits of fatty materials in other body tissues. Then other experiments by Stamler and Louis N. Katz at Michael Reese Hospital in Chicago produced similar results in chickens. Doubts nevertheless remained that what occurred in these laboratory animals really applied in any degree to human beings.

But in the last fifteen years, many of these initial doubts and questions have been answered. Dr. Joseph Bragdon at the National Heart Institute in Bethesda, Maryland made an important point. He showed that weanling rabbits fed only on their mothers' milk, which is rich in fats and cholesterol, do develop fatty streaks in their blood vessels similar to those found in young humans. And atherosclerotic plaques now have been produced in almost every species of laboratory test animals—in the dog, the rat, pig, chicken, duck, pigeon, guinea pig, hamster and monkey—by feeding high-fat, high-cholesterol diets.

Still, the detective must ask, is this truly significant? The experimental diet is different from what the animal "naturally" eats. How does this incriminate high fat or high cholesterol diets in actually precipitating heart attacks in men and women? And what is a "natural" diet for the human species?

One important piece of evidence came recently from Chicago, where Drs. Bruce Taylor and George Cox of the Presbyterian-St. Lukes and Evanston Hospitals showed that monkeys get heart attacks similar to those in man if the monkeys have been fed a diet moderately high in fats and cholesterol. The monkeys developed atherosclerosis, some to a severe degree. And some died sudden deaths from coronary thrombosis and myocardial infarction.

In medical research, as in all science, the basic task is to analyze a mass of information and from it draw fundamental generalizations. From the knowledge gained through animal experimentation, it is possible now to draw basic conclusions shedding light on the cause and development of atherosclerotic disease in man. There are three such generalizations that seem reasonable.

First, in all these experiments, the one common denominator producing atherosclerosis was a change to a diet high in fat and cholesterol. In many different species, including monkeys, this led to a rise in blood cholesterol and other fats. When this was allowed to go on for weeks and months, atherosclerosis always developed and progressed. We cannot easily dismiss this, unless we insist that man is entirely different from other animals, and reacts differently somehow to a dietary change. Diet is of great importance. It acts by raising blood cholesterol and fat levels.

Secondly, it is quite clear that what an animal or a person eats is *not the sole cause* of the artery disease. The underlying disease process can be made worse by other things. Dr. Robert Wissler at the University of Chicago showed that it becomes worse if the animals have damaged kidneys while consuming high-fat, high-cholesterol diets. Dr. Forrest Kendall of the Goldwater Memorial Hospital in New York City showed that it becomes worse if the activity of the thyroid gland (the so-called pacemaker gland of body activities) is suppressed. Stamler and Katz, George Wakerlin of the University of Illinois, Anitschkow and others showed atherosclerosis becomes worse if the cholesterol-fat-fed animals also have high blood pressure. Anitschkow showed with adrenalin that it becomes worse if the arteries have been damaged beforehand, or are damaged during the experimental diet. In that case, the sites of injury become the favored spots for plaques to develop.

Thirdly, the animal experiments and some human observations have produced very heartening news—that atherosclerosis is not an inexorable process, but that it can be stopped or even reversed.

When rabbits, or dogs or chickens have been fed a high-fat, high-cholesterol diet long enough to produce atherosclerosis, and then the disease-producing diet is halted, the artery lesions gradually disappear. Giving the animals thyroid hormone may help speed the disappearance of established atherosclerosis. And when atherosclerotic chicks are fed estrogen, the female sex hormone, all signs of the artery disease disappear within a few weeks even though they are still being fed a high-fat, high-cholesterol food! Microscopic studies showed their arteries had become completely free. These experiments were done as an international collaborative effort by Drs. Ruth Pick, Louis Katz and Stamler in Chicago and Dr. Rene Malinow and colleagues in Argentina.

Among humans, Dr. Sigmund L. Wilens of New York City found less severe degrees of artery clogging in persons dying after a wasting disease compared with those of similar age and sex who died from accidents or short-term illnesses without any or much loss of weight. He inferred that the severe malnutrition had brought about a significant amount of resorption of previously-formed plaques, for the two groups presumably would once have had about equal amounts. The greatest difference was less lipid in the artery plaques of those who had lost much weight. This suggested that the early lesions or plaques had been the ones most susceptible to reversal of the fatty depositing.

During famine years in Central Europe after World War I, the prevalence of atherosclerotic disease went down. During World War II, death rates from coronary disease declined in the Low Countries and parts of Scandinavia during the German occupation, with its enforced change of diet to one lower in intake of fats and cholesterol. The same finding was recorded among citizens of Leningrad during the long wartime siege. This also shows a potential for halting or reversing the disease process.

A Key Factor Uncovered

To prevent heart attacks, the essential thing is to avoid severe atherosclerosis, and it would seem that it's enough simply to prevent the disease from progressing. But it is even possible to reverse the process.

Animal experiments indicate atherosclerosis stems from a nutritional-metabolic disturbance, abetted by other things. In humans, these other factors can include obesity, a sedentary life, high blood pressure, heavy smoking, diabetes, kidney damage, an underactive thyroid gland, perhaps previous damage to arteries from some other disease or cause, and differences in hereditary makeup. And these factors may well interact.

A fundamental problem is to separate the primary or key causes from secondary ones, in order to know best what to do if we are to prevent heart attacks from occurring so often, and so early.

Seeking that answer, epidemiologists have roamed the world, and looked in upon our own cities and farms, comparing the mode of life of many different peoples, including what they eat.

6

Hearts—
Around the World

MOST AMERICANS EAT QUITE WELL, SO WELL THAT THE suspicion has been growing ever stronger that many of us are gorging and lazing our way into heart attacks.

Our diet is rich, varied, tasty, a delight and comfort. It is one proud symbol of our highly advanced economic society—most of us can afford to buy and consume much good food.

We know too well that hunger still sleeps each night with hundreds of millions of other people around the world, some in our own country, most in Asia, Africa and Latin America. Malnutrition and starvation kill untold numbers of babies. Malnutrition robs gaunt millions of adults of their vigor and ambition. We are among the fortunate, and it's all the more upsetting to hear that some of our favorite foods might be contributing to our plague of heart attacks.

Rather than going hungry or being severely undernourished, a high percentage of Americans eats too much, and creeping obesity is one price we pay. Rather than an army of starving children, we have an army now of fat children. Gone are rickets, scurvy and beriberi. Our main problem now is *over*-nutrition, particularly in certain types of foods.

Before we alter food habits, we must ask for convincing evidence that our diet really is part of the deadly syndicate in coronary heart disease. We should have confidence that making changes is likely to reduce our risk. For our habitual diet involves not only confirmed personal tastes and preferences, but the cardinal matter of sound nutrition for optimal health. And it involves a vast economic investment in agriculture, the dairy and meat industries, the food industry as a whole.

Patterns and Places

Changes in our American diet in recent decades provide some of the evidence. But primarily it comes from scientists who have wondered why heart attacks should be so common in some lands, and rare in others. What thing or things in peoples' ways of living could be responsible? Are ethnic, racial, hereditary influences involved? Is the lifetime diet involved? They went looking and checking, and so far have examined dozens of population groups, including ethnic groups moving from their homelands into other cultures.

And they found one clear pattern:

A higher rate of atherosclerotic heart disease and higher blood cholesterol levels occur in the countries and cultures which are more advanced economically. In these countries the diets tend to be high in total calories, high in animal and saturated fats, cholesterol, and "empty" calories from refined processed foods.

Atherosclerotic heart disease is rare and blood cholesterol level is low in the underdeveloped countries. There, the diets usually are low in total calories, low in calories from animal fats, and low in empty calories.

Heart disease ranks *first* among the ten leading causes of death in twelve of the most industrialized countries, the World Health Organization reports. These are Canada, the United States, West Germany, Denmark, Finland, France, Norway, the Netherlands, the United Kingdom, Sweden, Switzerland and Australia. Cancer ranks second as the cause of death, and strokes third.

The Search for the Common Factor

History provides some perspective for suspecting diet as a reason for variations in the incidence of coronary disease.

Hundreds of thousands of years ago, primitive man probably began chiefly as a vegetarian, a food gatherer dependent mainly upon nuts, roots, fruits and vegetables, and small game, down to insects and worms. He consumed a variety of natural, unprocessed foods, giving him a high ratio of essential nutrients to the calories consumed. All in all, he was well nourished—when nature was kind and he could find enough food. Apparently only in the Neolithic age some 25,000 years ago did he acquire enough skill to be a big game hunter so he could feast on substantial amounts of meat.

Some thousands of years ago in China, India and the Fertile Crescent of the Middle East, man mastered agriculture and animal husbandry. From a food gatherer he evolved into a food producer. He began producing not only essential grains and bread, but also meat and dairy animals, milk, eggs, butter, some of the higher protein foods. He was both farmer and herdsman. Agriculture supplied the basis for urban life to root and grow.

For most people, life was hard and the diet simple, as it still is. In the Egypt of the Pharoahs, the peasants' basic staples were bread and beer. The upper, privileged classes banqueted with meat and wine, and ultimately rich, luxurious diets not unlike those in advanced Western cultures today. As the Bible expressed it, the upper classes lived "off the fat of the land," at the top of a pyramid—whose base was a largely slave and largely hungry population. The Egyptian nobility and priesthood were among the favored group, and it is their mummies which disclosed bits of aortas with gross atherosclerosis.

Bread has literally been the staff of life for most people for thousands of years, along with rice and potatoes. Grains are still the basic food for most people in Africa, Asia and Latin America. For some, grains supply 90 per cent of all their calories. Probably a majority of these people has been and still is chronically undernourished.

It costs several thousand calories in fodder to produce 1,000 calories of animal food. In a few countries, as industry grew and economies expanded, more and more people could afford the more varied and richer diets, with sizeable amounts of the more expensive foods containing fats of animal origin. They could now have well-fattened meats, eggs, butter and other dairy products which were nutritious, tasty and appealing.

The Human Laboratory

Thus a sharp line developed around the world between the typical diets of great numbers of people, and this provided a human laboratory for the epidemiologists. Further, in each country there are usually class distinctions with great variations in daily menus. Comparisons can be made between the intakes of total calories, empty calories, total fats, cholesterol, and saturated or unsaturated fats.

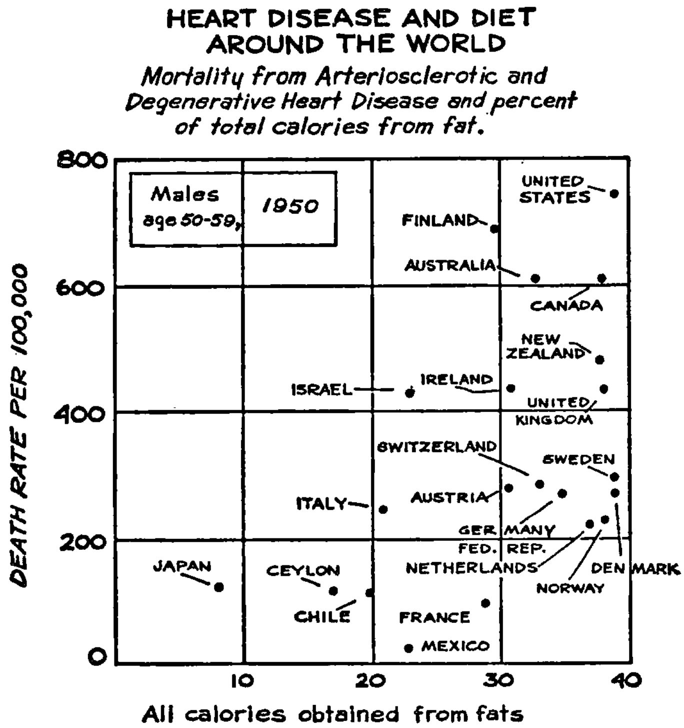
Empty calories mean those supplied by processed, refined foods which are high purely in energy value, but low in essential nutrients such as vitamins, minerals, essential amino acids (the basic components of proteins) and fatty acids utilized in building body tissues. They include such foods as refined sugar, unenriched white flour bread and pastries, and cooking and table fats and oils.

Several decades ago, when laboratory experiments began pointing to an influence from cholesterol and fats in artery rusting, epidemiologists made initial studies of lifetime diets in China, East Africa, Egypt, India, and Malaya as compared with the United States, Germany, Austria and other more economically advanced countries. These first researchers were mainly British, Dutch, German, French and Belgian doctors following colonists and troops.

They found atherosclerosis among people consuming a high-cholesterol high-fat diet in the form of eggs, butter, milk, meat and animal products generally. The artery disease was *not* so prevalent among those on a high meat intake but with a low intake of dairy products.

In Egypt and India, they noticed class differences. The artery trouble appeared to be low among poor people whose mainstay was largely cereals. But it was relatively high among those who could afford animal foods richer in saturated fats and cholesterol. Economic status and what they could afford to eat made a difference among persons of the same ethnic group and race living in the same geographical and climatic conditions. Race, ethnic origin, climate, geography are not of significance. It is the mode of life.

Since then, epidemiologists have checked people and their food in Austria, Ceylon, Chile, Colombia, the Congo, Costa Rica, Cuba, Czechoslovakia, Denmark, East Africa, Egypt and India again, Finland, France, Germany, Guatemala, Haiti, Iraq, Israel, Italy, Japan, Korea, Malaya, Mexico, Netherlands, New Guinea, New Zealand, Nigeria, Okinawa, Poland, Senegal, South Africa, Surinam, Thailand, Venezuela, Vietnam,


HEART DISEASE AND DIET
AROUND THE WORLD
Mortality from Arteriosclerotic and Degenerative Heart Disease and percent of total calories from fat.
Males age 50-59
1950
DEATH RATE PER 100,000
800
600
400
200
0
10
20
30
40
All calories obtained from fats
UNITED STATES
FINLAND
AUSTRALIA
CANADA
NEW ZEALAND
ISRAEL
IRELAND
UNITED KINGDOM
SWITZERLAND
SWEDEN
ITALY
AUSTRIA
GERMANY FED. REP.
NETHERLANDS
DENMARK
NORWAY
JAPAN
CEYLON
CHILE
FRANCE
MEXICO

the U.S.S.R., West Indies and other areas, and they came up with the same general association.

Rarely is there a significant degree of atherosclerosis among people regularly consuming vegetarian diets low in calories, total fats, saturated fats and cholesterol. The newer researches have added a further point—the blood cholesterol and fat levels of these people are low throughout life, and the tendency to thrombotic disease is generally slight. Few heart attacks are recorded, and often the rate is astonishingly low, particularly at middle age. These people are of course victimized by many diseases long ago brought under control in the United States and other countries.

Diets low in total fats, saturated fats and cholesterol are definitely associated with lower blood cholesterol, less atherosclerosis, and less heart disease. This has been found in almost every country which is less well-off economically, and it also holds true among low income groups in Spain, Italy and Japan.

A few specific findings are illustrative.

Among manual laborers in India, the mean blood cholesterol level is 125 milligrams per cent, among Korean monks and among Guatemalan workers, 140. This means 125 and 140 milligrams of cholesterol per 100 cubic centimeters of blood. A milligram is 1,000th of a gram—1/28th of an ounce—and 100 cubic centimeters are one-fifth of a pint.

These are very low blood cholesterol levels compared with a mean of about 230 or 240 among middle-aged American men.

In India and Guatemala, the mean cholesterol is over 200 milligrams among upper and middle classes such as physicians, government officials, businessmen, and army officers. Their diets tend to be like ours—high in calories, in fats and saturated fats and cholesterol, while the manual laborers mainly eat wheat or rice and vegetables.

The same pattern is found in Italy and Japan, with the well-to-do more susceptible to coronary illness and death than poorer persons, but the overall coronary death rates are lower than in the United States.

In South Africa, the Bantu are remarkably free from atherosclerosis and heart disease. Fats supply only about 17 per cent of all their calories. But white South Africans get about 37 per cent of calories from fats, mostly animal fats, and have far more atherosclerosis and heart disease.

Among Americans, blood cholesterol levels tend to rise with every ten years of life. Our men are already at the 190 or 200 mark, on the average, by age 20 or 25; by 30 or 35 we plateau at 230 or 240, with many individuals a good deal higher. But little or no such rise has been detected among the Bantus. The cholesterol levels do go up, however, among South African white men eating their kind of lifelong diet higher in fat content.

Dr. Keys and associates compared men aged 40 to 50, sick and well, in rural areas of Finland and Yugoslavia, using electrocardiograms and other tests. Finnish men showed more signs of coronary disease than the Yugoslavs. Both groups were poor, hardworking farmers, matched for age.

The Fat of the Land

But there were peculiar differences, with more coronary disease in eastern Finland than western Finland, more heart disease in Slavonia than Dalmatia. Why? Chemical analysis of the diets showed that those with higher blood cholesterol averages were eating foods with a higher proportion of calories from saturated fatty acids. These fatty acids tend to promote more cholesterol in the blood, while polyunsaturated fats have an opposite effect of reducing cholesterol, but they do less toward reducing cholesterol levels than the saturated fatty acids do toward increasing them.

Wherever people are studied, Dr. Keys concludes, patients with coronary heart disease come predominantly from the group with higher levels of serum cholesterol. It matters not whether they be businessmen in Minnesota, bankers in Naples, poor clerks or manual laborers in southern Italy.

The foods we consume over the years play a part.

7

Melting Pot, and Stewpot

WHAT DID YOU EAT TODAY, OR THIS WEEK?

Total up the list, mentally, of the variety of items, with special reference to the amount of eggs, butter, pastries, bacon, meats of various kinds, the range of vegetables or fruits, the amount of starches and sugars. Then consider two questions.

Is your diet today considerably different from what an American consumed fifty years ago? Is it very much different from what many other Americans ate this week, whether they are rich or have to watch their food dollars closely?

The average American diet *has* changed considerably within a half century or less, and we do not have such extreme differences in nutrient intake as characterize many other countries. We are, in a large sense, ladling from the same stewpot now in the types of nutrients. And our type of diet is the one associated with high blood cholesterol levels, which in turn are linked with higher risk of atherosclerosis and heart attacks.

Before looking into this American stewpot more closely, consider another important part of the great research into the role of food in coronary heart disease. One possible explanation offered for differences in heart disease in various countries is that they are due to ethnic or racial reasons. In other words, some nationalities or racial groups are presumed to be inherently more susceptible or resistant to atherosclerosis, and diet doesn't matter or at least plays only a very small role. The United States, once the "melting pot" to which various nationalities and races emigrated to blend their talents and character and skills into a new country, has provided one testing ground of this thesis.

"Something in the Mode of Life . . ."

Dr. Keys and others noted that Japanese peasants and laborers suffer only about one-tenth the male American rate of heart attacks. For these Japanese, fats supply about 10 per cent of daily calories, compared with the 40 to 45 per cent in the typical U.S. diet.

They also examined Japanese living in Hawaii or the United States where, in a new culture, they would tend to adopt customs and diets of their new homes. They found that Japanese who had emigrated to Hawaii were consuming diets higher in calories from fat than their former diets at home, and they suffered more coronary attacks than the Japanese still living in the home islands. But their rate of coronary heart disease was less than that of Caucasians living in Hawaii.

Japanese living in the United States, they learned, were consuming still higher amounts of calories from fats, and had a higher rate of coronary disease than the Japanese in Hawaii. Atherosclerotic heart disease is, in fact, the leading cause of death among Japanese Nisei in California. In coronary heart disease, the Japanese in Hawaii stood about halfway between the rates of those in Japan, and those in California.

For people of both Japanese and Italian ancestry living in the United States, there appears to be little difference in heart disease rate from that among Americans of the same ages whose families have been living in this country for generations.

In Boston, Dr. Fredrick J. Stare found that the proportion of men of Italian ancestry hospitalized for coronary disease was much the same as that among men of other ancestry, and is far greater than the proportion observed among Italians still living in Italy.

Clearly, "something in the mode of life is involved," Dr. Keys declares. It is not the ethnic or racial background.

A similar report comes from Israel, a relatively new country, settled by Jews from many different areas. Among them were some Yemenites, Arabian Jews, who historically have consumed less animal fats than comparable groups in Europe. One team of researchers compared 229 Yemenites and 260 European Jews, all about 70 years old, who had been living in Israel for five to ten years, in similar sheltered surroundings and conditions. Both groups consumed about the same amount of calories, but the Yemenites ate more carbohydrates, less protein, and only about half as much animal fat as the European immigrants. Electrocardiograms and other examinations showed the Europeans to have about three times the prevalence of signs of heart disease and severe atherosclerosis.

Other studies indicate that the Yemenite Jews had lower serum cholesterol levels than the European Jews, but the difference diminished the longer the Yemenite Jews lived in Israel. They were gradually being changed in their eating habits, adopting higher intakes of fat, hard fat and cholesterol—and their blood levels were rising accordingly.

Across the world, another team compared the diets and blood cholesterol of young Korean soldiers and U.S. troops. On their own army rations, supplying about 15 per cent of calories from fats, the Koreans had much lower serum lipids and cholesterol than the Americans. But these increased in a few weeks time when the Koreans ate American rations supplying 40 per cent or more of all calories from fats. The greatest increase was in blood cholesterol levels, Drs. Kyu Taik Lee, Kyung Sik Kim, and Yun Sik Kwak reported.

The U.S. Army diet supplied 4,500 calories per day, with 29 per cent from animal fats and 13 per cent from vegetable fats. The Korean army rations supplied 3,600 calories, with 3 per cent from animal fats, and 12 per cent from vegetable fats.

In the United States itself (to end our world travels), studies have shown less coronary disease among Seventh Day Adventists, many of whom carefully restrict or exclude meats from their diets.

The research is being expanded to a comparison of Seventh Day Adventists who eat meat, and an equal group of about 250 who don't, with each group matched for age, sex, race, occupation, weight and height. Many Adventists are vegetarians, and this study is aimed at comparing cholesterol levels between them and those who do eat meat.

Drs. Gordon Barrow and Carroll Quinlan in Atlanta, Georgia have been engaged in a similar study involving Trappist and Benedictine monks. The Trappist order adheres to a spartan diet restricted to dairy products and vegetarian foods. The Benedictines have no such rules. Blood cholesterol levels are lower in the Trappists, compared to the Benedictines or American men generally of the same age.

Returning to our national stewpot, we find that in the United States, the diets do not vary so markedly between social and economic classes as in some other countries.

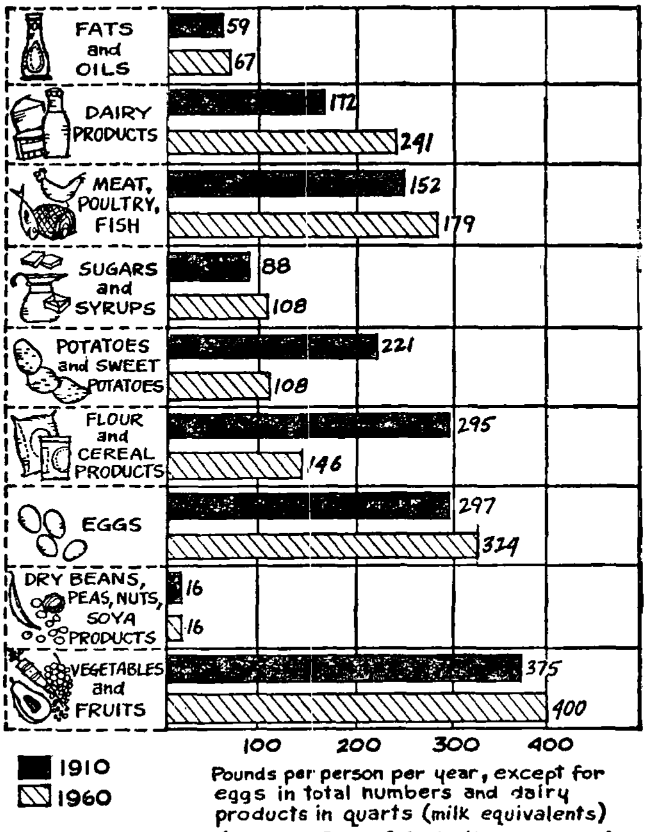
Groaning Boards and Groaning Hearts

En masse, we are consuming diets high in total calories, empty calories, total fats, cholesterol, and saturated fats. This general availability of similar nutrients across the dining tables is a recent innovation in the United States and certain other countries.

And in the last century, we have changed the emphasis in our diet. Per capita consumption of refined sugar has risen from eight pounds per person in 1820 to sixty-six pounds in 1900, and almost 100 pounds today. Meat consumption has tended to be relatively high in this country, but it has gone up higher in recent decades, and we have gradually increased our intake of butter, milk, other dairy products and eggs. The proportion of calories from fats has increased from a national figure of 30 per cent in 1910, to over 40 per cent now. This increase came along not in vegetable or fish oils, but in saturated fats from animal products and hydrogenated shortenings. Grain consumption has declined steadily, and for most of us, bread no longer is a main item of diet.

Except in some unfortunate areas, Americans no longer suffer from any severe undernutrition, and we've already mentioned the new problem of overnutrition and overeating. But also, our diet often tends to be unbalanced in terms of empty calories, total fats and saturated fats, and cholesterol. In a real sense, many Americans suffer from substandard nutrition in respect to their body needs for essential nutrients, despite the high caloric intake and the general availability of a great variety of excellent foods.

APPROXIMATE CONSUMPTION OF FOOD IN THE U.S., 1910 and 1960



Pounds per person per year, except for eggs in total numbers and dairy products in quarts (milk equivalents)
(From U.S. Dept. of Agriculture sources)

Our rates of coronary disease are high among the low economic brackets as well as among the high. For the Americans less privileged in income, the danger from heart disease is greater than that of persons in the middle income and high income groups in underdeveloped countries.

Our "poor" classes do eat large amounts of calories, cholesterol and hard fat from meats, dairy products, eggs, pastries and table and cooking fats. Many low income Americans have diets virtually as "rich" in these respects as those with plenty of money. Among any representative group of middle-aged American men, irrespective of social class, only a very small percentage receives less than 35 per cent of total calories from fats. Not unexpectedly, overweight, high blood cholesterol levels, high blood pressure, diabetes–the coronary risk factors related to diet—are frequent in all levels of our general population. No groups are spared. And premature coronary disease amounts to an epidemic among middle-aged urban and rural men of virtually all socio-economic and ethnic and racial backgrounds throughout the country.

Many men do reach old age with no clinical signs of disease, so atherosclerosis is not purely and simply a result of our diet. But diet does appear to be a key and even necessary cause of widespread premature disease, abetted by other things in the way we are living.

On this basis, the unhappy fact is that virtually all adult American men, and many women, are running avoidable risks.

8

Tallying Up Your Risk

YOUR OWN RISKS, AS A MIDDLE-AGED AMERICAN MALE, of getting a heart attack prematurely—before age 65—can easily be measured. The yardsticks now exist.

Whether you are a butcher, clerk, executive, teacher, lawyer, farmer, government worker, banker, or in any occupation, these figures apply to you. For they come from the laboratory of day-by-day living. They were collected in research on many thousands of persons in all types of jobs and careers, in careful studies to learn exactly what habits and health conditions are making us such easy targets for heart attacks.

In principle, the system is simple. Check the physical health and habits of hundreds or thousands of men and women. Then keep tabs on them during the following years. Record those who come down with heart attacks, and recover or die. Then check back to answer the key questions: Did those with high cholesterol get more coronary heart disease than those with normal or average levels? Were those with high blood pressure more susceptible, and by how much? Is heavy smoking associated with more heart attacks, or doesn't smoking count? Do thin or obese men run a higher risk?

What, in brief, is the natural history of coronary heart disease as it actually happens in a community of people living their usual lives?

These are known as prospective epidemiologic studies, relating life habits and experiences with life-span and the diseases that sicken or kill. They obviously demand painstaking work in data collection, record keeping, and objective analysis, and years of time with many men and women taking part to reach valid answers.

In Chapter 1, we listed most of the suspects in the coronary-killer syndicate, and the prospective studies provided one effective way of identifying them.

One of the best known and most significant studies embraces the area of Framingham, Mass., where over 5,000 men and women were included in a project beginning twelve years ago, directed by Drs. Thomas R. Dawber, Felix Moore and William B. Kannel of the National Heart Institute. Similar analyses are underway in Albany, N.Y., Los Angeles, Chicago, Tecumseh, Mich., Minneapolis, Charleston, S.C., Baltimore, Wilmington, Del., San Francisco, New York City, in Air Force personnel and in rural North Dakota, Indiana and Georgia. Most began with middle-aged Americans with no apparent heart disease and no clinical signs of atherosclerosis at the outset of the studies.

The Line-Up

Here is a summary of the findings, spelling out the arithmetic of increased risk. (More details are given in the following chapters.)

Blood Cholesterol: Men with a blood cholesterol of 260 milligrams or higher had a rate of new heart disease double that of the general population. But, those with a reading below 200 had only *half* the general rate. This is a four-to-one difference. In other words, men with a high cholesterol reading run four times the risk of low cholesterol men. The risk of coronary disease goes up, stepwise, as cholesterol increases from low to high concentrations.

High Blood Pressure: Persons with a systolic pressure (when the heart is pumping) below 120 had *one-fourth* the rate of coronary disease expected for people of their age and sex. But those with a systolic pressure of 180 or higher developed *twice* the expected amount of coronary disease. This is an eight-fold increase, from one-quarter below to double the usual rate. Each step-up in pressure brings increased risk.

Excess Weight: Extra pounds produce two to three times the expected risk or rate of developing high blood pressure, hypertensive heart disease, and coronary disease.

Smoking: Cigarette smokers develop coronary disease at a rate three to six times greater than non-cigarette smokers. The smokers have more coronary disease regardless of weight, cholesterol or blood pressure levels.

Diabetes: In middle age, diabetes boosts the risk of coronary disease two to four times over normal expectation, a study of 80,000 duPont Company employees finds.

Physical Activity: British studies indicate the sedentary man runs twice the risk of the active man, when both live in similar environment. Evidence from American studies is less clear cut.

Heart Abnormalities: Several abnormalities can be detected by the electrocardiogram (abbreviation: ECG), and frequently are found in people who otherwise seem perfectly all right. One abnormality is known as left ventricular hypertrophy (LVH) or left heart strain. It brings a several-fold increase in risk of developing frank heart attack in subsequent years.

A lethal teamwork influence leaps out of the Framingham findings.

Men 40 to 59 years old who had high blood pressure, elevated cholesterol, and LVH developed *four times* more coronary disease than the general population. But men normal in each of these three respects had only *one-eighth* the expected risk for men of that age group.

A wide span separated the extremes of risk, from low to high. The men entertaining three members of the syndicate were thirty times more likely to get heart attacks than the men with low-normal findings. After six years of the study, one-quarter of the men who had two or all three of these abnormalities at the outset had developed heart attacks. By eight years time, almost one-third in this group had had heart attacks.

These studies disclosed significance in another set of ECG abnormalities—the so-called minor non-specific T wave changes. From the findings on Western Electric Company and Peoples Gas Company employees in Chicago, and civil servants in Albany, N.Y., it is now clear that these ECG abnormalities are very significant, especially when they persist in repeated tracings. By themselves, they indicate a doubling of coronary proneness, and they too link up with other risk factors for cumulative impact. In the Albany study, for example, men with those ECG abnormalities and blood cholesterol level of 275 or greater had nine chances out of ten—a 90 per cent probability or risk—of developing clinical illness from coronary disease before age 60.

At least 20 per cent of middle-aged American men are saddled with two or more of these risk burdens.

The Great Leveler

There's no immunity by virtue of your income, the place where you live, your type of job, or race. The shattering fact is that the syndicate spans the whole country, reaches out everywhere, into all kinds of homes.

This is shown by surveys in Chicago and elsewhere among employed white men standing on all rungs of the socio-economic ladder. In every group, there was a high prevalence of obesity, high blood cholesterol and high blood pressure, heavy cigarette smoking, hypertensive and coronary disease. Foreign-born white men tended to have slightly lower rates of the risk factors than the native-born, but the differences were not substantial. And the foreign-born Americans had considerably higher rates than men of their same ethnic groups still living in the original homelands abroad.

Middle-aged Negro men in Chicago were also found to have the same susceptibility to coronary disease as white middle-aged men. Negroes are much more subject to hypertension and hypertensive heart disease. They are less likely to be heavy smokers, though, and tend on the average to be better off regarding blood cholesterol and weight. At least these are the findings among low income Chicago Negroes.

Negro women apparently are more subject than white women of the same age group to hypertension, obesity, and diabetes—and to coronary disease.

The myth persists that coronary heart disease is chiefly a threat to the better educated, the better paid, the business and professional men operating from plush offices.

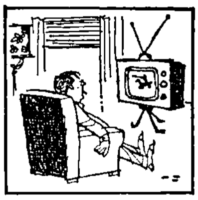
Coronary disease actually is at least as great in lower income as among higher income groups in the United States today. It is as great among the blue-collar as white-collar workers, most

✓ HEART RISK CHECK LIST

OBESITY
☐ NORMAL
☐ RISKY

EXCESSIVE EATING
☐ NORMAL
☐ RISKY

HEREDITY
☐ NORMAL
☐ RISKY



LITTLE EXERCISE
☐ NORMAL
☐ RISKY

CIGARETTE SMOKING
☐ NORMAL
☐ RISKY

TENSIONS
☐ NORMAL
☐ RISKY

...And also ask your Doctor particularly to check:

- HIGH BLOOD PRESSURE
- HIGH LEVELS OF BLOOD CHOLESTEROL
- DIABETES

of the American surveys show. However, life in rural areas may carry less threat of dying of coronary disease than life in a big city, such as Chicago. Death records and epidemiological studies show a slightly lower rate of coronary deaths in the rural areas, although people's diets are not greatly different now in small towns and farms compared with the great metropolises. At this stage, we can only guess at reasons. Perhaps people in rural areas are more active physically, perhaps they are less subject to stresses and frustrations. There is some evidence that rural Americans have less high blood pressure, at least the white men and women. But by no means are they free of coronary disease. Their death rates from it run quite high compared with people in countries of Europe, Asia, Africa and Latin America.

It's terribly simple to fall under the influence of the lethal syndicate, through our easy, appealing ways of life. This is dramatically demonstrated in an on-going study started in 1958 by the medical author (JS) and associates among 1,466 middle-aged men employed by a Chicago utility company. It is one of several such studies designed to detect the men of high risk.

Before and After

Half of these men had worked for the utility company ever since they were young adults, twenty or thirty or more years ago, and physical exams back then had recorded their weights and blood pressures when they were first employed. All received thorough physical checkups at the start of the present study.

The differences in health status then and now are pretty shocking. Slim when in their 20's, most had gained weight, and a majority was obese. In fact, over 50 per cent weighed 15 per cent or more above their desirable weights by life insurance company standards! Extra pounds had clambered aboard their frames with the years, and 22 per cent of the big weight gainers weighed one-fourth more than they had in youth. Many a man who had weighed 160 in his 20's weighed 200 pounds in middle age. Less than 100 of all the 1,466 men had been overweight as youths. In middle age, six times as many were 25 per cent or more above their desirable weights. Less than a quarter of them weighed in at their desirable poundage.

At about 50 years of age, 10 per cent of all these men had definite high blood pressure.

As for blood cholesterol, less than 40 per cent had readings under 225 milligrams per cent (sometimes labeled as the upper limit of "normal"), while almost 30 per cent had readings of 260 plus, and 9 per cent had very high levels over 300. Only a small percentage had levels in the optimal range, or under 200 milligrams.

One-fifth of all these men had put themselves into the hands not of just one syndicate member, but two to three, such as being overweight, having elevated cholesterol levels and high blood pressure. About 10 per cent were "enjoying" the trio of risks from heavy smoking, elevated cholesterol, and obesity.

These are not isolated findings. Other analyses also find millions of men are flirting with heart attacks because of lifelong habits. Not all will pay the price that the syndicate often collects. Neither do all of us get hurt or killed whenever we speed in our cars faster than safety really permits. But our intelligence tells us we are taking great risks, and the sorrowful procession from highway accidents to cemeteries is one measure of gambling with speed.

In the epidemic of heart attacks, we know we can alter, remove or control the risks many of us are running. Let's look to the specifics of what we can do in the effort to reduce the chances of premature, stabbing heart attacks. How can we deal with each of the conspirators?

PART II

THE COUNTERATTACK

9

Bringing Down Cholesterol

YOU CAN EASILY EAT YOURSELF INTO A HIGH RISK OF A heart attack, as measured by high blood cholesterol. It's a good bet, in fact, you may already be doing so.

But with knife and fork and spoon and glass, you can lower blood cholesterol in a short time, and keep it down. Best of all, you can do so while still eating a great variety of tasty and familiar foods. The change required is moderate, not a drastic surrendering of all the foods that tempt you, not a starvation diet, not a monotonous restriction to just a few things so typical of many crash diets. It involves primarily a change in the amount and type of fat—and the amount of cholesterol—you eat.

The First Line of Defense

The changes needed are spelled out in the next chapter. First, however, let's consider three questions the intelligent reader asks himself: Does a diet change really work? What changes do I have to adopt, and what, really, is the difference between saturated and polyunsaturated fats, and what foods contain which ones? And what's involved in the great discussion of whether people generally should make changes in their diets?

Can diet changes reduce blood cholesterol? They can. It's been amply proved in diet studies by a host of researchers. In various ways, beginning about fifteen years ago, they worked out the story of the changes in food intake that bring down cholesterol. Dr. Weldon Walker and colleagues at Harvard showed that active weight reduction did it—and that the decreased level persisted as long as the weight loss was maintained. Keys at Minnesota, Donald Watkin at Columbia, William Kempner at Duke and others showed that the rice diet—used to lower blood pressure in hypertensive patients—also reduced blood cholesterol concentration. The rice diet resembles the fare of Orientals. It is very low in total fats, in hard or saturated fats and in cholesterol.

A few years later, several investigators showed that the *amount* of fat and cholesterol in the diet is not the only factor. The *type* of fat is very important. When vegetable or fish oils—low in saturated fats and high in polyunsaturated fats—replace saturated fats and cholesterol in the diet, blood cholesterol levels fall dramatically. Pioneering researches demonstrating this important fact were done by Dr. Laurance Kinsell in Oakland, California. His observations were soon confirmed and extended by Drs. Edward Ahrens at the Rockefeller Institute, James Beveridge in Canada, B. Bronte-Stewart and J. F. Brock in South Africa, Haqvin Malmros and Gerhard Wigand in Sweden, and many others throughout the world.

Some tests involved volunteers in metabolic wards of hospitals, eating formula diets of highly purified foods. In this way, absolutely everything a person ate could be controlled down to the least fraction of an ounce. In other studies, small groups such as students hewed to formula diets while living normally otherwise. In other research, diet changes involving ordinary foodstuffs were prescribed in a doctor's office and blood cholesterol declined in those following the advice. Dietary changes have lowered cholesterol in men or women who have had a heart attack, and also in apparently healthy persons with blood cholesterols in the high and even middle range.

Dr. Irvine H. Page in Cleveland first became his own guinea pig, to test whether a diet rigidly restricted in total fat intake would bring down blood cholesterol. It certainly did—but he hated the diet, and found it intolerable because he had carried it too far. Without a certain minimum of fat in his diet, he found himself tired and out of sorts, and far less efficient. Intentionally, that diet change had gone beyond the point of moderation.

Later Drs. Helen Brown, Jerome Green and Page modified the approach. They used a special diet kitchen and enlisted the food industry to modify the amount and type of fat in foods. Moderation became the keynote, along with substitution of vegetable oils (unsaturates and polyunsaturates) for animal and other hard fats (saturates). Dietary cholesterol intake also was reduced in the process. The participants felt fine, ate well—and their blood cholesterols came down and stayed down.

The word *substitution* in the last paragraph needs emphasis, particularly since commercial advertising a year or so ago confused many people. The main idea is *not* just to use unsaturates and polyunsaturates. Above all, it's to cut down on saturates—and cholesterol—in the diet. Just adding oils to your present diet accomplishes nothing—but it will make you fat! You need to substitute one for the other to lower blood cholesterol.

Until recently, there was also some confusion about the role of dietary cholesterol. As we saw in Chapter 5, it has been known for many years that it raises blood cholesterol and causes atherosclerosis in experimental animals. Nevertheless, some researchers doubted its effect on men.

In the last two or three years, this question has been thoroughly looked into. The answer is unequivocal—as made clear by careful, decisive studies in man by William Connor at the University Hospitals in Iowa City, Beveridge in Canada, Bronte-Stewart in South Africa, Alfred Steiner in New York City and Joseph Anderson and Keys in Minneapolis. Dietary cholesterol definitely influences blood cholesterol in man—and so do the amount and type of fat consumed. The higher the cholesterol intake—over the range usually consumed by man—the higher the blood cholesterol level, other things being equal. Therefore, changing eating habits to lower blood cholesterol level involves not only the amount and type of fat in the diet, but also the amount of cholesterol. Intake of saturated fats and cholesterol must be reduced—this is the cornerstone of the approach to lowering blood cholesterol and preventing heart attacks.

The Anti-Coronary Club

In 1957, the late Dr. Norman Jolliffe—one of the nation's most outstanding nutritionists and chief of the Bureau of Nutrition in the New York City Department of Health—took the next necessary step in the unfolding research effort. Along with Drs. Seymour Rinzler and Leona Baumgartner, New York City's Commissioner of Health, he set up a large Anti-Coronary Club to guide the change in eating habits of hundreds of men—and to go after the crucial problems: Would the diet be palatable over months and years? Would the men stick to it? And would the blood cholesterol stay down? Above all, what would the effect be on heart attacks?

The volunteers at the outset were largely in the age range from 40 to 59 years and had no history of heart disease. They had fairly high cholesterol readings averaging 260 milligrams, with only 8 per cent in fact being under 200. The prescribed diets cut their intake of fat calories from a customary 40 per cent down to 30 per cent, with only one-third of these fats being saturated. Dietary cholesterol intake was also reduced markedly.

These volunteers kept eating ordinary foods purchased in the open market, but were told to cut down on such items as butter, eggs, cream, ice cream, cream cheeses, and animal fats. They were told to eat more fish and seafoods (low in saturated and high in polyunsaturated fats), and to limit beef, mutton and pork to a total of one pound a week. Overweight men were limited to 1,600 calories, about one-fifth of this coming from fats.

The majority found this particular diet tasty enough, and only 7 per cent of those with normal weight have dropped out, compared with 30 per cent of those who were overweight.

Blood cholesterol fell to safer ranges in about 80 per cent of the men taking part, and about half those who had been chubby lost weight.

Among those aged 40 to 59, who had no coronary disease before, five have had heart attacks, two of them fatal, after following this "prudent diet" for a year or more. The significance? That is one-fifth the rate expected for men of this age on the basis of the Framingham Study (3.4 attacks per 1,000 men in New York per year, compared with 14.5 in Framingham).

Many of the men in the Anti-Coronary Club had two or more risk factors, especially obesity and high blood cholesterol, making them very coronary-prone. For these men, the attack rate in the New York study was only 5 per cent—or one-twentieth—that among Framingham men with similar abnormalities.

However, the New York and Framingham results are not strictly comparable, as Dr. Rinzler, now heading the New York study, points out. Obesity was given slightly different definitions. There was a small difference in the ages of the men. Also, the New York volunteers were more health conscious, they smoked less, and differed in other ways from the men in Framingham.

It is therefore premature to credit the changed diet with actually having prevented many heart attacks among men in the "Club"—such definitive proof is still to come. The New York "Anti-Coronary" study is continuing to assess the effects of its dietary changes. Meanwhile, we can be cautiously optimistic. From various studies, there is good reason to expect that a 15 to 20 per cent reduction in cholesterol levels among middle-aged men could reduce heart attacks by 25 to 50 per cent. That reduction is not hard for most people to achieve when they have starting levels significantly above 225 milligrams.

Men of High Risk

In Chicago, a similar coronary prevention research program was started in 1958, headed by the medical author of this book, among men 40 to 59 who were high risks. They adopted diet changes which were simple, moderate, and feasible, using familiar foods—the kind of changes explained in the next chapter.

In just a few weeks, blood cholesterol levels came down, and have stayed down as the men stayed with their new eating habits. Among almost 200 coronary-prone men in this project, cholesterol levels declined an average of 15 per cent. They came down by 23 per cent in those who had the highest initial readings, above 300 milligrams. A few men slashed their blood cholesterols almost 50 per cent. In about one-third of all the men, there was little change, including some who had rather low initial levels, and some who did not stick with their diets. Less than 10 per cent appeared to be truly resistant to the lowering effect of changes in their food intake habits.

Many obese men have trimmed down, losing 1½ to two pounds a week on diets supplying about 1,600 calories daily. In the first few months, some lost 10 per cent or more of starting weights. As is usually so, those most resistant to caloric restriction were the men weighing in at 40 per cent or more above desirable weight. About one-third of all the men starting the program dropped out during the first year or two, but since then all but a few have continued. Again, it is too early to tell if their diet changes and other steps to reduce risks have positively protected them from heart attacks.

In Los Angeles, Dr. Seymour Dayton has obtained similar positive results working in a Veterans Administration custodial facility. Dr. William Connor has also achieved long-term success with diabetic patients in the University Clinics at Iowa City. There is now no doubt that diet change can reduce blood cholesterol, and that this can be achieved and sustained under ordinary living circumstances on a year-in-year-out basis, with ordinary foods and a nutritious and healthful, palatable and pleasant fare. It is being done across the country right now!

"What Must I Do?"

What changes do I have to adopt, and what's the difference between saturated and polyunsaturated fats?

First of all, the changes do not involve any magic, nor any pills, nor any jiggers of special oils. The changes are simple to follow, they are safe, and can significantly lower blood cholesterol.

Cut down total intake of calories if you are overweight.

Consume 25 to 30 per cent of *all* calories from fats, rather than the 40 to 45 per cent typical of today's American diet.

Reduce saturated fat intake down to 9 per cent of total calories or less, instead of the usual 16 to 18 per cent.

Increase the ratio of polyunsaturated fat to saturated fat so that of all the calories you consume from fat, at least one-third are the unsaturated type.

Reduce cholesterol intake to less than 300 milligrams a day, instead of the usual 650 or 700.

9

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The Anti-Coronary Club

In 1957, the late Dr. Norman Jolliffe—one of the nation's most outstanding nutritionists and chief of the Bureau of Nutrition in the New York City Department of Health—took the next necessary step in the unfolding research effort. Along with Drs. Seymour Rinzler and Leona Baumgartner, New York City's Commissioner of Health, he set up a large Anti-Coronary Club to guide the change in eating habits of hundreds of men—and to go after the crucial problems: Would the diet be palatable over months and years? Would the men stick to it? And would the blood cholesterol stay down? Above all, what would the effect be on heart attacks?

The volunteers at the outset were largely in the age range from 40 to 59 years and had no history of heart disease. They had fairly high cholesterol readings averaging 260 milligrams, with only 8 per cent in fact being under 200. The prescribed diets cut their intake of fat calories from a customary 40 per cent down to 30 per cent, with only one-third of these fats being saturated. Dietary cholesterol intake was also reduced markedly.

These volunteers kept eating ordinary foods purchased in the open market, but were told to cut down on such items as butter, eggs, cream, ice cream, cream cheeses, and animal fats. They were told to eat more fish and seafoods (low in saturated and high in polyunsaturated fats), and to limit beef, mutton and pork to a total of one pound a week. Overweight men were limited to 1,600 calories, about one-fifth of this coming from fats.

The majority found this particular diet tasty enough, and only 7 per cent of those with normal weight have dropped out, compared with 30 per cent of those who were overweight.

Blood cholesterol fell to safer ranges in about 80 per cent of the men taking part, and about half those who had been chubby lost weight.

Among those aged 40 to 59, who had no coronary disease before, five have had heart attacks, two of them fatal, after following this "prudent diet" for a year or more. The significance? That is one-fifth the rate expected for men of this age on the basis of the Framingham Study (3.4 attacks per 1,000 men in New York per year, compared with 14.5 in Framingham).

Many of the men in the Anti-Coronary Club had two or more risk factors, especially obesity and high blood cholesterol, making them very coronary-prone. For these men, the attack rate in the New York study was only 5 per cent—or one-twentieth—that among Framingham men with similar abnormalities.

However, the New York and Framingham results are not strictly comparable, as Dr. Rinzler, now heading the New York study, points out. Obesity was given slightly different definitions. There was a small difference in the ages of the men. Also, the New York volunteers were more health conscious, they smoked less, and differed in other ways from the men in Framingham.

It is therefore premature to credit the changed diet with actually having prevented many heart attacks among men in the "Club"—such definitive proof is still to come. The New York "Anti-Coronary" study is continuing to assess the effects of its dietary changes. Meanwhile, we can be cautiously optimistic. From various studies, there is good reason to expect that a 15 to 20 per cent reduction in cholesterol levels among middle-aged men could reduce heart attacks by 25 to 50 per cent. That reduction is not hard for most people to achieve when they have starting levels significantly above 225 milligrams.

Men of High Risk

In Chicago, a similar coronary prevention research program was started in 1958, headed by the medical author of this book, among men 40 to 59 who were high risks. They adopted diet changes which were simple, moderate, and feasible, using familiar foods—the kind of changes explained in the next chapter.

In just a few weeks, blood cholesterol levels came down, and have stayed down as the men stayed with their new eating habits. Among almost 200 coronary-prone men in this project, cholesterol levels declined an average of 15 per cent. They came down by 23 per cent in those who had the highest initial readings, above 300 milligrams. A few men slashed their blood cholesterols almost 50 per cent. In about one-third of all the men, there was little change, including some who had rather low initial levels, and some who did not stick with their diets. Less than 10 per cent appeared to be truly resistant to the lowering effect of changes in their food intake habits.

Many obese men have trimmed down, losing 1½ to two pounds a week on diets supplying about 1,600 calories daily. In the first few months, some lost 10 per cent or more of starting weights. As is usually so, those most resistant to caloric restriction were the men weighing in at 40 per cent or more above desirable weight. About one-third of all the men starting the program dropped out during the first year or two, but since then all but a few have continued. Again, it is too early to tell if their diet changes and other steps to reduce risks have positively protected them from heart attacks.

In Los Angeles, Dr. Seymour Dayton has obtained similar positive results working in a Veterans Administration custodial facility. Dr. William Connor has also achieved long-term success with diabetic patients in the University Clinics at Iowa City. There is now no doubt that diet change can reduce blood cholesterol, and that this can be achieved and sustained under ordinary living circumstances on a year-in-year-out basis, with ordinary foods and a nutritious and healthful, palatable and pleasant fare. It is being done across the country right now!

"What Must I Do?"

What changes do I have to adopt, and what's the difference between saturated and polyunsaturated fats?

First of all, the changes do not involve any magic, nor any pills, nor any jiggers of special oils. The changes are simple to follow, they are safe, and can significantly lower blood cholesterol.

Cut down total intake of calories if you are overweight.
Consume 25 to 30 per cent of *all* calories from fats, rather than the 40 to 45 per cent typical of today's American diet.
Reduce saturated fat intake down to 9 per cent of total calories or less, instead of the usual 16 to 18 per cent.
Increase the ratio of polyunsaturated fat to saturated fat so that of all the calories you consume from fat, at least one-third are the unsaturated type.
Reduce cholesterol intake to less than 300 milligrams a day, instead of the usual 650 or 700.

Now, all of that is a big mouthful of scientific words and numbers.

It sounds complicated and "way out there." It really isn't. Let's get specific—but first let's sweep away the misconceptions.

It certainly *does not* call for trying to skip all fats—or even all animal fats. It doesn't mean becoming a vegetarian, for example. It doesn't mean switching over only to proteins and carbohydrates. It doesn't mean you must give up all—or any—of your favorite foods. It *does* mean changing some emphases on types of major foods. And this involves mainly the types of fats, and where they come from. The differences are easy to understand, and a chart in the Appendix lists the amounts of different kinds of fats and cholesterol in many familiar foods.

The Differences in Fats

Here are the ABC's on the different types of fat:

Saturated fats are the kind that tend to increase cholesterol in the blood. They generally, but not always, come from animals. They usually harden or solidify at room temperature, like the fat in gravy or stew.

Polyunsaturated fats generally, but not always, come from vegetable or fish oils and tend to remain liquid at room temperature. If you reduce the amount of *saturated* fats and cholesterol in your diet, blood cholesterol comes down. If you *substitute* some polyunsaturated fats for the saturated kind, you get a further moderate decrease in blood cholesterol.

A third type of fat is mono-unsaturated fat, which apparently has little effect on blood cholesterol. Olive oil is an example.

(For a note on their chemistry, a saturated fat is one containing all the hydrogen atoms it can hold. A polyunsaturated fat is one that could still link up with four or more hydrogen atoms, and change to a saturated or "hard" type by doing so. The mono-saturated fat can take up two more hydrogen atoms. Since 1910, this process of "hydrogenation" has been done intentionally with some kinds of oils, to produce margarines and vegetable shortenings. In this process, liquid fats are turned to a semi-solid or solid state.)

No food that you eat is made up solely of either saturated, "mono" or polyunsaturated fat. Our foods vary in their proportions of all three types.

What foods are high in saturated fats? These include cream, butter, lard, eggs, cheeses, meats, chocolate and coconut oil. These foods are also *low* in polyunsaturated fats.

Next comes most vegetable shortenings and margarines, which contain about half of the saturated fats found in dairy or meat fat.

What foods are highest in polyunsaturated fats and lowest in saturates? First, the liquid vegetable oils which have not been hydrogenated, and next the lightly hydrogenated vegetable oils, available as liquid shortenings. Then come several of the newer margarines. Lowest in their content of polyunsaturated fat—and highest in saturates—are beef, lamb, pork and dairy fat.

Look at some examples:

Corn, cottonseed and soya oils contain about 55 per cent polyunsaturated fats, and about 10 to 25 per cent saturated fats, with the rest being mono-unsaturated. Safflower and peanut oil also are generally high in polyunsaturates, and relatively low in saturated fat.

Butter, on the other hand, contains about 50 per cent saturated fat and less than 10 per cent polyunsaturated fat, with the rest being mono-unsaturated.

As for cholesterol, it is present in moderate quantities in all animal tissues, for example fat-containing dairy products and the muscle meat of beef, pork, poultry, fish and sea food. The amount is somewhat higher in organ meats such as liver or kidney. It is very high in a few foods, particularly egg yolks and brains.

Let's caution again that the way to lower blood cholesterol is *not* to avoid all foods containing cholesterol or saturated fats. You really cannot do so, and by all means you shouldn't try. What is important to remember is that the amounts of cholesterol and saturated fat taken by mouth tend to work together to raise blood cholesterol levels. Reducing these, while increasing the amount of polyunsaturated fats, acts to bring down blood cholesterol and the other blood fats as well.

Cholesterol is only one of the fatty materials—called lipids —found in the blood and tissues of humans and animals, and coming under some suspicion of playing a role in the artery rusting.

Another of these fatty materials is triglycerides, and still another the phospholipids. While these names may look formidable, they are really not. Triglyceride simply means a glycerine combined with three (tri) fatty acids. It's the main form in which fats exist in the body, either as storage or source for energy fuel. The triglycerides are common in most fatty foods.

Phospholipids are molecules of fat containing phosphoric acid and complex organic chemicals.

Now, none of these lipids or fats dissolves in water, and our blood is mostly water. So in order to get into solution, they must combine with proteins and become giant molecules known as lipoproteins which can mix with water.

Lipids, triglycerides and phospholipids tend to increase or decrease in the bloodstream in parallel fashion, since they are associated with one another. The proportions of different kinds of lipid or fatty molecules can vary from time to time.

After a meal rich in fats, the amount of triglycerides tends to rise in the blood, making blood serum appear cloudy or milky, while the amount of cholesterol and phospholipids is affected only slightly. The "rust" spots in arteries contain triglycerides, phospholipids and cholesterol. As these obstructions grow, they contain more and more cholesterol, and there is considerable evidence that cholesterol acts as an irritant to promote dangerous scarring of the arteries.

Some researchers, including Dr. Margaret J. Albrink of West Virginia University School of Medicine, now think that triglycerides are as or more important than cholesterol in causing atherosclerosis. They believe the triglycerides are as good or better barometers of the risks of coronary heart disease than is cholesterol.

Other researchers, particularly Dr. John Gofman of the University of California at Berkeley, hold that certain levels of lipoproteins, especially those known as beta-lipoproteins, are the best predictors of artery trouble.

Both these concepts are still under continuing study. They may be significant, or may be fine points of the total story. The major fact—turning up in a host of studies—is that what we eat does affect the amount of cholesterol and other lipids circulating in the blood.

As for the effects of dietary changes in lowering cholesterol, there are some cases in which a moderate-fat diet doesn't succeed in bringing down cholesterol and triglycerides. In some persons, the amounts of triglycerides in the blood may be very high. This rare condition may be due to a variety of causes, including a hereditary disturbance in fat metabolism. In some cases, this condition can be successfully cleared up with a low fat diet. Others respond to a diet low in carbohydrates (sugars and starches) and high in vegetable oils. These research findings indicate that some very small percentage of persons may need a much more extensive change in diet to reduce the fatty materials in their blood, which in turn may be involved in the artery rusting.

"When Do I Start?"

In 1960, the American Heart Association recommended cutting down total fat and hard fat consumption, under medical supervision, as a possible means of preventing atherosclerosis and premature heart attacks and strokes. It urged this step particularly for people who are overweight, for men with a strong family history of atherosclerotic heart or blood vessel disease, for those with a high blood cholesterol, those with high blood pressure, and those who already have had one heart attack or stroke.

Two years later, in August, 1962, the American Medical Association's Council on Foods and Nutrition, in a guide to physicians on treating patients, approved the concept of altering the type and amount of fats in the diet as an experimental means of treating hardening of the arteries. It cited many studies showing that blood cholesterol can be reduced markedly when fats are regulated in the diet, and spelled out the status of current knowledge.

But then, only two months later, the AMA appeared to reverse itself. A press release from the Association's public relations and executive offices seemed to call the whole cholesterol-diet question "a new food fad." That raised a great fuss, which is mostly ancient history now.

The imbroglio was resolved by an editorial from the chairman of the Council the following December, confirming its original position and viewpoint. This statement said a properly-instituted diet "can significantly and safely alter" concentrations of cholesterol in persons who have a high level. It recommended that a doctor oversee the diet change. It pointed to the evidence that low blood cholesterol is associated with low death rates from arteriosclerotic heart disease, but said the proof is still lacking, and did not endorse any diet change among the general public yet in the hopes of preventing heart disease.

At about the same time, the Canadian Heart Association declared that people generally, especially men, should consider the desirability of replacing about half their customary intake of animal or saturated fats with the unsaturated kind from vegetable and fish oils, under guidance of their doctors. It recommended a combination of diet and exercise to control obesity.

To no one's surprise, there is controversy over the idea of changing what we eat. But more and more specialists are urging nutritional action now against the risks that millions of us are taking.

The American Heart Association Statement—adopted three years ago—was "a reasoned guess that some of us thought probably useful until better information becomes available," says Dr. Page, who was chairman of the Association's expert committee drafting the recommendations.

"There is too much loss of life involved in this problem to give way to any barrage of manufactured confusion," he wrote in *Modern Medicine* magazine. While studies continue, "a hue and cry is being set up that is awfully hard on the nerves. One group says that polyunsaturated fats may be highly dangerous, another says the economy will be wrecked, and still another says that we should continue as always—and continue to enjoy our heart attacks."

The fact that there are conflicting reports and differing opinions is not unusual at all, Dr. Page adds, suggesting we "get on with the research and not confuse people far beyond the ordinary needs of certainty."

Is "Best Fed" Well Fed?

Some people claim our present American diet is the "best" the world has ever known, and react with horror to any suggestion of change. Our modern diet may be "best" in essential nutrients—calories, proteins, carbohydrates, fats, minerals and vitamins—although many fail to eat adequately and don't realize even this potential. But it has never been proven best—quite the contrary—in terms of overnutrition, and in terms of our present-day American problem of consuming far more food than we need, and eating things that promote premature heart attacks.

In his history, man has maintained good nutrition under a wide variety of circumstances with widely differing foods, so long as enough foodstuffs were available to take care of all his metabolic needs. Our typical diet today has evolved fairly recently, and is continuously changing. The plea that we ought not to change it in any way is very hard to justify. The prime concern is to change it with good sense, in a reasonable and safe fashion, with attention to the principles of sound nutritional science, for maximum effectiveness. The science of nutrition is still relatively young, and in the past has been concerned more with the dangers from *under*-nutrition and diet deficiencies than with the modern problems and hazards of *over*nutrition.

The scientific evidence now, from many quarters, is that millions of us are eating too much of the wrong kinds of things so far as the safety of our hearts is concerned. You can reduce your blood cholesterol, if it is high. You can do it safely, with no danger of any kind, but you must also make sure you have a balanced diet incorporating all essential nutrients, including a moderate proportion of fats. You can do this, and still enjoy your food extremely well.

10

Choosing Your Food

YOU DON'T HAVE TO GIVE UP ANYTHING IN EATING YOUR way to a lower blood cholesterol level, and keeping it there.

The main change is in the emphasis upon the kinds of foods and "goodies" you eat—more emphasis on some, less on others. You can get the hang of it quickly, and make it a habit quite as customary as what you're doing now. It can be just as enjoyable, just as satisfying and healthier for your heart. If you are a gourmet, you can still be one. With practice and experience, you don't have to keep thinking every day about the objectives and guidelines.

The Rules Are Simple

Reduce the share of calories or "fuel" coming from fats, in favor of other foods you like.

Put *less* emphasis on foods high in saturated fats.

Put *more* emphasis on foods high in polyunsaturated fats.

Put *less* emphasis on foods high in cholesterol content.

Control total caloric intake to achieve and then to hold to desirable weight. Don't expect this to happen in a quick week or so; it took time to pad on those extra pounds.

Once again, the key is to *substitute* for some present habits. *Substitute* low-fat or non-fat foods to reduce the total calories from fats down to 25 to 30 per cent of calories supplied by everything you eat. *Substitute* more polyunsaturated fats for the saturated kind. Don't just *add* polyunsaturated fats to what you are eating now. That would merely add to total fats and calories, and it wouldn't turn the corner to reducing blood cholesterol.

You can go about this without having to carry around some pocket computer to know what to eat. Just keep in mind the overall objectives—and the importance of the right total *dietary pattern*—not just for one course or one meal, but for the day, the week, and many weeks to come. Here's how to choose among major and familiar types of foods:

Dairy Products:

Emphasize those low in fats and cholesterol—such as skim milk, buttermilk, cottage cheese and other low-fat cheeses, such as farmer cheese, hoop cheese and sapsago cheese (for au gratin dishes and melted cheese sauces).

De-emphasize high-fat products such as sweet cream, sour cream, ice cream, butter and other cheeses.

Eggs:

De-emphasize eggs, especially if you've been eating eggs at every breakfast, and numerous dishes made with eggs. Egg yolks are very high in cholesterol and contain considerable amounts of saturated fat. The white of eggs is essentially a protein, albumen, and you can eat as much of that as you like. Reduce egg consumption to two to three yolks a week. In cooking with eggs, you can use the whites of two eggs rather than one entire egg in making muffins, waffles and cakes, or in meat loaf and other recipes where eggs serve as binding agents for a tasty, appealing dish.

Meats:

Emphasize trimmed cuts of lean meat such as veal; cube, flank and round steak of beef; arm (upper shoulder) pot roast and rump roast; porterhouse, sirloin and tenderloin beef steak; loin lamb chops; leg, loin and crown roast of lamb; butterfly, loin and rib pork chops; pork steak and tenderloin; sirloin, crown loin, rib and neck of fresh ham. Meats low in saturated fats also include game (venison, rabbit), liver, heart, kidney, dried or smoked chipped beef, ham-butt, shank and Canadian bacon.

One effective step is to trim off all the visible fat surrounding that steak or roast put in front of you. You don't have to eat it, and you can change any habit of gobbling up this pure fat. It is not only high in saturated fats, but high in calories, too, compared with the lean meat in steak or roast.

It is even better if the butcher or housewife or cook trims off this fat before cooking, and takes care to broil the meat, to use a rotisserie, or roast it with a drip pan to catch the melting fat—and then discards the fat rather than using it in a gravy. If meat is to be braised or basted, the cook can use vegetable oils (corn or cottonseed or safflower oils), rather than suet, lard, beef or bacon drippings, or hard shortenings; or the cook can marinate meats in oil and vinegar before cooking them.

When a stew or meat soup is prepared, one very simple way to cut down on its saturated fat content is to let it stand overnight in the refrigerator. Then scoop off the hardened layer of fat which has risen to the surface and congealed there, before heating the stew or soup again for serving. This doesn't detract from the flavor of the dish at all.

The housewife intent on helping her husband's heart can also save money by buying commercial or good grades of meat, rather than the choice or prime. Until very recently at least, methods of grading meat depended upon the amount of pure fat created by force-feeding penned animals. More of a premium price has been placed on fat content rather than actual meat content. The more the meat has been marbleized—streaked with fat—the better it has been considered.

Now, more housewives are beginning to demand that they get meat rather than fat for their money. Meat packers are beginning to advertise and stress the leanness of their meat products, putting onto the market more meat per pound, and less fat. The present grading system, however, still lists the "lower" grades of meat, including commercial and good grades, as those containing more real meat or protein than fat! The reason presumably is that fat content makes the meat tenderer and tastier.

But these cuts of "lower grade" meats can be just as appetizing and chewable. Packers are beginning to use pretenderizing methods of preparing meats before and during slaughter or packing. The housewife herself has tenderizers right at hand now. She can also readily assure flavor by judicious use of spices, herbs, marinades, tomato and fruit juices, wines, oils and other sauces low in total fat content, or low in saturated fat. And, rather than paying extra pennies per pound, she can ask that excess fat be trimmed off thoroughly before she plunks down some of her household money for the meat courses for her family.

With meats, you can also adapt yourself to moderation in the amount you eat. It's not unusual at all now, in modern America, to find the menu offering twelve to sixteen ounces (one full pound) or even more meat for one portion. The Continental style is much more sensible. With first courses of citrus fruit, salad, soup and pasta, a four to six ounce serving of lean meat as the main course fully satisfies the gourmet, when it is well prepared.

Take the example of a prime raw steak weighing twelve ounces, or three-quarters of a pound. Even if the fat is trimmed off, it supplies 650 calories and over forty grams of total fat, about twenty grams of saturated fat, and over 300 milligrams of cholesterol. If you ate the fat around it, it would give you about 1,000 calories, ninety grams of total fat, over forty grams of saturated fat and about 400 milligrams of cholesterol. And all too often such a hefty course is only one part of a single feast.

If the steak were six ounces raw, good grade instead of prime, with fat trimmed away, you would be consuming less than 300 calories, less than twenty grams of total fat, less than ten grams of saturates, about 160 milligrams of cholesterol. This is a reasonable serving, provided the day's pattern is appropriate overall.

Poultry:

Emphasize lean poultry, especially the white meat of chicken fryers and broilers, and turkey. Avoid the skin, because the fat is concentrated under the skin. This precaution reduces total fat and saturated fat intake. Poultry has more of the polyunsaturated fats, and less of the saturated kind, than most meats. Ducks, geese and stewing hens, however, are relatively high in fat. You can eat more freely of Rock Cornish hen and game birds in general.

Fish and Seafood:

You should *emphasize* favorite fish and seafoods. These are high in their protein content, much lower in saturated fats, and higher in polyunsaturated fats than the meats. Fish live in a wild state, and like all animals existing under natural conditions, tend to be relatively lean compared to domesticated cattle or swine reared and fed under artificial conditions. Living in cold water, fish and seafood must have polyunsaturated fat which remains liquid at relatively low temperature. Were it otherwise, marine life would congeal or "freeze up."

Although low in saturates, fish and seafood—like all creatures in the animal kingdom—do contain cholesterol in moderate amounts. A wise rule therefore is to eat these foods in reasonable portions, as with the meats. A half dozen oysters or jumbo shrimp are quite all right, but overemphasis on them could give you a higher cholesterol intake than you want. And always remember, it's a consistent overall pattern—in the long run—that you're after.

Vegetables and Fruits:

Emphasize all of these. They are low or moderate in calories, and rich in essential nutrients, vitamins and minerals, and the small amounts of fat in most vegetables are polyunsaturated in type.

Legumes such as peas and beans are good sources of protein also, and can sometimes serve as the main dish of a meal in place of meat. Baked beans in vegetarian sauce is an old favorite dish of this type.

Include at least one serving of Vitamin C-rich fruit or fruit juice in your diet each day—cantaloupe, grapefruit, oranges, strawberries, tangerines, tomatoes. Also include at least one serving of Vitamin A-rich green or yellow vegetables in your diet each day—broccoli, carrots, greens, kale, pumpkin, winter squash.

You can eat unlimited quantities of raw vegetables and salad greens—tomatoes, lettuce, celery, green peppers, cucumbers, carrots.

But—pay attention to the kind of dressings and sauces sprinkled on salads, or used in preparing vegetables. Many customary dressings or sauces contain cheeses, or butter, or the usual type of margarines high in saturated fats. Instead, use oil and vinegar on salads, or prepared dressings containing polyunsaturated fats, or mayonnaise and mayonnaise-type salad dressings which are low in saturated fats and cholesterol, and high in polyunsaturates. The newer low-saturated-fat margarines may be used on vegetables, or sauces prepared with oils or even better, non-fat seasonings and flavorings.

Pastries and Bakery Products:

De-emphasize these foods especially since most commercial sweet rolls, cakes, cookies, doughnuts, rich crackers, pies and pastries are not only high in calories, but are generally made with highly saturated shortenings—and often with whipped cream to boot! For dessert, you can more frequently substitute fruit, either fresh or compote, for pie à la mode or shortcake, for example. Again—the Continental style!

At home, a wide variety of cakes, pies and pastries can be prepared using oils and modified shortenings which are relatively low in saturated fats and high in the polyunsaturates. Remember that too much of these foods can put you over your daily caloric needs.

If you are a big-dessert man, don't just gloomily decide offhand that cholesterol control is not worth the sacrifice of cake and pie or other favorites. You need not eliminate them, by any means. You can eat them more sparingly, or make room for them in your weekly menus by cutting down on some other high calorie or high fat foods. Furthermore, we can anticipate that more and more pastries and desserts lower in saturated fat and cholesterol content will be coming to your stores. Some of these have already been prepared, and are being used in the National Diet-Heart Study described in Chapter 28. In taste and appearance, they are indistinguishable from the same foods prepared in the customary fashion. Here is a perfect example of what can be done through ingenuity and intention to change the emphasis in our diet without distressing dislocations of established habits and ingrained preferences.

Breads, Cereals and Pastas:

Perfectly *acceptable* in your cholesterol-lowering diet are white bread, whole wheat and rye bread, plain rolls, low-fat crackers, all cereals (use skim milk with them), all pastas such as spaghetti, macaroni, and noodles—and potatoes too. The only caution is to watch your total caloric intake if you have a weight problem—and to use the right kind of fat in cooking—oils, not solid shortenings.

Spreads and Oils:

As already mentioned, you should *de-emphasize* solid spreads, cooking fats, butter and margarines high in saturated fats in cooking foods, or in salads, or as spreads on toast or bread or rolls. New margarines are now available, made with corn or safflower oils, which are higher in polyunsaturates and lower in saturated fats. With bread or toast, try using jelly, jam or honey or marmalade rather than a thick layer of butter.

Miscellaneous Items:

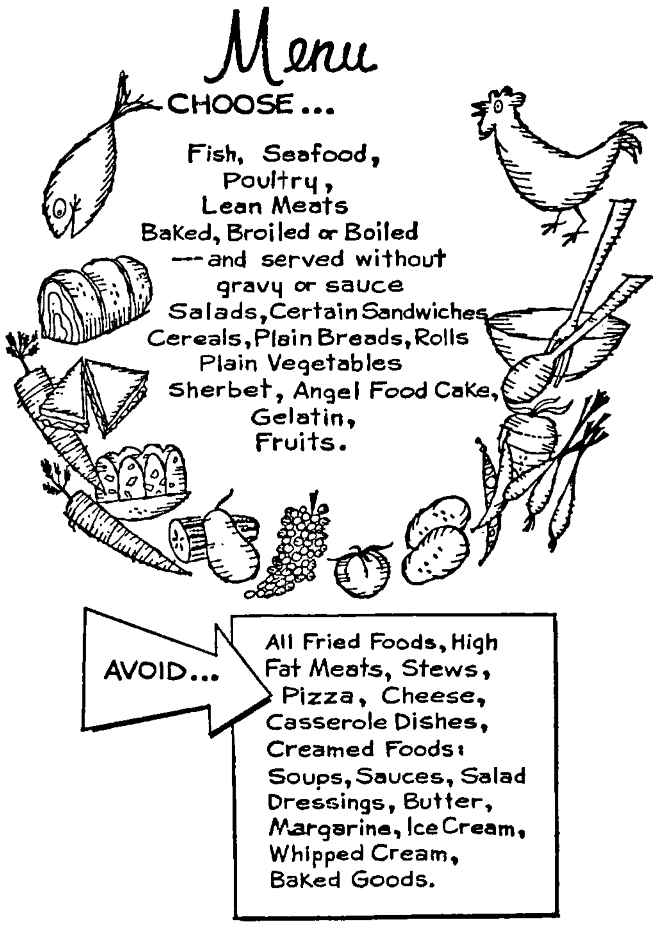
Nuts of almost all kinds are good items in your diet, for they are high in poly-fats, low in the saturated kind and are cholesterol free. However, they are high in calories—weight watchers should consume them sparingly.

Chocolate candies are high in saturated fats due to cocoa butter, and products made with coconut are also high in saturates. But chocolate syrups generally are essentially fat free, as are many candies (fruit balls, gum drops, plain mints, etc.). Coffee, tea, gelatin, fat-free broth, canned or dried soups (except for the creamed types), condiments, herbs, pickles and relishes are all low in fats or fat-free. On the other hand, many mixed dishes, specialty foods and processed meats—pizzas, hashes, liverwurst, bologna, hot dogs—are laden with hard fat and cholesterol.

Alcohol:

Alcohol provides only empty calories, with any vitamins or fats coming only from ingredients with which it's mixed, whether fruit juices or cream or milk. It contributes to your total of calories consumed, and anything above a very moderate number of drinks can complicate your caloric control. If alcohol is not used directly for energy, it breaks down within the body into acetate, which becomes available for manufacturing and storing fat.

So far as is known, alcohol has no direct effect on the arteries or on atherosclerosis, but overindulgence—and the malnutrition that goes with chronic alcoholism—can lead to cirrhosis of the liver, damage to the nervous system and beriberi of the heart from lack of Vitamin B_1 (thiamin). Com-


Menu
CHOOSE...
Fish, Seafood,
Poultry,
Lean Meats
Baked, Broiled or Boiled
—and served without
gravy or sauce
Salads, Certain Sandwiches
Cereals, Plain Breads, Rolls
Plain Vegetables
Sherbet, Angel Food Cake,
Gelatin,
Fruits.
AVOID...
All Fried Foods, High
Fat Meats, Stews,
Pizza, Cheese,
Casserole Dishes,
Creamed Foods:
Soups, Sauces, Salad
Dressings, Butter,
Margarine, Ice Cream,
Whipped Cream,
Baked Goods.

bined with the fatty hors d'oeuvres frequently served with cocktails, alcohol has produced longer milkiness or creaminess in the bloodstream than occurs in persons who ate only the delicacies, without taking a drink. It is not yet clear, however, whether this milkiness or lipemia of the blood immediately following a meal plays an important role in bringing on atherosclerosis. Some researchers suspect it does.

With these general guidelines, you can begin now to select the foods and meals which will reduce your intake of total fats and cholesterol, and substitute more poly-fats for the solid ones. In the Appendix are tables listing the caloric, cholesterol and fat content of many of your favorite foods.

You should also space out your meals over the day, rather than counting on one huge meal and semi-starvation at breakfast or lunch, because the great banquet type of supper or dinner tends to raise blood cholesterol.

All too typically, the middle-aged American male indulges in an evening meal that supplies more calories in one session than his body needs all day. In a restaurant or at a dinner party, or even at home, George Livewell begins with one or two or three cocktails and a handful of hors d'oeuvres; a salad with a rich dressing; three quarters of a pound of meat with gravy; potatoes flavored with butter; vegetables with a rich cream sauce; a couple of pats of butter on a roll or two; a high-powered dessert; cream and sugar in his coffee, and perhaps a brandy afterward. In one sitting he consumes 3,600 calories and a high load of saturated fat and cholesterol, not to mention drinks or snacks later in the evening. There's a ring of truth if he tells his hostess: "It's all so good, you're killing me."

But he could enjoy his dinner just as much with a different choice, consuming only 1,500 calories, only one-third as much saturated fat, and less than half as much cholesterol.

Here's George Livewell's typical banquet or dinner party feast before he began paying attention to calories, cholesterol and fats:

Food	*Amount*	*Calories*	*Saturated Fat (grams)*	*Polyunsaturated Fat (grams)*	*Cholesterol (milligrams)*
2 martinis	4 oz.	312	0.4	—	—
Hors d'oeuvres	8 medium	324	9.8	3.1	159
Clear tomato soup	½ cup	23	—	—	—
Shrimp cocktail	5 large				
and		126	0.3	0.3	126
cocktail sauce	1 tblsp				
Prime rib roast (untrimmed)	12 oz.	1,728	80.4	3.6	432
Natural gravy	1 tblsp	84	4.4	0.2	12
Browned potatoes	4–5 small	243	3.0	0.9	—
Peas and onions in cream sauce	½ cup	109	2.3	0.6	14
Lettuce and asparagus salad	¾ cup	86	1.5	3.9	—
and					
Oil and vinegar	2 teasp				
Hard rolls	2 small	160	1.0	—	2
Butter	2 pats	102	6.0	1.4	42
Dessert:					
Butter cake	1 pc.				
and					
Ice cream	¾ cup	359	7.8	1.2	62
and					
Fruit sauce	2 tblsp				
2 cups coffee with cream	2 tblsp	40	2.0	0.2	12
TOTALS		3,696	118.9	15.4	861

(Cont. next page)

And this is how George Livewell feasted as contentedly with far reduced risks for his girth and his heart:

Food	*Amount*	*Calories*	*Saturated Fat (grams)*	*Polyunsaturated Fat (grams)*	*Cholesterol (milligrams)*
2 martinis	4 oz.	312	0.4	——	——
Hor d'oeuvres (low cholesterol)	8 medium	285	2.8	3.8	77
Clear tomato soup	½ cup	23	——	——	——
Shrimp cocktail and cocktail sauce	5 medium 1 tblsp	89	0.2	0.2	84
Sirloin tip roast (trimmed)	6 oz.	318	4.8	0.6	216
Baked potato (no butter)	1 large	135	——	——	——
Frozen peas, plain	½ cup	55	0.1	0.2	——
Lettuce and asparagus salad and	¾ cup	86	1.5	3.9	——
Oil and vinegar	2 teasp				
Hard rolls	2 small	160	1.0	——	2
Fresh fruit cup	½ cup	58	——	0.1	——
2 cups coffee with whole milk	2 tblsp	21	0.8	——	4
TOTALS		1,542	11.6	8.8	383

Sometimes, of course, you have no choice at a banquet, business luncheon or dinner party. But if the food seems all wrong, there's still much you can do to keep your fat intake at a reasonable level. You can at least be moderate in the portions you eat, and you can remove the skin from fried chicken, the breading from veal cutlet or fried fish, the fat from meat. Ask that your meal be served without gravy, that your salad dressing be the oil-vinegar or French variety "on the side," and request sherbet or fruit for dessert. And take special pains the next day to reduce the number and servings of high-fat, high-cholesterol foods. The goal is not so much a controlled diet every single meal, as it is a long-term consistent effort to bring down hard fat and cholesterol intake and substitute more of the poly-fats than you have been eating. The occasional day when you can't stay completely on your diet is not as important as careful adherence to it the rest of the week.

The instructions on "eating out" given to men taking part in the National Diet-Heart Study provide a sound guide worth widespread dissemination. We reproduce them here for your benefit, along with their list of typical foods to eat—and to avoid—in a cholesterol-lowering diet. You can add other foods by consulting the Appendix.

EATING OUT

Follow a few basic rules and you'll have few problems finding foods low in saturated fat when you eat away from home.

Whenever possible, avoid restaurants which feature fried foods. Patronize restaurants (or cafeterias) which offer a variety of broiled foods or a choice of salads and sandwiches. Also, try to choose the majority of your meals from the poultry, fish and seafood groups when eating out rather than from meats, which are higher in fat.

In general, ask for cooked foods to be broiled or baked or boiled—and served without added fat. Avoid stews, pizza, cheese dishes and other casserole-type mixtures.

Here's a list to help you choose wisely and well:

APPETIZER: Fruit juice or cocktail, tomato juice, seafood cocktail.

SOUP: Bouillon, broth, consommé, vegetable, bean. Avoid cream soups.

SALAD: Chicken, turkey, cottage cheese, fruit, gelatin, seafood, vegetable.

SALAD DRESSING: French-type, mayonnaise, oil and vinegar. Avoid dressings made with cream, sour cream or cheese.

SANDWICHES: Chicken, turkey, peanut butter, lean roast beef (round or sirloin), tuna, salmon, shrimp or chicken salad. Specify no gravy, butter or margarine to be used.

FISH & SEAFOOD: Any variety—poached, baked or broiled. Use lemon, cocktail sauce or tartar sauce. Specify no fat be added.

MEAT: Canadian bacon, roast round of beef, roast veal, small lean steak (tenderloin or sirloin), veal cutlet. Remove all visible fat—and request meat be served without gravy or sauce; avoid breaded items.

EGGS: "Straight" either boiled or poached; egg salad sandwich. Limit to 2 whole eggs or egg yolks a week.

FRUIT: You can choose any fruit.

VEGETABLES: You may have any vegetable that is prepared without sauce, butter, or margarine. Use lemon juice or vinegar for seasoning.

BREAD: All plain breads and rolls, soda crackers, rye crisp, melba toast, English muffin. Eat plain or with jelly, jam, marmalade or honey. Avoid biscuits, rich muffins, and sweet rolls.

DESSERTS: Angel food cake (unfrosted), fruit, gelatin, sherbet. Avoid ice cream, whipped cream, all baked goods, puddings.

BEVERAGE: Coffee, tea, skim milk or buttermilk, soft drinks, fruit juice, alcoholic beverages.

MISCELLANEOUS: Worcestershire and steak sauces, catsup, mustard, pickles, relishes.

This kind of changed emphasis in foods can put you well on the road toward a cholesterol-lowering effect. No one is going to carry around a balance scale to weigh the portions of food you eat, to make sure you're getting the recommended amount of grams of poly-fats versus the saturated. What you can do is to study the list of foods, with their proportions of each of these types of fats, and the calorie value of different foods. Then you can mentally estimate values to get only 25 to 30 per cent of all daily calories from fats, and to keep the intake of saturated fats at about one-third of all the fats.

Remember, most of the fat, particularly the hard fat, comes from five big sources in the American diet—meats, dairy products (whole milk, cream, cheeses), eggs, solid fats (butter, lard, shortenings and margarines) and commercial baked goods (pastries, cakes, cookies, pies). Make a significant dent in all of these and it's hard to miss the target.

Your doctor can determine your blood cholesterol reading for you, and help you to do the right thing about it—as needed.

But let's also consider weight and calories, and whether you frown or smile when you step on your bathroom scale. If you frown, how can you change it to a smile?

11

Extra Pounds And How to Lose Them

MANY A YOUNG BRIDE SETS OUT TO KILL HER HUSBAND.

She does it unwittingly with the food she sets before him—too much, too good, too rich, too highly processed. The slim young bridegroom begins to expand, he becomes a victim of creeping obesity, the bane of a majority of American men and women as well. The extra pounds, however delightfully acquired, carry an ominous risk.

At middle age, the overweight man—depending on the amount of his blubber—is two to three times *more susceptible* to coronary heart disease than his neighbor of normal weight. If he has gained 20 per cent or more over his youthful desirable weight, for example, he is at least twice as prone to a coronary as the man who stayed lean.

If he has high blood pressure and is overweight, his risk of premature heart attack is about four times the normal risk. It is also very high with a combination of obesity and high blood cholesterol. And—as Dr. David M. Spain of the Beth El Hospital, Brooklyn, N.Y. recently reported—obesity and diabetes are a particularly malevolent pair of abnormalities.

Obesity by itself means a higher susceptibility to elevated blood pressure, high blood cholesterol, strokes, diabetes and kidney disease. For nearly fifty years—with a keen eye on the monetary significance of their massive life and death statistics —life insurance companies have penalized the obese man with a higher premium on his policy, reducing it when the fat man brings his weight down to normal. His risks have then been reduced.

Overweight has become a national disease and by the millions, Americans wail, "I can't seem to do anything about it." They do keep trying—for as one saying goes, "In every fat man there's a thin man fighting to get out." Each year, we spend millions of dollars, and work up anxiety, and go into frenzies of determination (transient ones), seizing upon crash diets, special reducing diets, highly-touted drug nostrums, dietary formulae and "great" books—and still we keep yearning for some simple presto formula to slim down and trim off the extra pounds.

But you really can lose weight, and keep it down, by acting upon a few fundamental physiological laws governing the reasons why most of us gain weight. The first immutable law is that calories absolutely *do* count, and no crescendo of trumpeting that they don't count will ever change nature's law.

Our new young husband illustrates the way many men—possibly a majority—begin gaining weight and thus veer a bit closer toward a premature heart attack.

Heartily Ever After

George Livewell married the girl with green eyes, and began consuming tastier and better food than in his bachelor days. Displaying her culinary skills (possibly with a grateful patting of her wedding present cookbook), his bride pleases him with delectable dishes. These days, she is probably more aware of what constitutes a well-balanced diet, which is all to her and his and their future children's good.

But up goes George's intake of calories—which are simply a measure of the energy to be derived from food in the form of heat. Our bodies are chemical machines, and we constantly spend energy to keep our organs and functions working. We "burn" or catabolize (break down and oxidize) our food to produce heat and perform muscular work. Weight remains the same if we completely utilize all our food for fuel and realize its full potential of energy (calories) as heat over a period of time. But excess calories—foods not needed to power our bodies, foods not fully spent or burnt—are retained and stored as fat. And it makes no difference whether they come from proteins, sugars, starches or fats. If the calories are not used, they're put in the bank, and this bank tends to set up branch offices embarrassingly in the front and back around our middles.

A single pound of fat represents 3,500 "banked" calories. The dismaying thing is that we fatten our bank account little by little.

Let's say the young husband is taking in only 100 more calories a day than he used to do, and hasn't increased his spending of calories through extra activity. In thirty-five days, he can gain one pound, and ten pounds in a year, if he maintains that excess of intake. If he has an excess of 200 calories a day—and that's not hard to do—in a year's time he can be shocked to discover he is twenty pounds heavier.

Because he is heavier, it now costs him more calories to move that weight around, but even this may not be enough to do more than slow down his creeping gain of weight from the extra calories from food each day.

The Sad Reckoning

Unhappy with the ring of fat on his stomach, George decides he must lose weight—now. It took fifty-two weeks to build up the fat, but our determined young man is going to drop it all in three or four weeks of sacrifice, and perhaps has a sneaking thought that *then* he can go back to eating just as he has been doing. The hero charges off to do battle, stout-heartedly. He will, he vows, eat 1,000 fewer calories a day. In three days or so, he'll lose a pound, and twenty times three is sixty days . . . or more . . . but the main thing is to "get going and prove that I'm master of my appetite," and watch the scales and utter an occasional triumphant shout when a pound has been lost . . . and then another half-pound . . .

George Livewell starts out in trouble. Partly because he enters battle *against* food, rather than *for* food and for him-
elf. And his arithmetic is a bit awry. Eating a restricted
t, he might be able to slash his caloric intake by 1,000
r day. He overlooks the fact that his present intake is 200
bove what his body needs, so his *net withdrawal* of calories
'ould be about 800 a day rather than 1,000. That means

more than four days to lose a pound—all other things being equal. And he also forgets that as the excess poundage is peeled off, his needs decrease. It takes less energy—fewer calories now—to keep him in balance. So his true deficit—or net withdrawal—declines further. And it takes more like twelve or fifteen weeks of drastic and boring diet to drop his twenty pounds. No wonder he begins to feel hungry, forlorn over refusing offerings of so many goodies, or the snacks or drinks while watching TV . . . despondent, bewitched by old habits.

"Yeah, I dropped five pounds, but it's tough. *She* (the girl with green eyes) wasn't on any diet, and could eat what *she* pleased, and you know you have to go to parties and all . . . I've got it all back. Wish there was a pill . . ."

The Arithmetic of Gain and Loss

George Livewell expected too much, too soon. Let's assume he was eating 3,000 calories a day, and liking it all. It was 200 too much. By cutting down to 2,800 he would stop gaining more weight. By cutting down to 2,600—400 fewer calories per day—he could lose his extra twenty pounds over a year's time, at no great sacrifice or self-pity, no over-drastic change of habits.

He could also speed up the process by spending more calories than he was accustomed to spending—the subject of our next chapter. For something else had happened. With marriage, he not only ate more but had given up his sports or exercise habits of his bachelor days. Spending less, he needed fewer calories to maintain his lean weight. By continuing to eat as much and more as formerly, he became calorie-rich, and ultimately fat.

Another immutable fact about calories has to be taken into account: With each year after age 25, our bodies need about ten fewer calories per day.

At age 25, for example, let's say you maintained an even keel of weight on 2,500 calories per day. Five years later, you need only 2,450 calories a day, assuming that you have remained just as physically active, or inactive, as you we previously. At age 30, then, if you've stayed with an int of 2500 calories, you are getting fifty more calories a d than you need—and that's enough to put on five pounds a year!

The amount of physical activity has a great deal to do with whether we gain or lose weight. As a George Livewell is promoted in his career, or changes his job to work at a desk, he may become less active, and therefore need fewer calories. He has a choice of reducing his caloric intake, or seeking more exercise, or finding he has to let his belt out another notch. The housewife whose children require less running after in school years, or whose husband can afford a maid to give a hand in house cleaning, also can begin spending fewer calories. But if she keeps on eating the same amounts and types of food, her weight inevitably rises.

All diets that shrink off pounds are based upon a deficit in calories, no matter how they are advertised. Diets presented under the label of calories-not-counting are actually low calorie systems. One highly promoted diet also calls for walking about an hour a day, to *spend* about 300 calories more than the person normally does, but this is not especially stressed. This diet also drastically limits high carbohydrate foods, the sweets, pastries, cookies, cakes, potatoes, bread and other starches, which customarily give Americans almost half their total intake of calories.

A point to remember in the figure-control eating is that 100 grams (about 3½ ounces) of carbohydrates supply about 400 calories. You get the same amount from 100 grams of proteins, from meats or cheeses. But 100 grams of fats supply 900 calories. Restricting fats is one simple way of reducing the calories you consume daily.

A marvelous pill that will safely melt off pounds, regardless of what you eat, has still to be found. Some drugs do dull the appetite, but these should be taken only under the watchful eye of a trained physician. At most, such drugs may serve as a crutch to tide you over the beginning phases of a drastic reduction in food intake. But they can give you the illusion that the drugs are the key. The real key is to adopt a new pattern of eating—one that you can live with—to bring weight down, and then later liberalize the diet so that you keep a balance between caloric intake and outgo.

And if you're heftily overweight, don't go barging into some self-prescribed reducing diet without consulting a doctor. There are some conditions—relatively rare, it should be noted—in which excess weight is *not* due just to excess calories, and a medical checkup can prevent harm from dangerous dieting, particularly a diet that doesn't pay attention to consuming all the essential nutrients the human body needs.

Excusing extra poundage on grounds that you are different and your metabolism is completely different from other people's is generally just that—an excuse. Only rarely is obesity due to faulty glands. There *are* some individual variations in metabolic rates and efficiencies with which we use food stuffs, but these are usually minor. Some researchers think there may well be hereditary or genetic reasons why some people seem to put on weight more easily, but it's difficult to say whether this is due to constitutional reasons or ingrained family habits of eating.

Men and women who are grossly overweight do find it far more difficult and discouraging to lose weight. For one thing, they have farther to go than the person trying to drop five or ten pounds. It's harder to change years of habit of taking in too many calories, and is even harder if and when any genetic or metabolic or emotional reasons might be involved. But for most of us, it is a matter of eating too much.

Food Is What You Make It

Food has far greater meaning to us than being simply a "gasoline" to run the human engine. It is "high caloric" in emotional significance, for a variety of reasons. It's one way of comforting ourselves when we are unhappy. It is one way of celebrating good fortune. In recent times, the well-fed appearance and even the stomach paunch were a sign of business and social success. To some immigrants, the groaning table measured the progress from the hard days behind them. Today the ability to set an abundant table is a mark of gracious living and affluence. And when tuberculosis was a great ravager, it struck more often at the undernourished, the lean and the thin. Being overweight seemed to be protective.

Push-button living and automation now make it easier for most of us to gain weight. So does the cornucopia of modern, appealing "rich" foods—and the advertising lures that push them. So do food habits begun in childhood. When parents overeat and grow stout, children tend to do the same.

Plumpness is still regarded as the hallmark of the "healthy" child, rather than a potential danger signal. Overanxious parents urge, cajole and even bribe children to eat everything on their plates to be good boys and girls. And—failing—many a mother nibbles up the remnant from a child's plate rather than see it go to waste, and thereby only complicates her own personal struggle for weight control.

A better solution is smaller portions on the child's plate, with seconds available. There's utterly no reason why a child has to eat a certain amount of food every meal, or every day. Almost all healthy children will eat what their bodies require—so long as they aren't permitted excessive between-meal snacks, and if the dinner table is not turned into an emotional battleground. Force-feeding, when it does succeed, only promotes excess weight, and 10 to 15 per cent of U.S. children are estimated to be overweight. They tend to remain so as adults. And their chubbiness is abetted by high consumption of "empty" calories in the form of sodas, cookies, chips and other foods.

In teen-age years, the boy with phenomenal appetite doesn't gain weight on 5,000-plus calories a day, when he's growing rapidly and is very active. But let him become just a spectator at sports, or a prisoner of TV, and his appetite leads to ballooning pounds.

How to Know If YOU Are Overweight

Carried into adult life, with little activity, the robust appetite can only spread girth. And most of the weight gained after young adulthood is fat, except in men who stay very active physically. A glance at weight tables tells whether it's happened to you, and by how much.

There is small comfort in being of *average* weight as listed on many weighing machines. That only shows how close or far you are from other people. The best guide is the table of *desirable weights*—on page 98—associated with the least risk of diseases and shortened life. These weights are based on a large-scale study by the Society of Actuaries, pooling the experience of twenty-six U.S. and Canadian life insurance companies for the years 1935 to 1954. They take account of height, body build and sex in listing desirable weights.

Surveys based on these tables show that *half* of men in their thirties are at least 10 per cent over desired weight, and one-quarter have zoomed to 20 per cent or more. It's worse

DESIRABLE WEIGHTS FOR MEN

OF AGES 25 AND OVER

WEIGHT IN POUNDS ACCORDING TO FRAME (IN INDOOR CLOTHING)

Height (with shoes on) (1-inch heels) Feet	Inches	Small Frame	Medium Frame	Large Frame
5	2	112-120	118-129	126-141
5	3	115-123	121-133	129-144
5	4	118-126	124-136	132-148
5	5	121-129	127-139	135-152
5	6	124-133	130-143	138-156
5	7	128-137	134-147	142-161
5	8	132-141	138-152	147-166
5	9	136-145	142-156	151-170
5	10	140-150	146-160	155-174
5	11	144-154	150-165	159-179
6	0	148-158	154-170	164-184
6	1	152-162	158-175	168-189
6	2	156-167	162-180	173-194
6	3	160-171	167-185	178-199
6	4	164-175	172-190	182-204

among men in their fifties, with 60 per cent being at least 10 per cent over desirable weight, and one-third surpassing it by 20 per cent. Thus the majority of middle-aged men are overweight, and in most cases this overweight is due to fat, not muscle. This conspirator has therefore put them at increased risk of having premature heart attacks. An exception should be made for men who are particularly heavily boned and muscled, such as weight lifters or professional football players. These rather rare individuals in our country are usually well conditioned, and by no means obese—although overweight—unless they too are padded with layers of fat or protruding bellies, as sometimes is the case.

Only some 10 per cent or so of men and women are *under* desirable weights, and to be moderately underweight is considered beneficial. By the actuarial tables, you are considered overweight if you exceed the range by a few pounds, frankly "obese" if you weigh in at 15 per cent or more extra pounds,

DESIRABLE WEIGHTS FOR WOMEN

OF AGES 25 AND OVER

WEIGHT IN POUNDS ACCORDING TO FRAME (IN INDOOR CLOTHING)

Height (with shoes on) (1-inch heels) Feet	Inches	Small Frame	Medium Frame	Large Frame
4	10	92-98	96-107	104-119
4	11	94-101	98-110	106-122
5	0	96-104	101-113	109-125
5	1	99-107	104-116	112-128
5	2	102-110	107-119	115-131
5	3	105-113	110-122	118-134
5	4	108-116	113-126	121-138
5	5	111-119	116-130	125-142
5	6	114-123	120-135	129-146
5	7	118-127	124-139	133-150
5	8	122-131	128-143	137-154
5	9	126-135	132-147	141-158
5	10	130-140	136-151	145-163
5	11	134-144	140-155	149-168
6	0	138-148	144-159	153-173

For girls between 18 and 25 subtract 1 pound for each year under 25.

Source: Metropolitan Life Insurance Company.

and markedly obese if your weight is 20 per cent above the desired range (with the exceptions noted above).

The Society of Actuaries found the weight trend to be upward in men and downward in women compared with thirty years ago. Women in their 20's now *average* five to six pounds less—height for height—than a generation ago. Lighter clothing nowadays could be a reason (the weights include normal dress), but experts think it also reflects the desire to be fashionably slim.

American males were found to be about five pounds heavier than a generation earlier, particularly men in their twenties and thirties. Men appear to mold on extra pounds most rapidly at those ages, with a smaller rate of increase later. Women tend to gain weight most rapidly chiefly in their mid-30's and 40's, moving into the category of "fair, fat and 40."

You can make your own tests for obesity. One is to look at yourself in a full-length mirror, undressed. Is your shape agreeable? Are there usual bulges? Bend over to regard your toes. How much of your lower anatomy can you see? An obstructed view means gross obesity.

Or lie down on the floor or a firm surface, and place a yardstick on your midriff, from breast bone to crotch. Does the yardstick touch your body at both ends? If it points upward (disregarding pregnancy) you are obese. And there's the pinch test. Human skin is about one-eighth of an inch or so thick. Pinch a fold of skin on the back of your arm, or just over your lower rib. Anything more than half an inch of tissue between your fingers means excess fat is present. One inch indicates a good deal of fatty tissue.

A desire to lose weight brings up the nasty business of "dieting" and all the woes attached thereto that George Livewell found. But you needn't repeat his mistakes. Rather than looking for a miraculous crash diet, set yourself a goal first of reversing your trend to weight gain, and then a moderate approach over a period of time to achieve your desirable weight. A little easy arithmetic shows you how.

The 15x Factor

To maintain each present pound of weight, if you are a moderately active man, requires fifteen calories per day. So to maintain a desirable weight of, say, 150 pounds, your maintenance goal then is 150 times fifteen, or 2,250 calories a day. To *lose* weight calls for reducing that amount, or increasing activity to spend more calories, or a combination of both.

If you cut your calories to 1,500 a day, you have a daily deficit of 700 to 800—a weekly deficit of 4,900 to 5,600, enough to lose about 1½ pounds a week. In twenty weeks, you can drop thirty pounds. Then you can go back to 2,250 calories a day to hold your desirable weight, always remembering that next year your goal is ten fewer calories a day with the advent of another birthday anniversary.

Accompanying tables list the caloric value of many familiar foods to guide you. You can keep tabs on progress by weighing yourself once a week, at the same hour of the day, on the same scale, dressed in the same amount of clothing, or nude on bathroom scales. Daily measurements may vary quite widely, due to loss or retention of water, and such roller-coaster swings should neither elate nor depress you. You are embarked on a long-term project.

There will be temptations, and backslidings, to be made up on another day. Skipping meals is not a good idea, especially going without breakfast that keeps energy fires stoked through the day so you don't have costly lows in efficiency and morale. But it's also permissible to fast occasionally, and that aids in cutting down the week's total food intake.

Some excellent books and pamphlets list specific diets for weight reduction, including methods of counting calories very carefully if desired, so we need outline only the general recommendations.

A diet of 1,500 calories a day might be composed of 3½ ounces (100 grams) of protein giving you 400 calories; five ounces of carbohydrates (140 grams) supplying 560 calories, and about two ounces (60 grams) of fats for 540 calories. Choose the fat so about two-thirds are polyunsaturated fat and only one-third saturated, as a means of lowering or holding down blood cholesterol.

Be Selective . . .

You can have a wide variety of foods in each group, and considerable bulk to combat hunger, probably felt most keenly in the very beginning of the diet change. And this pattern readily permits a high intake of all the vitamins, minerals, fatty acids and amino acids of proteins needed for good health.

Fashion your diet in the manner described in the preceding chapter. Emphasize the lean meats, chicken and turkey, fish and seafood, skim milk, cottage cheese, whole grain or enriched flour products, fruits, dark green and yellow vegetables, and modest amounts of vegetable oils. Most of these are low calorie, high nutrient foods—making it possible to get a good deal of satisfying groceries under your belt without overeating of calories. De-emphasize fat cuts of meat, table spreads and solid cooking fats (butter, margarine, lard), bacon, salt pork, alcohol and carbonated beverages, cheeses, cream, eggs, and rich specialty dishes and desserts high in processed fats and refined carbohydrates.

The foods you find most appealing are not forbidden, and you should provide for some of them, but not as frequently as you may be doing now, or else boost your activity to allow room for them in your new caloric banking. The calorie tables of foods provide tips. Trimming the visible fat from meats is a must. A generous restaurant serving of prime beef can total 1,100 calories. But with the visible fat separated to one side, and left there, it supplies only 600 calories. A bowl of strawberries for dessert contributes 150 to 200 calories. In a shortcake, you bounce calorie intake from the strawberry dish to 300 to 600 calories—because of the load of concentrated empty calories from shortening, whipped cream and sugar.

. . . and Sensible!

Trying for too drastic a slash in calories through an unbalanced diet can sabotage your health. Even if you make sure you get essential nutrients, it's mighty hard to stay on such a diet, and the tendency is to give up, or go back to old food habits when some pounds have been lost. Severe swings in weight loss and gain may be quite harmful to your body.

A much more reasonable goal is gradual weight reduction. It's easier to reduce with familiar foodstuffs, in variety, rather than by the monotonous limitation to a few types of dishes. And it's easier on the pocketbook to buy usual foods, but less of them.

Make your reducing diet one you can find pleasure with—at the table. If you are miserable while losing pounds, you're likely to swing back to old habits, and feel miserable then because the pounds are creeping back on.

Bring Out the "Thin Man in You"

And don't think in terms of—and make resounding vows about—"going on a diet." That implies you can quit when you are "cured," just as you stop taking medicines when an illness passes. Losing weight, and holding to a better weight, means more than "going on a diet." The essential thing is to change old food habits permanently, by consciously soft-pedalling certain foods, and emphasizing tasty foods not so high in calories. Gradually, through repetition, the new patterns of eating become the habitual, established customs, so you no longer need to concentrate on following them. The first time you drove a car, it probably seemed to be an enormously complex affair. But soon you no longer thought consciously of how to start the engine, to turn corners smoothly, to judge distances and speed in traffic. You became conditioned to doing all these tasks.

Just so, you can decondition yourself from old food patterns, and condition yourself to new ways. Falling off the wagon with a calorie splurge, occasionally, is not so risky as falling off the wagon is for the alcoholic. But is your food fling really an exception, or happening so often that you are being turned from your new food path back to the old?

Properly nourished and physically active people, at their best weight, are healthier and do live longer. Living longer, they ultimately enjoy more good food.

And you can also spend your way to slimmer weight.

12

Spend Those Calories

IF CALORIES WERE MONEY, MOST AMERICANS WOULD BE rich.

Generally we are doing quite well in calorie income, but are becoming a nation of skinflints in spending calories. The excess doesn't add to our worth—only our girth.

But one way to give yourself an assist in losing weight and yet not go hungry is to spend more calories. A brisk fifteen-minute daily walk, over and above your present activity, will spend an extra seventy-five calories. You can use it all for withdrawals from your fat—or calorie—account and lose a pound in forty-seven days ($47 \times 75 = 3,525$ calories) or almost eight pounds in a year. Or you can apply the extra spending to being able to eat a bit more while maintaining present normal weight.

A look at the table of caloric price tags on ordinary activities shows ways of boosting spending in pleasurable fashion to lose or control weight. The vigorous walk costs about five calories a minute. Sitting and watching TV, George Livewell spends only about 1¼ a minute. In two hours, he spends 150 calories—easily offset, or more by his snack or drink.

As a nation, we've been lulled by delightful comforts and gadgets and automatic aids into inactivity, flabby muscles, and spreading fronts and waddling rears. Just as water seeks its lowest possible level, it's rather "natural" now for Americans to seek the lowest level of effort possible, and still get along. Some other Western countries have undergone the same transformation.

But we sit with a heavy cross on our backs, in the form of an overplenitude of food.

Man began as a physically active animal, the roving food gatherer, hunter, fisherman, farmer, and through the ages relied on his muscles and strength as well as wits for survival. Our body's method of regulating food intake was never designed to adapt easily to modern highly mechanized society, any more than animals were made to be caged, Dr. Jean Mayer, Harvard University nutritionist, remarks. With sedentary life, lessened activity is not offset by a decrease in food intake—it may even tend to increase. Pen up cattle, hogs or geese, and they still eat as much as when they were free, and they fatten up. Farmers have known this principle for centuries.

To avoid obesity, we must step up our activity, or else be mildly or acutely hungry all our lives in our efforts at weight control, Dr. Mayer declares. We need to reorganize our lives to include regular exercise, which most people once had. Children especially must be encouraged to be active, and be given facilities to do so, or else obesity is destined to become an overwhelming problem in future years, he predicts.

Scientists warn of other penalties from inactivity—and greater rewards to be won from becoming more active physically, and better fit. They find, as the next chapter tells, that exercise is a good tonic and even necessary for your heart.

First, let's consider the matter of spending calories as an aid in fighting excess poundage.

Our bodies being heat and chemical machines, the calories from food go to keep us alive and to supply energy for action and work. Sleeping, we spend about one calorie per minute, and if we were completely inactive, our caloric expenditure would amount to only about 1,500 calories per day. Sitting up, we spend about 1¼ calories per minute—and it costs practically nothing for our eyes to watch TV and our brains to tell us what we're seeing. Indeed, so far as anyone has been able to measure, thinking costs us virtually nothing in calories—all those good ideas come for free.

Calories in Action

Motion costs us energy, and hence calories spent. It all depends upon the amount of work involved. Walking upstairs, moving our bulk upward, costs a great deal more than walking downstairs. Swimming can cost about ten calories per minute, and tennis six, and golfing about five—little more than walking save for the effort of swinging the golf club 100 times or so (and hopefully less). An electric golf cart completely sabotages golf as an outing for exercise.

Bowling can cost 6.5 calories per minute, but take this with a grain of salt—that rate applies only to the few seconds when you are actually throwing the ball. While waiting your turn—with or without a can of beer—your expenditure falls down to about 1½ or two calories per minute.

The larger or chubbier you are, the more it actually costs to propel yourself down the street during a walk as compared with the thin, lighter man. The older you are, the less you spend doing the same task as a person of the same weight who is younger. The energy for a walk, for example, spent by a man of 65 is about 10 per cent less than the man of 25. Our metabolic needs decline with age. This is the reason why we should eat about ten calories *less* per day with each year of age.

The caloric price tags listed here are generally drawn from actual measurements of energy expenditure by young men, and are approximations for other ages, but good enough to give you guidelines of how much you are spending in any activity.

By spending more—while keeping your diet intake at present levels—you can drop weight. Spending fifty calories more per day can bring a weight loss of five pounds in a year. The reverse process is the way George Livewell and most of us gained the extra pounds—by eating a bit more than we needed, and more than we spent, through the years. The fifty calories can be supplied in one slice of bread or one pat of butter.

There are differences in how we spend calories in routine living. It costs a few more calories to stand than to sit—about nine more *per hour*. But the person who fidgets while he stands, who never quite stands still, may spend sixty to seventy more calories per hour than his placid friend. This seemingly accounts, in part, for the fact that one person gains weight while his brother holds his weight while eating the same intake. The fidgeters, or foot swingers, are putting a bit more drain on their calorie account.

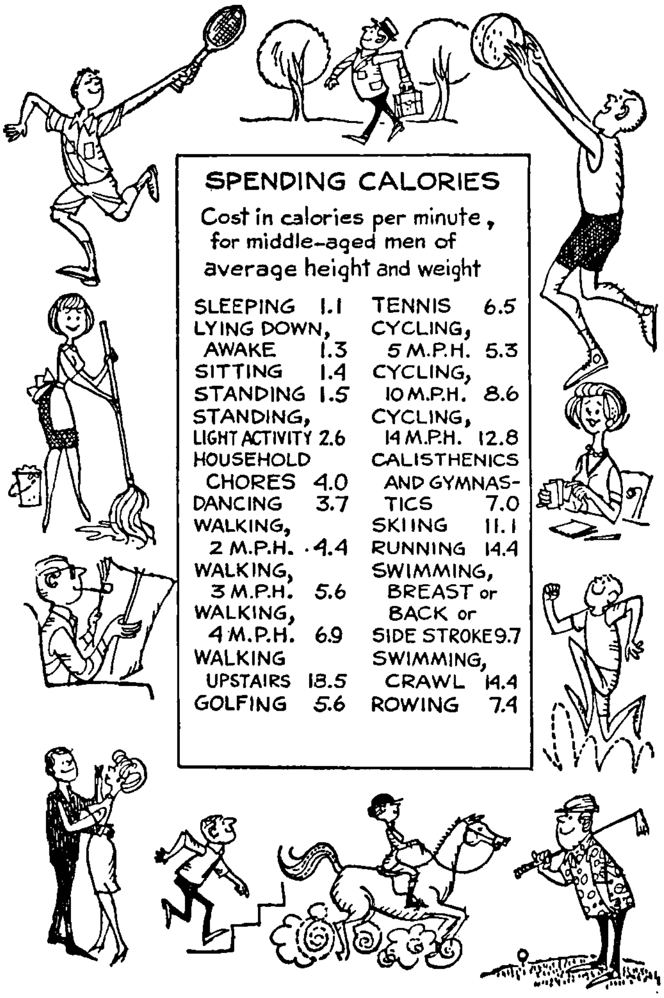
A Matter of Motion

Small differences in our ways of life do create an amazing disparity, Dr. Herbert Pollack of New York City points out. He has helped work out the energy or metabolic cost of numerous human activities. For example, consider the stenographer, 5′ 3″, weighing 120 pounds (pretty of course) using a mechanical typewriter. She spends 87.7 calories per hour operating it. Then her boss buys her an electric typewriter—and it costs her 72.9 calories per hour. Now she is spending 14.8 calories less per hour at her work, or about ninety calories during six hours of actual typing, or about 450 calories less during a week. By caloric arithmetic, this means she could gain a pound of weight in about eight weeks, and six pounds during a year, unless she reduced food intake, or better yet, turned to some other way of spending the calories saved.

Operating a tractor with standard steering wheel, a farmer was found to burn 157 calories per hour. With a new one equipped with power steering, his spending fell to 126 per hour, a saving of 250 calories during eight hours of work. This is equivalent to the calories in five slices of bread. And it's a far cry from the time he walked behind the plow.

In the home, a housewife used to spend 240 calories actually scrubbing the clothes, and another fifty putting it all out on the clothesline. But today it costs her only about fifteen calories to dump those clothes in the washing machine and then the dryer.

The biblical advice was that man should earn his *bread* by the *sweat* of his brow. That still applies in many economically underdeveloped countries where cereals and low-fat diets are the staples, and where human muscles do the work. These two factors could well be involved in the lower incidence of atherosclerosis and heart disease. But in the United States, and other advanced nations, the situation has reversed. In 1850, human hands and muscles performed 30 per cent of all the work done in the United States. But in 1950, human muscles performed only 9/10th of 1 per cent of the nation's work. With mechanization, electricity, coal, oil and atomic sources of energy and power, our use of muscles has declined



SPENDING CALORIES

Cost in calories per minute, for middle-aged men of average height and weight

SLEEPING	1.1	TENNIS	6.5
LYING DOWN, AWAKE	1.3	CYCLING, 5 M.P.H.	5.3
SITTING	1.4	CYCLING, 10 M.P.H.	8.6
STANDING	1.5	CYCLING, 14 M.P.H.	12.8
STANDING, LIGHT ACTIVITY	2.6	CALISTHENICS AND GYMNASTICS	7.0
HOUSEHOLD CHORES	4.0	SKIING	11.1
DANCING	3.7	RUNNING	14.4
WALKING, 2 M.P.H.	4.4	SWIMMING, BREAST or BACK or SIDE STROKE	9.7
WALKING, 3 M.P.H.	5.6	SWIMMING, CRAWL	14.4
WALKING, 4 M.P.H.	6.9	ROWING	7.4
WALKING UPSTAIRS	18.5		
GOLFING	5.6		

in almost all occupations, while caloric intake has not declined proportionately.

Working at a desk, a man today may spend only about 1.6 calories per minute, compared with six per minute for his wife while she is doing housework. The factory worker, with machine aid, does his job on the average with a spending of some two calories per minute, and the coal miner in the mechanized pits has had his backbreaking labors relieved so that he spends about four calories per minute on his job.

By and large, we have won leisure and freedom from drudgery, and we treasure these boons. But we are no longer obliged to use our muscles. A rising cost is counted in creeping fat and flabbiness, a scourge of aching backs, and worse, a pretty good chance we are rusting our arteries.

"Most of us don't wear out—we rust out," declares Dr. Theodore G. Klumpp of New York, a student of aging, himself a vigorous tennis player at 60. "We are still stoking the human furnace as we did when muscle power made the world go round," he adds.

Elevators, automobiles, power steering and brakes, automatic kitchen, automatic factory lines, huge earthmoving machines, have penalized our muscle use, and brought a general decline in exercise. The clothes dryer, the electric typewriter, the automatic mining machinery are great inventions. By all means, let us make full use of them and let us have more of them. But let us read the signposts of our new era rightly—and provide pleasurable healthful activities during leisure to maintain our muscles and our fitness.

Some sports have increased in popularity—but we are mostly spectators and critics, not performers. Children are given rides even for the few blocks to school or dancing class or the movies, rather than even thinking of walking. Large muscles of their bodies frequently are not exercised in childhood, much less during adult life.

By middle age, the bulging rubber tire around the beltline is often apparent as a full-blown sign of overeating and under-exercising. But middle-age spread is not inevitable. And while muscle tone does decline with age, you can help maintain it with activity and exercise. The lack of enough activity is one of the dangers and insults in George Livewell's whole way of life.

Some Myths About Exercise

Inactivity has been encouraged by mythology about dangers of exercise, and by the appeal of humor—"When I feel the urge to exercise, I lie down until it goes away," or "The only exercise I get is as a pallbearer at the funerals of friends who exercise." The myth that exercise kills is perpetuated because we occasionally read of men dropping dead on the golf course or tennis court, or while shoveling snow. Overlooked is the fact that only about 2 per cent of heart attacks occur during strenuous activity. Fifty per cent actually occur during rest or sleep—which doesn't make sleeping a dangerous invitation to a heart attack.

Obituary pages usually record only the deaths of fairly prominent men, and such men often have the leisure to play golf or tennis. Snow shoveling deaths are news items when many people are grudgingly removing snow. Such victims were not in good enough condition to make that effort, and might have died from any similar exertion a few days later. The fact is that these people already had severe coronary disease—the exercise was only the final event tipping the scales and precipitating the fatal attack. The basic damage in the form of advanced atherosclerosis had been piling up during the years of no exercise. Superficial reactions to incidents of this kind serve only to implant the idea that exercise is bad, rather than good for the human heart for the person in good health, even if overweight.

Another myth is that exercise is useless because it makes you hungrier, so you eat more. Experiments and studies with man and animals repeatedly have shown that if exercise is decreased below a certain point, the intake of food actually increases rather than decreases. People and animals with the lightest food intake are those who engage in moderate physical activity. Those who exercise more, eat more. But the people who exercise less do not eat less—they eat more. If you don't walk the half hour a day that might be equivalent to three slices of bread, you still want to eat that amount of food. But the walker can burn up some of his excess calories—and condition his habits to avoid the hunger after exercise, and the overeating and overdrinking at the nineteenth hole.

Other studies find that obese teen-age children tend to be inactive compared with the non-obese, and the slimmer youngsters generally eat more than their chubby companions. Inactivity appears to be more important than overeating in development of childhood obesity, Dr. Mayer finds. When the youngsters are systematically exercised, they lose weight and fat, despite increasing their food intake.

Another myth is that exercise is hopeless because you must walk about thirty-five miles to lose one pound of fat. The arithmetic is correct—but nobody insists you walk the thirty-five miles in a single day. Spread it out, spending 100 calories more every day, and in thirty-five days you withdraw the 3,500 calories equivalent to one pound of fat. In a year's time, that can mean a loss of ten pounds. Did you eat, in one day, the extra 35,000 calories represented by ten pounds of fat? The fifty-mile-hike fad a while ago showed that some people are in good enough condition to make that effort, and some might have burned off a pound or two of fat. But it's a tough way of burning up calories, and who really has the time?

Still another myth is that men must slow down at 40. This actually was the general medical advice and fashion years ago. Doctors then were acting on the best information and guesses they had available, and it is no disrespect to suggest they were wrong then. No one today would suggest that physicists in the 1920's were incompetent because they had not yet achieved atomic energy. Medical science has advanced in its knowledge of the workings of the human body, and its needs. But the myth of slow-down-and-take-it-easy has been firmly established in the public mind. Now we know that the "slow-down-and-live" advice applies more to speeding in automobiles than to our hearts and muscles.

Be A Calorie Spendthrift

If you are chained to a sedentary life, try moving around more. Even in an office, calories can be spent by walking up a few flights rather than taking the elevator, by walking to and from the job, by using your legs instead of wheels to carry you a few blocks, by going to see co-workers rather than summoning them (if you're a chief), by taking up—very gradually—sports and interests you have abandoned. Activity can be a family affair, too, for the health of child, wife and husband.

Calisthenics cost calories, and are conditioners, but tend to be dull, unless interest is somehow aroused in them. A better choice is activities which use muscles while giving enjoyment. And try to make it daily activity, not only to spend calories but to improve blood flow, muscle tone, aid digestion, and aid in sleeping—and as a way to shed extra pounds without going hungry on a severely restricted diet. Reducing machines, vibrators, and other passive "aids" to weight reduction have one thing in common—they don't work.

When you begin exercising you may encounter problems from social mores. Several years ago, one of us discovered, through use of a reliable pedometer—a pocket gadget for measuring distance walked per day—that his normal daily mileage on the job was low. He decided to increase it by walking to and from a suburban railroad station each morning and evening to increase his walking by 1½ miles a day, except in foulest weather. Still today, friends and even strangers almost every day offer rides, in disbelief that he really wants the ten-minute stroll. The habit even involved stress for his wife who began worrying—maybe the neighbors thought she was too lazy to drive him.

Dr. Mayer tells of a psychiatrist in exclusive Beverly Hills, California, who liked to walk at night, dressed in slacks and sport shirt. Police on the watch for prowlers and suspicious characters repeatedly stopped him, even taking him to jail when he lacked identification and insisted he was only out for a walk. He had to call his wife to fetch him. The psychiatrist solved the problem by buying a dog to take along on his walks. He wasn't bothered again, Dr. Mayer reports, "because everyone knows a *dog* needs exercise."

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Exercise—The Heart Tonic

Wintry wind whipped along the New York City street. "I'll get you a taxi," the man said.

"How far is it? Eight blocks? I'll walk, thanks," and with that, Dr. Paul Dudley White picked up a heavy suitcase and plunged out the door to keep another appointment before heading—that time by taxi—to an airport to continue his journey.

"Hard work never hurt a healthy human heart," declares this eminent heart specialist who religiously follows his own advice and takes vigorous daily exercise. In his 70's, he urges legpower or bicycling as often as possible in place of auto wheels, and on holiday in Vermont goes marching over a mountain for relaxation.

Dr. White has powerful company in a growing legion of specialists and doctors who endorse regular exercise and physical activity as part of a general prescription to protect the heart and help prevent premature heart attacks and strokes. Exercise provides much more than a way of spending calories to help control weight. Research has turned up increasing evidence as to *why* exercise may protect the human heart.

But any established myth dies stubbornly. At a recent health fair, where the public could answer questions about the heart as true or false, a majority said it was "true" that vigorous activity hurts the heart. Many people are aghast that a middle-aged man should exercise, and voice a protest. Dr. Klumpp, who regards exercise as an "anti-rust" for the arteries, avoids the complications sometimes when a business conference is nearing its end, and the time is coming to make a train to keep a tennis engagement. Rather than say he is going to play tennis, and risk lost time in explaining the value of exercise, he simply says, "Excuse me, I have to keep an appointment for a medical treatment."

The concept of exercise as good medicine for the heart grew from three major lines of research. One is that it can promote "collateral circulation." Another is the observation that men physically active in their jobs may be less subject to heart attacks than the sedentary ones. Third is the recent finding that vigorous exercise may reduce blood cholesterol levels and speed up removal of blood fat.

Collateral Circulation

When you exercise or work physically hard, your heart must work harder and more efficiently to distribute more blood everywhere, including to its own muscular tissues through the coronary arteries and all their smaller and smaller branches. This helps develop what is known as collateral circulation—a richer, more extensive network of blood channels to assure a good blood supply to all areas of the heart muscle.

When a heart attack occurs from blockage of an artery, the heart tries to establish collateral circulation, actually growing new small blood vessels and capillaries to take blood to the area deprived of normal flow. This is one factor in successful recovery from a heart attack.

The heart which has already been challenged by extra work or activity has, to an extent, already taken this step. It is already prepared to meet an emergency and keep vital traffic flowing if a roadblock does occur from a heart attack. Even if some artery clogging is beginning to build up, the exercise may prompt the extension of collateral circulation as a man asks his heart to do more work despite one artery which is less efficient than it should be. Other blood channels extend to take over the job.

It is an isolated instance, but Clarence DeMar ("Mr.

Marathon"), who died of cancer at the age of 70, had coronary arteries two to three times the normal diameter. He had some atherosclerosis in these arteries, and in his aorta, but no serious obstructions of the channels. DeMar had run 1,000 long-distance races, including 100 true marathons of twenty-five miles or more. He had competed in his last race in 1957, at the age of 69.

Lower Incidence—Greater Recovery

Our old friend, epidemiology, produced strong clues that men physically active on their jobs fare better against heart attacks than the "sitters." In an early, provocative study, Dr. J. N. Morris and associates in Great Britain found that bus drivers, sitting behind their wheels, had a higher incidence of heart attacks than did the conductors running up and down steps on double-decker buses. When initial heart attacks did strike, the conductors were more likely to survive.

Morris noted the same difference in the postal service--a higher rate among sedentary clerks than among mailmen trudging their rounds. Again, the attacks striking mailmen were less likely to be fatal during the first days or weeks. National autopsy studies in Great Britain of hundreds of men found less coronary disease among men whose recent jobs had required greater physical activity. Their activity had seemed to aid development of collateral circulation.

One immediate scientific question was whether the bus drivers were "sitters" by choice, and perhaps heavier in girth when they started their jobs. Was it really occupational activity or something else, accounting for the difference in heart attack rates compared with conductors? Morris checked into this by comparing only those bus employees of similar girth and age, and still found the conductors with a lower rate of heart attacks, and initial fatalities from them. These drivers and conductors came from similar class levels, and ate remarkably similar diets. The conductors had lower blood pressures, lower blood fat levels, and lower hemoglobin levels.

Note that the conductors and mailmen, too, were not immune from heart attacks. Far from it. The exercise helped somewhat, but was not by itself a thorough-going mode of protection.

Some studies of American workers have also found fewer attacks among men physically active on their jobs. In North Dakota, for example, farmers were found to have a lower rate of heart attacks than non-farmers in the same area. Other studies have not observed lower coronary rates in men engaged in active occupations in this country. The findings here are not consistent.

In one major research project, Dr. Henry Taylor and associates of the University of Minnesota checked on railroad men—clerks, switchmen, and men doing much heavier work on maintenance of way. All had been on their same jobs for ten to twenty years or longer into middle age. The clerks suffered death rates from coronary disease ranging up to *double* that of switchmen, while men working on maintenance of way had slightly lower rates than the switchmen in the age groups 40 to 49, and 50 to 59.

The switchmen and clerks didn't vary much in their blood cholesterol levels, or weights—but the switchmen did tend to have more muscle, and less fat.

Using a device measuring consumption of oxygen, Dr. Taylor's group measured how much energy the men expended on their jobs. On the average, the switchmen spent about 600 more calories a day than the clerks.

Now, 600 extra calories is a huge expenditure for a man whose job keeps him at a desk, or indoors. To spend 600 or more, he would have to walk briskly for two hours, or swim fairly vigorously for a full hour or more. It's extremely doubtful he could ever find time for that kind of exercise, or would be much tempted to try. Any light activity during his working day, including doing all the walking he could, would fall short of such a goal. Is 600 calories of extra expenditure of work a critical amount in producing a 2-to-1 more favorable chance of avoiding a coronary, or how much is helpful? We still need good experiments to pin this down, and as yet there is no information that just *light* activity is helpful, if at the same time we keep following our present food habits.

But there are good grounds for thinking the additional exercise could greatly benefit the now-sedentary person if he also reduces his consumption of saturated fat and cholesterol. If we act against high blood cholesterol and against obesity, there is hope that spending 200 to 300 calories more each day through exercise and work could have protective effects. Heavy work or exercise alone is not a "vaccine," nor is inactivity the only cause of atherosclerosis and coronary attack. But exercise—along with diet—is one of the approaches to preventing premature attacks.

Down Goes Cholesterol

In a third influence, exercise may actually lower blood cholesterol levels, or offset at least some of the effects from our modern diet.

At Kent State University in Ohio, Dr. Lawrence A. Golding put forty-two men, all working in sedentary occupations, through a program of repetitive exercises to develop muscular strength by calisthenics, and other activities to step up endurance. They met an hour a day, five days a week, for nine months, and ranged in age from 29 to 63 years. Another group of thirty-five men served as "controls"—meaning they did not go through the exercises.

In every man taking up the exercise, blood cholesterol declined, with the greatest drop among the men who had the highest levels at the outset. From a mean of 260 among all the men, the level fell to 195. The reduction was highest (eighty-five milligrams) among those who attended class most of the time, and still showed a welcome fall (by fifty-one milligrams) among those attending the class 70 to 80 per cent of the time. By contrast, there was no significant change in the controls who didn't go in for the muscular work.

None of the men was asked to change his diet in any way. Practically all were in poor physical condition at the beginning, and began with mild exercise. It was five months before they could do any significantly strenuous exercises. Once they could, and once the work was made increasingly difficult, their cholesterol levels began to come down. With such heavy exercise, food intake undoubtedly increased, to supply the needed extra calories. The Kent U. study did not furnish details on this aspect. Perhaps the men changed the composition of their diets, and this may have contributed to the fall in blood cholesterol. The interplay between diet and exercise is a complex one in such long-term experiments, and other workers have not been able to lower cholesterol by exercises alone. More studies on this important problem are needed.

Skip to Michigan State University, where rats were forced to exercise while they were kept well fed. They had less body fat, and lower blood cholesterol, than rats kept inactive while eating all they wanted. In this experiment, regular exercise appeared more effective in controlling fatness and cholesterol than restrictions on food.

At Harvard University's School of Public Health, Dr. George Mann and Fredrick Stare had young men gorge themselves on 6,000 calories a day. With no increase in their daily exercise, the volunteers gained weight and their blood cholesterols rose. But when they exercised vigorously to offset the high food intake, they didn't gain weight, and their cholesterol levels didn't rise, even when they ate foods high in fat content.

Our military services take thousands of young men each year from civilian life into rigorous basic training—and many say they never felt better physically in their lives than during this period. They eat more food, even prodigious amounts, and usually replace flabby pounds with solid muscle. The military fare habitually has been one high in saturated fats and cholesterol. The percentage of fats is even higher than most Americans now eat.

What happens to such young men? A medical team investigated 101 young Marines during twenty-two weeks of boot training. They consumed an average of 4,500 calories a day, with fats from milk, butter, eggs, meats, etc. supplying about 45 per cent of all their calories. They didn't show any significant rises in blood cholesterol—already fairly high to begin with—but did have some rise in blood content of triglycerides, another form of fat. They gained little or no weight.

But these young men were kept vigorously active sixteen hours a day, becoming furnaces for foods. With that kind of activity, a diet high in calories and saturated fats may not promote atherosclerosis, said the research team composed of Capt. G. L. Calvey of Camp Lejeune, N.C., Drs. L. D. Cady, M. M. Gertler and Miss J. Nierman of New York University Medical Center, and Lt. M. A. Mufson of the National Institutes of Health. In their report, they wonder—as others have—whether the typical U.S. military diet ought not to be revised not only for recruits but for men on active duty and for the civilian population as well. It simply takes tremendous effort to offset the cholesterol effect of our typical diet.

All branches of our military establishment report a shockingly high incidence of coronary disease among relatively young men. In peacetime, at least, after basic training they keep eating the same kind of food, but their assignments rarely call for continuing the same amount of exertion as in the first few months. Pot bellies on easy duty are not uncommon. If the high intake of calories is not covered by exercise and exertion, the blood content of cholesterol and triglycerides goes up, with serious portents for premature heart attacks.

Other Possible Benefits

Researchers are exploring the intriguing question of exactly how exercise may help prevent atherosclerosis and heart attacks. One hunch is it may affect the rate of synthesis of cholesterol in the body. Some authorities think there is a beneficial effect from stimulating the thyroid gland, the "pacemaker" governing metabolism, so fats are burned up more speedily in the bloodstream. There is evidence that exercise helps the body dispose of fats consumed in food. After a meal, exercise brings about a quicker clearing of the milkiness of the blood. Activity may also help combat blood clots or thrombi, since blood tends to coagulate more easily if it has a high content of fats.

Whenever you face an upsetting or threatening situation, your adrenal glands pour out adrenalin to prepare you to fight or run. There is evidence that this mechanism makes fats available in the blood, for energy and muscular activity. But, if the fatty material released this way is not used up, it can float around and perhaps promote the clogging of arteries. If you do fight, or run, or exercise, the fatty material could be used up. This is one possible explanation for harmful effects from everyday stresses in our lives, unless we react with physical action—or go find an outlet and fun through exercise.

Once we used to hear a good deal about the "athlete's heart," supposedly meaning a heart enlarged from lots of exercise as a young man, and so somehow doomed to wear out sooner than the heart of the man not "damaged" by vigorous sports. Medical science now knows that there is really no such thing as the "athlete's heart." Some famous athletes do die prematurely from heart disease, but generally speaking athletes live as long or longer than men who sit in the stadium to watch the gladiators. The great problem for the former high school or college athlete at team sports is to find something to keep him active throughout life. If he keeps eating as in his playing days, he gains weight and fat, and with lessened activity, he is headed for potential trouble.

A far more apt phrase is "loafer's heart," coined by Dr. Wilhelm Raab of the University of Vermont. Inactivity can make the heart less able to meet the stresses of life. Dr. Raab believes heart tissues can be damaged by chemicals from the breakdown of adrenal hormones released by emotional stresses—if a man's heart has been *under*exercised, and doesn't have normal counter-regulatory ability.

Almost certainly, exercise and physical exertion can help us handle many mental stresses. Muscular work provides an outlet for the tensions that inevitably build up within us. Muscular exercise helps us relax physically and mentally, it promotes sounder sleep, and better digestion. It's a safety valve for the aggressive feelings stemming from frustrations and tensions. The man who expresses these tensions by striking a ball, or through games, is less likely to strike out at spouse, children, neighbor or co-worker.

He also may be helping himself to avoid "old" arteries in a young body. Says Dr. White: "The habit of regular and vigorous exercise is a necessity in a program of positive health." He advises changing our customary words at parting from "take it easy," to "take it hard." And, adds Dr. Edward L. Bortz of Philadelphia, a prominent specialist on aging, "it begins to appear exercise is the master conditioner for the healthy, and the major therapy for the ill."

Dr. Bruno Balke, of the Civil Aeromedical Research Institute, Norman, Okla., a physiologist, says daily exercise can alleviate some symptoms of aging such as high blood pressure, artery or heart spasms, the accretion of fat, and that it can improve lung capacity and functional abilities. In a society of soft living, many of us are not prepared to meet emergencies calling for any degree of real endurance, he says. If a plane came down in a desert, twenty-five miles from the nearest town, the vast majority of passengers couldn't reach help.

Fit for the Future

The physical condition, or lack of it, of American youngsters has been a growing cause for concern, and the President's Commission on Youth Fitness under Charles "Bud" Wilkinson, the University of Oklahoma football coach, is spearheading a major effort to prevent today's youngsters from joining the ranks of flabby adult Americans.

Our underdeveloped, overprotected children lack muscle strength and tone, and coordination, and cardiovascular fitness, the Commission points out. It is urging more attention to physical exercise and fitness in schools and at home to prevent physical degeneration.

Fitness by itself doesn't prove anything, Wilkinson remarks. The goal is not to make athletes out of all American youngsters, or adults. It is to make them feel well enough to do all their jobs well, and to be up to par physically, to be able to go on to more demanding physical activities and challenges if they want to, or need to.

Children can be encouraged to be more than spectators, especially if parents set an example. And while team sports are part and parcel of our custom, the young athlete also should be encouraged to pick up skills or pleasure at more individualized sports which he can follow throughout life. Apathy is the biggest hurdle the Commission encounters, Wilkinson adds. "Nobody says, go be unfit. But nobody much says, go and become fit." The high rate of rejection of young men for military service, due to physical defects, is sometimes partly blamed upon poor habits of exercise and physical development.

In adult life, it is never too late to begin to improve over an existing poor physical condition. A thorough medical checkup is an essential first step, to learn what you can safely do. Any program of improvement or restoration should of course begin slowly, and mildly, building up to greater endurance ability. Overweight or obese men have less tolerance for activity and stress, and need to begin even more cautiously. And don't push to overfatigue. It took time to become short of breath, and endurance and the recouping of endurance can't be done in a week.

Once started, the activity should be continued, preferably daily, not just the weekend spurt with only a minimum of effort or walking on weekdays. It isn't done through just an occasional game of badminton or golf. It should become a rule of living. The first five pounds or so of excess weight should be the signal to begin exercising more.

Joining an athletic club is a fine idea, if you can afford it. And if you use it as such. In the heart study with utility company men in Chicago, about fifty men in office or executive jobs said they belonged to an athletic club. That implied exercise. But when the matter was pursued further, most acknowledged that all they did at the club was to eat lunch or dinner. The "exercise" involved only hand and jaw.

The best activity or sport for you is a matter of preference, convenience, availability, and your physical condition. It can be swimming, golf, squash, tennis, badminton, bicycling, a home rowing machine, calisthenics, brisk walking at any time of the day including the noon hour. President Truman made his daily early morning walk a ritual. Walking can provide time to think, and see bits of an interesting world that go by awfully fast from a car window. The objective is to find something that suits you and helps restore or maintain good functioning of your body.

Well, how about those elderly active men who seem to be living along quite well without having heart attacks and who seem to flaunt the recommendations for slimming down and being more active physically? Is good fortune or a better constitutional endowment involved? Perhaps. But is this a good reason to say, "I'll take my chances and be a George Livewell so far as exercise goes"?

No, not from all the evidence and new understanding. The odds are against most of us if we try to emulate these men—and hope to do so as well, or nearly so. Sensible activity and exercise, in the largest amounts you can handle, are indeed part of the new approach to guarding your heart.

14

Smoking, and Your Heart

FOR SOME 400 YEARS, MAN HAS FOUND PLEASURE IN tobacco through pipe, snuff, cigar and, especially in the last half century, through cigarettes.

For millions of men and women, cigarette smoking has marked one major change in our habitual way of life since World War I, with cigarette consumption increasing about 500 per cent in that time. Cigarette smoking is one prime suspect among the conspirators—along with many others—contributing to the mournful toll of premature heart attacks among middle-aged men.

And whether we like it or not, investigations during the last dozen years have turned up ominous statistical evidence that heavy cigarette smokers increase their risk of premature heart disease by three to six times over non-cigarette smokers. These studies find too that smokers who stop before they become ill, or who greatly reduce their smoking, also reduce their added risk.

Proof is lacking for direct cause-and-effect mechanisms between cigarette smoking and coronary attacks. There is as yet little definitive understanding as to *how* smoking affects the heart detrimentally.

But over the past few years, more and more specialists and medical and health groups have been impressed by the mounting data demonstrating the risks—and have taken a stand saying or suggesting that cigarettes are harmful to health and to the heart, and urging that smokers quit and youngsters be discouraged from taking up the habit. Doubters and defenders of cigarettes have also spoken up strongly.

Recommendations for changes are certainly not to be made lightly. Cigarette smoking involves a multi-million dollar industry, the employment of hundreds of thousands of citizens from farmer to manufacturer to advertiser and retailer, a very considerable revenue for government from taxes, and the pleasure of tens of millions of people. What is the background?

A Clouded Controversy

Statistical and other research linking cigarettes to increasing incidence of lung cancer are well known. Less well known is the fact that these studies also linked cigarettes with a greater risk of coronary heart disease. This is much more significant in terms of total numbers of human lives involved than deaths from lung cancer, because heart disease for years has been a greater killer disease. The latest surveys reinforce this same finding.

It turns up in statistical studies looking both ways—retrospectively or backward into the habits of people who have developed heart disease or cancer, and prospectively, looking forward to learn what diseases develop among men and women who smoke cigarettes, or who smoke pipes or cigars, or don't smoke at all. The agreement in both these approaches, plus other evidence, is not easy to explain away.

In Framingham, the prospective or on-going study of the U.S. Public Health Service has found heavy cigarette smoking associated with more than a two-fold increase in risk of severe forms of coronary disease, and increased deaths from all heart ailments. The risk increases with both the amount and duration of cigarette smoking.

Drs. Thomas R. Dawber, Joseph Doyle and colleagues have reported their analysis of combined figures from the Framingham and Albany studies. This shows a six-fold increase in fatal heart attacks and deaths from all causes among middle-aged cigarette smokers, compared with non-smokers, former cigarette smokers, and pipe or cigar smokers. All of these 2,080 men aged 40 to 49 had been free of clinical disease when observations had begun eight years earlier in Framingham, and six years earlier in Albany. The differences were not attributable to differences in blood cholesterol levels, body weights or blood pressures.

For some twenty-five years, a few medical reports had been linking cigarette smoking with decreased longevity and with lung cancer. So far as major public attention is concerned, the fuse was lighted to the cigarette-cancer bomb in 1951 when Drs. E. Cuyler Hammond and Daniel Horn of the American Cancer Society began checking upon nearly 190,000 men, aged 50 to 69, and causes of their deaths. In 1954 and later, they produced their findings: Cigarette smokers die off earlier. And 25 per cent of their excessive or premature deaths, as compared with non-smokers, was attributed to lung cancer.

But this very same study found that 50 per cent of the excessive or premature deaths among cigarette smokers was due to coronary heart disease.

Roughly the same figure has come from a National Heart Institute study of 290,000 veterans holding U.S. Government life insurance policies. This study under Dr. Harold Dorn, checking into the men's smoking habits, found a 63 per cent higher death rate from coronary heart disease among cigarette smokers compared with those who didn't smoke, or smoked only occasionally.

In Chicago, Drs. Oglesby Paul, Mark Lepper and colleagues checking on middle-aged male employees in an industrial firm reported that cigarette smoking significantly contributed to risk of heart attack. The Peoples Gas Company study by Stamler and co-workers also reports significantly higher five-year mortality from all causes and from heart attacks in smokers of a pack of cigarettes a day, compared with all other middle-aged men in the company.

In England, Richard Doll and Bradford Hill found about twice as high a death rate from coronary disease among male smokers than non-smokers under age 55, but little difference in death rates from heart trouble after that age among smokers versus non-smokers.

Numerous surveys agree that smokers just do not live as long, regardless of cause of death, as non-smokers. A study of 25,000 British physicians concludes that a man of 35 has 1 chance in 23 of dying during the next ten years if he is a heavy cigarette smoker, but only 1 chance in 90 if he doesn't smoke. At this halfway mark in average lifespan, 1 in 6 of non-smokers won't enjoy his 65th birthday or retirement pension. Admittedly, said Drs. Doll and Hill, there could be additional influences affecting these chances other than smoking habits.

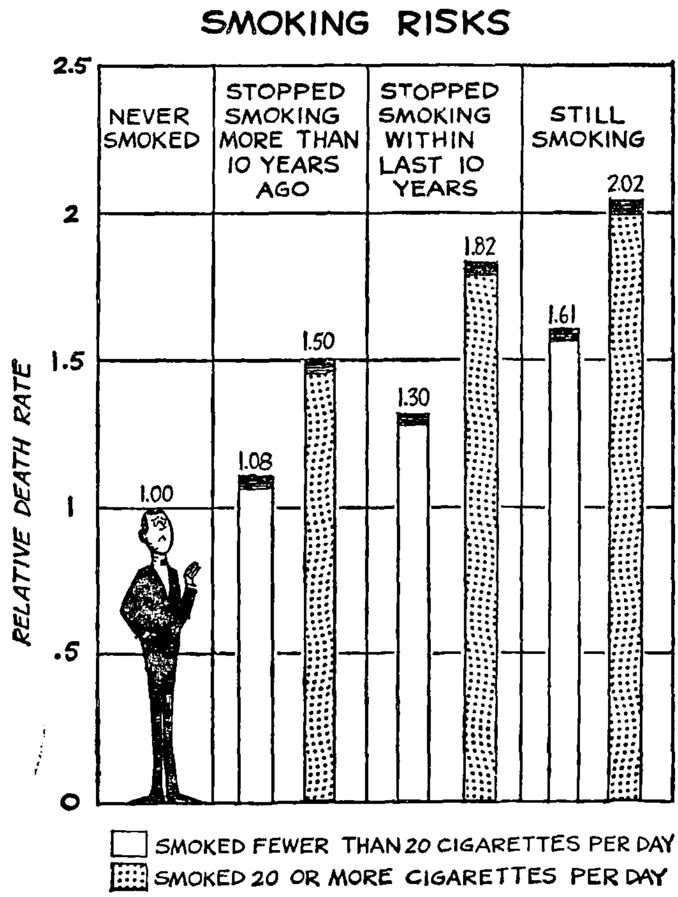
The studies to date all agree that cigar and pipe smokers are much better off than cigarette smokers. This seems to be related at least in part to inhaling by cigarette smokers. In general little extra risk of premature death has been found among habituees of pipes and cigars. And men who quit smoking cigarettes are found to have less risk, approaching the status of those who had never smoked.

After reviewing the evidence concerning cigarettes, the Royal College of Physicians in Great Britain declared in the spring of 1962 that cigarette smoking "probably increases the risk of dying of coronary heart disease."

In the fall of the same year, the American College of Chest Physicians said the scientific evidence indicates an association between cigarette smoking (and atmospheric pollution as well) and certain lung diseases, lung cancer, and cardiovascular disease. It concluded that the data strongly suggested a causal connection and urged members and doctors generally to tell the public, and youths especially, about hazards ascribed to smoking.

The American Heart Association in 1960 took note of statistical studies then indicating death rates from heart disease to be 50 to 150 per cent higher in heavy cigarette smokers (more than a pack a day) than non-smokers. It declared that while there was no proof of cause-and-effect, there were strong suggestions that heavy cigarette smoking may contribute to or speed development of coronary heart disease or its complications. It called for more research to find out if cigarettes were a cause.

In June, 1963, The American Heart Association went further, calling for educational campaigns to discourage cigarette smoking, especially by teen-agers and by adults with a high risk of coronary disease. It defined "high risk" as persons with a family history of heart disease or stroke by middle age, those with high blood pressure, or high blood fat levels, with signs of artery hardening, or a combination of these factors. It said the primary evidence that cigarettes


SMOKING RISKS
RELATIVE DEATH RATE
2.5
2
1.5
1
.5
0
NEVER SMOKED
STOPPED SMOKING MORE THAN 10 YEARS AGO
STOPPED SMOKING WITHIN LAST 10 YEARS
STILL SMOKING
1.00
1.08
1.50
1.30
1.82
1.61
2.02
SMOKED FEWER THAN 20 CIGARETTES PER DAY
SMOKED 20 OR MORE CIGARETTES PER DAY

could be harmful was still statistical, and again urged expanded research to investigate any relationships between cigarette smoking and cardiovascular disease.

Defending tobacco from these charges, the Tobacco Industry Research Committee concurred with the need for more research before cigarettes are blamed as a cause of lung cancer or heart disease. This committee, supporting research concerning tobacco and health, cites studies that presumably absolve or cast doubt on smoking as an abettor of these diseases.

The problems of cancer and heart disease are very complex, and "a broad range of possible causal factors is and must continue to be under study," the Tobacco Committee declares, and cigarette smoking should not be singled out from among the many suspects.

The U. S. Public Health Service in the fall of 1962 took the first step toward an official government stand on health aspects of smoking. It appointed an expert committee to review all available information, with another committee then probably to make recommendations upon the findings. In Great Britain and several other European countries, the Ministries of Health are already deeply involved in anti-smoking efforts.

The American Medical Association had scheduled a year-long special study of possible relationships between tobacco and various diseases, but dropped the plan. The AMA's Council on Drugs said it had trouble finding appropriate scientists and physicians to serve on the panel, and would recommend to doctor-delegates that the AMA await the report from the Public Health Service.

Cigarettes are under a smoky cloud, and the controversy may not be settled to everyone's satisfaction anyhow unless and until it is shown just how smoking acts to produce premature heart attacks.

What Happens When You Inhale

Cigarette smoking does bring a *temporary* small increase in blood pressure and pulse rate, and a drop in skin temperature of the fingers and toes presumably from constriction of their tiny blood vessels due to effect of nicotine. But the evidence is far from conclusive that nicotine from inhaled smoke is the great culprit. In animal experiments (Chapter

5), nicotine was one of the noxious materials injected in pure form in unsuccessful attempts to produce atherosclerosis. However, the experiments showed that it did damage arteries, and nicotine may act as a contributory cause.

Another possible nicotine effect is advanced by Dr. Alfred Kershbaum and colleagues of the Philadelphia General Hospital. They say nicotine stimulates the nervous system and adrenal glands to release hormones which in turn release free fatty acids into the bloodstream. They found the amount of free fatty acids in the blood increased within ten minutes after people smoked two cigarettes. The role of these free fatty acids—if any—in atherosclerosis is still unclear. And smoking does not seem to raise blood cholesterol levels.

Smoking doesn't seem to have any significant effect on the blood flow through coronary arteries of normal persons, says the Royal College of Physicians report. But in persons who already have coronary disease, electrocardiograms show signs that the blood flow has been reduced, and this might be due to nicotine. The reactions of individuals, however, vary a good deal.

Other studies suggest that smoking may speed up the rate of blood clotting, and make the clots somewhat tougher . . . that heavy exercise puts a greater strain on the hearts and lungs of smokers than non-smokers . . . that smoking impairs vital capacity (a measure of lung function), and decreased vital capacity has recently emerged as another coronary risk factor.

From a microscopic look at lung tissues, Dr. Oscar Auerbach of the Veterans Administration Hospital in East Orange, N.J. and Dr. Hammond suggest mechanisms for the link between smoking and heart disease. The pathological studies found extensive rupturing and thickening of the walls of the air sacs, or alveoli, in the lungs of smokers versus nonsmokers. The walls of small arteries and arterioles also were thickened, with this deterioration worse in heavy smokers.

Dr. Hammond suggests that these tissue changes put added work upon the heart, while at the same time the oxygen supply in the bloodstream is reduced, because the lung air sacs are less efficient. Carbon monoxide in tobacco smoke combines more easily with hemoglobin (the carrier of oxygen) than oxygen itself does, thus further reducing the oxygen "fuel" while it is working harder to oxygenate the blood.

This Much Is Certain

Smoking obviously doesn't promote physical health.

The American Cancer Society is concerned enough to have started a campaign to discourage youngsters from smoking, emphasizing its findings of lung cancer risk. The American Heart Association has joined this effort, because of the link between cigarette smoking and coronary disease. The Parents-Teachers Associations are lending their great weight to this effort. So are many others, as the concern rises to flood-tide.

The Royal College of Physicians decided the health risks are serious enough to call for general preventive measures. Among its suggestions were efficient cigarette filters; possible modification in tobaccos if the harmful elements can be detected; smoking less of a cigarette so that each cigarette's own length does a good deal of filtering; and switching from cigarettes to pipes or cigars from which the smoke is usually not inhaled. It frowned on advertising which might encourage children to start smoking, and the British cigarette industry began delaying TV advertising of cigarettes until after 9 P.M. Recently, the major U.S. tobacco companies agreed to discontinue their advertising in college newspapers and their campus representatives. And the President of the National Association of Broadcasters, LeRoy Collins—former governor of Florida—has urged that U.S. stations restrict cigarette advertising time, in line with the British approach.

The British Ministry of Health launched efforts to tell the public and school children of the hazards attributed to smoking, to restrict sales of cigarettes to children through vending machines, and to restrict smoking in public places. In the United States, and Britain also, numerous physicians have stopped their own smoking. Those impressed with the evidence of heart and cancer hazards know they can't very well tell patients to give up or cut down on cigarettes while the doctor himself puffs away.

The controversy rages, from declarations that smoking is a form of respiratory roulette and that encouraging teen-agers to smoke is comparable to dope-pushing, to insistence that no harm has been proven and that statistical associations have inherent weaknesses and merely produce scare stories, even promoted in part by killjoys. More soberly, the opposing standpoints are: No one has proved cause-and-effect or explained away the considerable statistical association.

Meanwhile, cigarette consumption rises. Smoking is deeply ingrained psychologically and socially. For those who are already smokers, especially heavy smokers, it is difficult to control or break the habit. And a huge investment in advertising—$100 million a year for TV alone—acts to perpetuate and extend the habit associating it with beauty, sophistication, virility, wisdom, and romance as well as pleasure. Especially under these social circumstances, it is no wonder that many smokers who try to quit never make it. As Mark Twain said, it's the easiest habit to break, he had done it a thousand times.

"Habit is habit, and not to be flung out of the window by any man, but coaxed downstairs a step at a time," Mark Twain added. Like losing weight and keeping it off, breaking the cigarette habit can be a long hard pull—and sometimes a very tough one. Often it requires the close guidance of a physician—and during the early days and weeks of an all-out effort, it may require a total plan for regulated living.

But more and more men and women have been quitting with success—doctors prominently among them. Most who stop smoking report they feel better, and cite physical and psychological benefits; others say they don't feel better, and continue keenly to miss the pleasures from smoking. Others declare they prefer the pleasure of smoking to the possibility of adding a few years to their lives. To those who say "everyone must die of something sometime," Britain's Minister of Health replied this argument was never advanced to discourage road safety or polio vaccination shots.

Many smokers say that when they stop, their appetites improve and they gain weight because they turn to food as a substitute. Others find they can control weight, some by becoming more active physically. For many, planning and guidance for weight control are sorely needed as the cigarette habit is abandoned.

Smoking certainly is not *the* critical factor in our epidemic of heart attacks. But the statistical studies unanimously point to smoking as one important influence, with significantly less risk encountered by non-smokers or those who stop smoking.

With tobacco, we have the choice of abstinence, moderate and careful use via pipe or cigar, or abuse with cigarettes—and serious risks.

15

Tensions and Stress

"IT'S THE BIG EXECUTIVES WHO COME DOWN WITH HEART attacks . . . from all those tensions and high pressures," the TV repairman remarked. "Guess I'm lucky in my job . . ."

He drove off on his next call and fumed—once more—at another poky driver, and his adrenal glands pumped furiously when a speeding car running a stoplight nearly hit him. He cursed trying to find an obscure house address, and for twenty minutes was wholly frustrated by a balky TV set. At home the sudden storm of a family quarrel ruined his dinner, and later he fretted by himself over the family budget, and how to squeeze out the funds to help his son go to college.

Many men comfort themselves that *it is mainly the big man* in the big job who is hurried to his grave from a heart attack because of tensions and stresses. Numerous men in stressful jobs worry that their work is killing them, and their wives worry, too. There's also some general impression that the tensions of our modern living are one of the great enemies of our hearts regardless of our jobs, and that nothing much can be done about it. We are too aware that people drop dead of heart attacks at thrilling baseball games, or during fires, or on other occasions of stress and excitement.

Stress and tension do have powerful effects upon our bodies, and can even raise blood cholesterol temporarily. But it still is far from clear that tension and stress *induce* the artery clogging, or are a key influence in setting us up for heart attacks. And it's debatable whether our way of life really involves *more* stress than our ancestors faced.

Stress Is Not New

Shooting a tiger away from the home cave, or hunting dangerous wild animals with a spear, weren't exactly picnics thousands of years ago. Being a slave forced to build a pyramid, or to labor at galley oars or pick cotton under an overseer's whip, involved stress. Pioneers clearing the American wilderness and facing great uncertainties and hazards had their stresses. The threat of great epidemics of infectious diseases stirred fear and induced stress. So did the threat of living in a city under siege by enemies who would put all captives to the sword—a stressful situation later translated to fire-bombing of cities, and now to threat by extinction of the human race in the holocaust from H-bombs.

Poverty, economic depressions, fear of unemployment, anger over social injustices, anxieties about our children, indignation and frustration at religious and racial discrimination, the race between income and debt, personal tragedies, accidents, the pressure to make critical decisions—these have been with us for a very long time.

Some kinds of stresses have changed. Ours is an era of heady, rapid changes and greater and greater complexity in our social and industrial organization. We engage more and more in mental work and decision making, less and less in physical labor, and live at a faster pace. We are more dependent on other people, and on baffling machines and devices. We are beckoned by more opportunities, and fretful of losing security or limb and life.

Some challenges—call them stresses and tensions if you will—are good for us, if we're not to live dull, vegetable lives, empty of change and progress and richness of experience. Our bodies are tuned to react to challenge and dangers, physical or mental, and our species would never have survived without these mechanisms. The question is whether more stress somehow is doing us in.

Some heart specialists think we are being subject to more stresses, pressures and deadlines in our technological society than formerly. Prof. A. L. Miasnikov of the Academy of

Medical Sciences in Moscow is one who thinks social environment, the tempo and noise and restlessness of modern life, and fear of war, play a role in heart attacks. He and other specialists observe that some people may react more sensitively to their environments than others. According to still other researchers, discontent, dissatisfaction, restless driving ambition, a keen sense of time urgency are the mark of the coronary-prone personality in our civilization.

All this is very difficult to assess, objectively. If psychological stress in general is a *key* factor in coronary heart disease, then we must assume that similar stress either doesn't exist, or else it operates differently, in countries where the incidence of heart disease is very low. Are African populations really happy, carefree people free of stress? Or isn't it more likely that they are undergoing a good deal of severe stress with the social, economic and cultural problems they have had for many decades, intensified now by the new ferments of winning national independence?

To put the question another way, is a particular kind of stress involved in bringing on atherosclerotic disease? Or is stress, or certain types of stress, significant only when linked with other elements, such as diet, smoking, high blood pressure? What kinds of stresses (if any) are really harmful—fear and anxiety, anger and frustration, uncertainty and boredom and restlessness, rapid change, time pressure, deadline chasing, working too hard, fatigue, not getting enough sleep?

Clues to the Nature of Stress

Clues to clarify the role of stresses and tensions are coming from varied and sometimes ingenious research. We've learned more about who gets and doesn't get coronary attacks, and heart specialists do have some suggestions for handling stresses in your life.

Everyone knows that our hearts beat faster and blood pressure rises and our hands may get clammy when we become scared or angry, or anxious, when danger suddenly appears, or even when we ask for a raise. We react to stress with more adrenalin and chemical changes in our blood to make us more alert, to prepare for fight or flight. But invariably we don't find it either permissible or possible to run away or throw a punch. This may be hard on our arteries and heart, unless we can find ways of handling stress.

In the person with angina from narrowed arteries, physical exertion can bring pain when the heart is forced to work harder and suffers from lack of oxygen. Emotional excitement or anger brings similar effects, increasing blood pressure and pulse rate and putting a heavier load of work on the heart. Emotional reactions increase the coagulability of the blood, which may boost the chances of developing coronary thrombosis or a clot.

Former President Eisenhower is quoted as saying that some few hours before his heart attack he had been annoyed by three nonurgent telephone calls interrupting a golf match. He thought perhaps there was a connection between that upset and his attack, but it is difficult to prove. Stress might precipitate an attack if a man already has the underlying artery disease, as Mr. Eisenhower did have.

But if some single event were all that critical, it is amazing how any political candidate manages to survive the tension of winning a nomination and then an election, or how athletes or actors or the ordinary unaccustomed-as-I-am speaker stands up under the emotional stress of public appearances. Fear or anger simply cannot reach out suddenly, to clamp off a healthy heart artery. But a long series of reactions to stress, combined with other factors, might have some effect.

For years, some researchers have held that high blood pressure is a response of a vulnerable person to unfavorable life experiences and stresses, and—as we have seen—hypertension is one of the most important coronary risk factors. In a recent study by the medical author and his wife, the frequency of hypertension among low income Negroes—a group very susceptible to this disease—was found to be closely associated with their psychological responses to stressful aspects of their life.

Stressful situations—and our emotional reactions to them—can also kick up blood cholesterol levels. Medical students taking tough final examinations, and income tax accountants at their busiest pre-deadline work, have both been found to have higher blood cholesterols than their norms at other times. Blood cholesterol has also been found to rise sometimes when a person has an exciting dream. Dr. Chester Pierce of the University of Oklahoma Medical Center showed this by taking blood samples by vein tube without waking sleeping volunteers when they were apparently having dreams.

Drs. Meyer Friedman, Ray Rosenman and associates of Mt. Zion Hospital in San Francisco noted rises in blood cholesterol levels in men subjected to cyclic variations in their occupational stress, and they cite other evidence that stress and tension play a role in susceptibility to heart attacks. From their studies, they conclude that a specific behavior pattern—"characterized by excessive drive, competitiveness, ambitiousness and an enhanced sense of impatience and of time urgency"—is associated with high blood cholesterol levels, increased clotting tendency of the blood and frequent heart attacks. This behavior pattern, they believe, "stems from habitual immersion in multiple vocational and avocational pursuits which are subject to 'deadlines' and time pressures." They are now testing these concepts—challenged and criticized by other researchers—in a large prospective study.

Col. Marshall Groover, Jr., of the University of Oklahoma, found cholesterol to be higher among Air Force men at times when they were under stress, with cholesterol coming down when they changed to other duty, or had rest periods. Other researchers hypnotized volunteers to study their reactions without any interference from any outside stimuli. Increases in free fatty acids were detected when they were prompted to feel angry, fearful or depressed. There was no increase among those whose emotions could not be aroused.

Also at the University of Oklahoma, Dr. Stewart Wolf, an authority on psychosomatic medicine, found striking changes in blood cholesterol of patients when they underwent emotional stress. One man, for example, had a sharp rise when he learned that a woman he liked was going to marry someone else. In each of these patients, their diet and amount of exercise were kept unchanged—only their emotional experiences varied. Cholesterol levels would rise within sixty minutes after emotional stress.

Dr. Wolf says it cannot be inferred that stress therefore plays a part in bringing on coronary atherosclerosis or heart attacks. For one thing, little is known about the effect of such brief sudden rise in blood cholesterol on the arteries. But the mechanisms governing the amount of some fats in the blood certainly are connected with and capable of reacting to impulses from higher centers in the brain, he says.

At the University of Chicago, Dr. Robert Wissler and colleagues fed monkeys a diet that produces atherosclerosis and elevates blood cholesterol. To some, he gave a familiar tranquillizer, and they had less cholesterol in the blood and less atherosclerosis than other monkeys given ephedrine, a stimulator of the central nervous system. A third group of monkeys, getting the same diet, but no drug action on the nervous system, had cholesterol levels and artery plaques between the two. Dr. Miasnikov in Moscow has done similar experiments on rabbits, with similar results. Back in the early days of experimentation, Anitschkow had found that rabbits got scarred and damaged arteries but not atherosclerosis if given repeated injections of adrenalin. But severe atherosclerotic plaques did develop in the scars when he fed cholesterol and fats as well as giving the adrenalin.

The nervous system and glands seem to be involved in the way cholesterol is formed and handled. But whether people have persistent high cholesterol because of chronic nervous tension and stress is still not known. It's certainly not unreasonable to suspect that the kick-ups in cholesterol and blood pressure from stresses could help promote atherosclerosis, especially in people on high-fat, high-cholesterol, high-caloric diets.

Challenge—or Threat?

Our personalities, and ways we react to stress, could well be involved. An apparent link between personality traits and risk of subsequent coronary disease—particularly angina pectoris—was turned up by Drs. Adrian Ostfeld, Oglesby Paul and Mark Lepper in a study of more than 2,000 middle-aged men employed by the Western Electric Company in Chicago. They were checking into a host of possible factors behind heart disease, including body build, diet, smoking, blood cholesterol, blood pressure, occupation and personality patterns. The men, all ostensibly healthy at the outset, were tested with the Minnesota Multiphasic Personality Inventory. Those who later developed angina showed a tendency to answer certain questions differently, and "scored higher than non-coronary men on measures of hypochondriacal, depressive, psychasthenic, hypomanic, and generally neurotic behavior."

Differences in our types of jobs provide a kind of laboratory to study stress effects. The big problem is to put a label on the real amount of stress involved in each job and for the individual performing it.

Through questionnaires, Dr. Henry L. Russek of Staten Island, N.Y., surveyed 3,000 physicians in general practice and 9,000 specialists in medicine, dentistry and law to learn how many had had heart attacks. He found coronary heart disease three times more prevalent among general physicians than specialists, such as dermatologists or pathologists, who presumably have less stressful jobs. Lawyers trying cases in court had more coronary disease than patent attorneys in presumably calmer jobs.

Dr. Russek also found that men who had formerly smoked reported a lower rate of coronary disease than those who had never smoked. This shouldn't be so if smoking is an important risk in heart attacks, he feels. His theory is that people who manage to stop smoking are better capable of adapting to stress than those who habitually smoke, or who never smoked. So his vote goes to stress as being more significant than smoking.

These findings certainly merit a follow-up, partly to make sure that the sample of men was representative and not affected by failures to answer the questionnaire. This is always a problem with questionnaire surveys. Thus, Dr. Russek's findings on smoking and the results of quitting, compared with never smoking, don't agree with those of more precise studies.

To bolster up family budgets, some men "moonlight" or hold down more than one job. This could increase their emotional tensions, as well as fatigue from lack of normal rest, but so far there is little information whether this imperils their hearts in any way. Dr. Lawrence Hinkle of Cornell University Medical School has been studying this problem in young executives in New York City.

Probably the greatest complication in measuring stress effects is knowing what job or situation is really stressful to someone. Two men on the same job, even a menial one, can react differently, with one being unhappy and frustrated, the other quite contented. In a job of high responsibility, one may feel inadequate, or dislike some aspects. Another may revel in making tough and quick decisions involving the future of a company, the fortunes of many employees, and his own chances for success. Even if two men react the same way to their jobs, their stresses at home from family or health problems can vary greatly. Humans also vary in how much they either suppress emotions or let off steam, how much they find outlets for tensions through hobbies or exercise.

Whether coronaries are brought on in part by stress or not, heart attacks are assuredly not primarily a disease of executives now.

In a three-year study of duPont Company employees, initial heart attacks after age 45 occurred more frequently among lower salaried male employees than those in higher brackets, said Drs. Sidney Pell, and C. A. D'Alonzo. Men in the highest pay bracket had the lowest rate of heart attacks (two per 1,000 per year), with the rate being twice as high among those in the lowest salaried group. Among men working for wages—including skilled, semiskilled and unskilled production workers—the rate was about in-between the top executive scale and lower salary scale. The wage earners were more physically active than most of the lower salaried men, and this could have been a factor.

Responsibilities attached to a job are not an indicator of how much stress a man undergoes, Drs. Pell and D'Alonzo said. The higher the position, the more satisfaction men and women may derive from the demands of their jobs, while employees in lower income levels may feel more frustration, or even resentment. Men who move up to the top possibly are selected because they are well adjusted individuals, and so better able to cope with the stresses, they said.

Other studies of civil servants in Los Angeles and personnel of utility and industrial firms in Chicago, all show executives and professional people to be no more prone to coronary disease than people on other economic levels of the working force.

Dr. Allan J. Fleming, duPont's medical director, found no significant difference in the prevalence of high blood pressure, overweight, and excessive blood cholesterol among executives and non-executives in a group of 1,585 salaried employees aged 40 to 64. For the young executive heading up the ladder, this provides some assurance that his risk of developing "stress" diseases isn't heightened by his goal, and "in fact, the statistical risk of developing such disease is slightly decreased the higher he climbs."

Executives are killed by heart attacks more than by any other single disease, but not excessively so just because they are executives, Robert M. Thorner, M.P.H., and E. L. Crumpacker, M.D., of Washington, D.C., report on the basis of 451 white male executives of a major industrial firm who underwent annual medical examinations. From current death rates, twenty-five of them would have been expected to die of heart trouble during the ten years of the study, but only eleven actually succumbed.

The periodic health checkups could have been helpful, and executives may have a better environment and recreational opportunities. "Stress, like beauty, is in the mind of the beholder," they said. "The wage earner who worries about a layoff may feel as much or more stress than the executive who fears the loss of his $50,000 a year job." This limited study doesn't support the idea that the business executive is a "harried and hurried man driven inexorably toward an early death."

Dr. Herman K. Hellerstein of Cleveland points out that emotional stress rarely brings an all-out physical reaction. He therefore challenges the implication of enormous effects from the stresses of everyday life. He made on-the-job studies of what stress did to factory and steel workers, to surgeons, to TV personalities, to sky-jumpers and others. Under stress, only a small percentage of these people reached heart beats of 150 per minute, and less than 1 per cent had their hearts race up to 170 beats a minute from emotional or psychological stress. The 170 reading is very close to the maximum reached during strenuous exercise.

Dr. Hellerstein finds that reactions to emotional stress vary with the individual, his past life, what a given situation means to him, the amount of fatigue, his general health and physical fitness, plus effects from use of drugs and tobacco. Among surgeons, under stress during operations, he found slower heart rates among those who were physically fit compared with those who weren't. Emotional stress can boost pressure and stroke volume, and increase the viscosity and coagulability of the blood, the circulating fatty acids, and adrenalin. But unlike exercise, which does many of these same things, it doesn't increase collateral circulation to help the heart handle emergencies, he reports.

Dr. Howard B. Sprague, noted Boston cardiologist, is very sceptical about the role of tensions and stresses. Some heart men even go so far as to say that stress is being used as a poor excuse by many people—to cover up overindulgences in food, tobacco, etc., and to avoid facing up to the need to change living habits. Obviously the role of stress is a difficult and controversial question.

Other researchers suggest the need for more sophisticated approaches. Simply looking at occupation—for example—may not be enough. It may be too crude an index. Ostfeld and colleagues have this impression. They found no gross sociological differences between the coronary and non-coronary men in their study. "However," they note, "there are suggestions of subtle differences. The coronary men had a greater dissociation between house type, dwelling area, and wives' education on the one hand and their own income. . . . One speculates on the role of educational inferiority to wife and striving upward in terms of dwelling area and house type as psychological stressors."

Similar ideas have resulted from the North Dakota farm area study conducted by a National Heart Institute team led by Dr. William Zukel. Dr. Leonard Syme, the project's research sociologist, looked into the socio-cultural backgrounds of coronary cases and controls, studying such factors as occupation and place of birth of the men's fathers, the men's own occupation, type and frequency of job change and movement from place to place. He found a group with "high socio-cultural risk" of coronary disease—composed of white collar workers of rural background, men who had experienced marked or moderate occupational changes, and men of American background who were geographically mobile. He suggested the "hypothesis that change in a person's life situation is related to development of coronary heart disease when the person's socio-cultural background has not prepared him for such change." The "low socio-cultural risk" group was composed of agricultural and blue collar workers who were geographically stable and who had experienced little or no occupational change. The high risk group had coronary rates six times higher than the low risk—and this difference was observed over-and-above the effects of smoking, blood pressure, weight and diet.

Dr. John Cassell of the University of North Carolina has made similar observations on rural mountaineers coming to work in textile factories. He, too, suggests that rapid change in way of life stresses the heart and blood vessels, and adds to risk of cardiovascular disease.

So what does daily or unusual stress do to us? There is little solid information to back up a viewpoint that psychological and cultural stresses by themselves produce enough of a large and lasting change in blood cholesterol or other mechanisms to hurry the development of the artery clogging disease. But stress could be a factor, acting in concert with other influences, to bring on the artery clogging over the years.

The Formula for Stress Defense

What is your defense? A magazine for young doctors, *The New Physician,* recently asked eight specialists whether they thought the tensions and anxieties of modern living bring on heart attacks. They all said no. Here are some of their tips for getting along in modern life, whether or not you feel it amounts to a rat race.

Dr. Page of Cleveland: A hygiene of good living formula "consists, among other things, of good weight control, regular exercise, disciplined life, participation in those things you can influence and avoidance of those you cannot, and living with a purpose and without fear as though you would live forever."

Dr. E. Grey Dimond, La Jolla, Calif., then president of the American College of Cardiology: "I work and drive as hard as I am capable, and fully believe that I would have found, or made, life just as stressful had I lived in ancient Egypt, in Greece, or in Rome . . . I do not personally feel 'stressed' and do not believe modern living, or my version of it, has changed my survival time one day."

Dr. J. Scott Butterworth, New York City, then president of the American Heart Association: "If more of us were concerned with the art of living than with the quest for longevity, we'd live more happily and productively, and perhaps longer, too."

16

High Blood Pressure— And A Victory

THE DOCTOR REMOVED THE BLOOD PRESSURE CUFF, knowing there was nothing more he could do except to hope. His patient's galloping blood pressure had risen again within a month. Very likely he would die within a year.

The time—1949.

But in ten short years, the counterattack to save your heart and life has scored a brilliant victory. A major weapon has been the new array of chemical bullets to shoot down high blood pressure. Between 1950 and 1960, deaths of middle-aged American men and women due to high blood pressure declined 44 per cent. Specialists now declare that high blood pressure—hypertension—can be combatted successfully with drugs and other means in almost every instance, *if* it is detected early.

George Livewell has rising blood pressure, but doesn't know it—he's not had it checked for several years. He doesn't have any obvious hallmarks yet—none of the serious complications that produce illness and disability. This dangerous conspirator in the heart attack and stroke syndicate usually does creep up quietly and unobserved.

By conservative estimate, well over 10 per cent of middle-aged Americans have elevated blood pressure, and women are victimized even more than men. The counterattack is saving lives especially among men and women aged 45 to 64, but unhappily with less success among Negro men and women who are more likely to develop high blood pressure and less likely to obtain early treatment.

Blood pressure is measured at two levels—the systolic pressure when the heart is forcing blood out along its long roundabout journey, and the diastolic when the heart is resting between beats. "Normal" pressure is often defined as below 140 systolic and below 90 diastolic. Frank high blood pressure is 160 or more systolic pressure, 95-plus diastolic. And elevated pressure is very definitely a conspirator against your heart and life.

In eight years time in the Framingham studies, men and women who had normal pressure at the outset had had only one-fourth the coronary disease generally expected among people of their age and sex. But those with high pressures—over 180 systolic—had twice the expected rate, or *eight times as much* as the normals. Over the entire range of recorded pressures, risk of disease increased steadily the higher the pressure. This was true for both systolic and diastolic pressures, which generally tended to parallel each other.

Shortening of life with each significant degree of rising blood pressure is also indicated in the studies of the Society of Actuaries. And when high pressure is combined with obesity, or enlargement of the left ventricle, or diabetes, or ECG abnormalities or other conspirators, the risk of early heart attack zooms even higher, and is truly appalling.

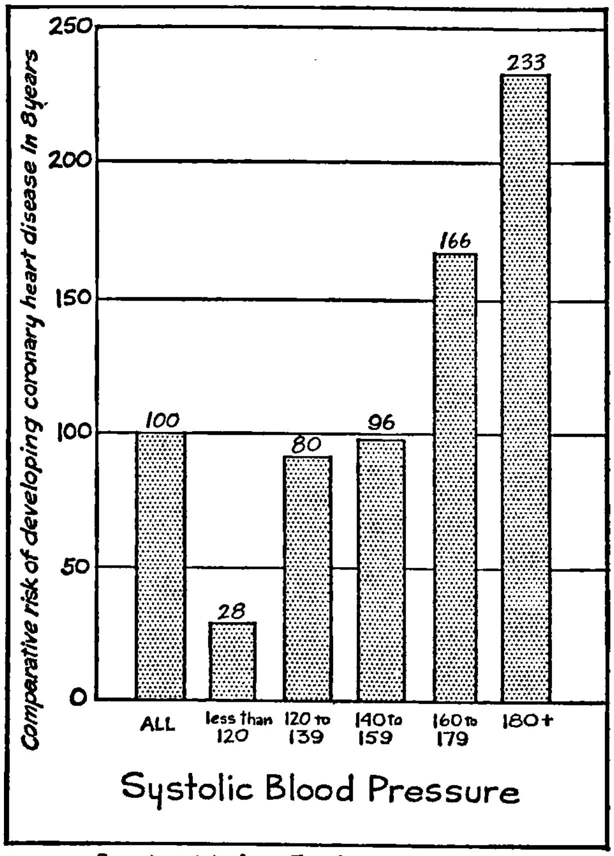
As we grow older, many of us show a tendency for blood pressure to rise, but this is by no means inevitable. In the Chicago utility company, where pre-employment health records were available on men who had started working twenty to forty years ago, some 30 per cent had held to their young-age pressures. Those men have been very well off in terms of escaping premature cardiovascular disease.

The Importance of the Checkup

If your blood pressure rises a bit with the years, it can still be within the normal range and not mean any serious hazard of disease or earlier death. The only sure way to know you are keeping your pressure under control is through regular checkups, because the early signs are so vague and ill-defined. (Dizziness or headaches may be brought on by hypertension,

RISK OF DEVELOPING CORONARY HEART DISEASE, ACCORDING TO SYSTOLIC BLOOD PRESSURE

In men and Women, aged 30-59



Based on data from Framingham Study

but they could also be symptoms of other troubles. And—we emphasize—"early" high pressure usually produces no symptoms.)

Unless controlled, elevated blood pressure can damage the heart, the brain, the kidneys, the eyes. It can produce heart attack or heart failure, apoplexy or stroke. If blood pressure is high, animals develop atherosclerosis sooner on a high-fat, high-cholesterol diet. Elevated pressure seems to increase the production of cholesterol within the body, tests with rats indicate. Increased pressure may help "push" fatty materials like cholesterol into the inner lining of blood vessels to accelerate the formation of patchy plaques. The head of steam from higher pressure may also damage blood vessels, aiding in formation of fatty deposits that narrow down blood vessels, or leading to their rupture—with massive hemorrhage. When this happens in the brain, as it frequently does, death soon claims the victim in most cases.

A Victory of Medicine

The counterattack to handcuff this conspirator of premature death dates back many years, from the earliest efforts to understand the causes of hypertension. Numerous causes have been unmasked, with first successes coming in understanding so-called secondary types of hypertension.

Researchers have identified causes stemming from the adrenal glands, and from the kidneys. Part of the adrenal gland—the medulla containing cells that secrete adrenalin—can enlarge or develop tumors so more adrenalin is poured into the bloodstream to boost blood pressure. Or the outer layer of this gland—the cortex—can enlarge and set free its hormones in excess. These also raise pressure. Surgery to remove the ailing gland can correct the blood pressure and other problems.

Ailing kidneys can kick up blood pressure, sometimes from congenital defects, and sometimes from infections. Women are more susceptible to such infections than men. Sometimes atherosclerosis blocks the main artery carrying fresh blood to the kidney. In that case, the blocked artery can sometimes be replaced with a substitute artery, or one damaged kidney can be removed entirely. Doctors now have various tests to discover if kidney trouble of some kind, or a fault with the adrenal glands, is sending blood pressure up. And they have better means now of correcting all these troubles.

The most frustrating problem, though, long has been so-called "essential" hypertension, which in medical terms simply means high blood pressure for which no specific cause is known. But recent research has been finding more and more of the specific and correctable causes, peeling away at the core problem of essential hypertension much as one peels away the leaves of an artichoke.

In some persons with essential hypertension, the pressure keeps rising and rising quite rapidly and the patient quickly becomes very ill—and may die within months unless treated. Doctors have aptly called this "malignant" hypertension. The name has nothing to do with cancer–it only means that the blood pressure gets worse and worse and finally kills, somewhat as a cancer grows worse and worse. It was particularly the signs of malignant hypertension that caused the doctor's gloom with his patient back in 1949–he was helpless then to stop it. At that time, about four out of five persons with malignant hypertension died within a year. Today, the disease can almost always be controlled, and patients now are living five to ten or more years longer than they did a decade ago.

The Role of Drugs

An entirely new army of drugs has been developed–to reverse the tide of death from high blood pressure. Frequently these drugs can bring high pressures back to normal. Today's doctor has a wide choice of drugs–derivatives of the Indian snakeroot plant, rauwolfia; compounds from the hellebore plants; and synthetic compounds such as hydralazine, chlorthiazides, ganglionic or nerve blocking agents, guanethidine, the enzyme inhibitors. Old native drugs gave some clues to isolate the active chemical agents in such home remedies. Other clues came from basic research spelling out the complicated story of normal and abnormal blood pressure, and the interactions of body organs that preserve or alter blood pressure.

Various types or families of drugs act differently, and they do not all have the same beneficial effects in all patients. Some produce unwanted or distressing side effects in some individuals, and not others. Through cautious trial and error, and from experience, the physician can almost always find the drug, or combination of them, to control blood pressure. If abnormal pressure is detected early, before any body organs have been damaged, it can be brought under control in practically all cases— and kept that way with prolonged treatment. The longer George Livewell waits to act, the more he risks harm from hypertension.

Hypertension means something obviously has gone awry with the normal mechanisms regulating blood pressure. The "barostats" governing normal pressure have become set too high, much as the thermostat to control the heat from your house furnace can be set a notch too high for comfort. Long-term treatment is needed—usually for years—to combat this derangement. In rare exceptional cases, the "barostats" can apparently be "reset" to normal by intensive sustained treatment, resisting renewed rise even after drugs are stopped, Dr. Page and associates find. In such cases, the patient may be able to get along fine without the drugs.

"A Grain of Salt"

Drugs are not the sole agents in the successful counterattack against hypertension. You may well have to be careful about salt intake. Drastic restriction of salt consumption in food has long been one of the helpful methods in treating high blood pressure, and only recently have researchers learned a good deal about how and why excess salt can be harmful. With modern drugs such as the chlorthiazides, very rigid control of salt intake is less of a problem, and a moderate reduction suffices.

For good results, persons with high blood pressure must also drop excess pounds, bringing weight under control. Obesity is a co-conspirator with hypertension in ominously higher risks of atherosclerosis, heart attack, heart failure and stroke. The same is true for high blood cholesterol—and its dietary control is especially urgent for the hypertensive. Your doctor may also well prescribe cutting down or cutting out smoking, because smoking constricts tiny blood vessels, making it harder for blood to flow through—and because smoking is yet another risk factor for heart attack. He may also suggest greater activity to promote mental and physical relaxation, and may urge you as best you can to avoid excessive emotional strain and worry. Getting enough sleep and rest are important.

If high blood pressure "runs in the family," it's all the more reason to have frequent checkups to spot the first tendency for your own pressure to rise, and then take effective counteraction. Holding to your most desirable weight is one main way of counteracting a family tendency to elevated blood pressure.

The great counterattack against hypertension points up two lessons:

One is that doctors did not hesitate to use drugs to control high blood pressure—long before they were sure that simply controlling the pressure would actually save lives, and add extra years to life. They thought it would, but they had no proof that reducing pressure would have such a rich meaning in salvation of human lives.

We stand in a somewhat similar position now knowing that elevated blood cholesterol is associated with far greater risk of premature death, just as elevated blood pressure brings a higher risk of early death. With drugs, physicians and patients had a simple way of attacking one of the conspirators and they used it. Why wait upon some amazing drug to reduce cholesterol, one that may never be found? Why not act now to lower cholesterol with a proved and safe method diet—and why not mobilize consistently and systematically against all the known risk factors which lie behind our epidemic of atherosclerotic heart attacks and strokes?

The successful counterattack against high blood pressure does not merely involve a drug. It also involves attention to diet, to weight control, and to other conspiratorial risks, such as diabetes.

17

Diabetes—
The Sweet Menace

EACH MAN IS IN HIS EARLY 50'S AND EACH HAS MILD diabetes.

One, an electrician, knows it and has his diabetes under firm control through diet, weight reduction and regular exercise, and daily doses of insulin. The other, a lawyer, is not aware of his disease. He doesn't quite feel up to par, and is becoming just a step slower in his reactions, a fact which—if he notices it at all—he attributes to growing older.

Nor does the lawyer know that on this one count of having diabetes, he is running three to four times the risk of premature heart attack or stroke than the non-diabetic. And in all likelihood his risk is considerably higher than that of the electrician who has his diabetes under tight control. Diabetes is one of the insidious conspirators promoting severe and dangerous atherosclerosis.

At least 2,000,000 American adults and children are estimated to have diabetes, and perhaps half of them do not know it. The figures may actually be much higher. One survey of Negro families living in a low-income housing project in Chicago discovered that 17 per cent of middle-aged men and women—1 in 6—were diabetic, and three-quarters of them were totally unaware they were harboring the disease. The community-wide study being done in Tecumseh, Michigan, by

Drs. Thomas Francis, Jr., Frederick Epstein and colleagues of the University of Michigan School of Public Health is also finding a high rate of undetected diabetes in adults evaluated by the glucose loading technique.

But diabetes can almost always be controlled, especially when detected fairly early, and most diabetics then have a far better expectancy of living out a normal lifespan, a life of good health and full activity.

In diabetes, the body cannot use or "burn" sugars, starches and other carbohydrates in normal fashion. The diabetic lacks enough insulin, a hormone from the pancreas, for this metabolism, or else the insulin is not produced in a form available for use. Sugar builds up in his blood. With this error in sugar metabolism, blood cholesterol and other fats tend to rise, and atherosclerosis develops more easily. Besides the threat to major arteries of heart and brain, small arteries and capillaries in the legs, feet, eyes and kidneys become more vulnerable to narrowing and closure. Severe reactions may occur, with damage to nerves, blindness, gangrene of the lower extremities and major complications from slight injuries or infections.

The Signs and the Tests

Diabetes sometimes begins in childhood, and about 50,000 youngsters have the disease. Very frequently, it first appears during middle-age, especially among men and women who are overweight. Among early signs are sudden loss of weight, excessive thirst, weakness and drowsiness, frequent urination, and outbreaks of itching and boils. Serious atherosclerosis usually doesn't develop for ten to fifteen years after the disease actually begins. It may often be avoided or minimized by good medical control.

With diabetes, some of the excess sugar in the blood tends to spill over into the urine formed in the kidneys, and a simple urine test can detect this. The urine test picks up only the more severe cases. In mild cases, when sugar doesn't appear in the urine, the disease is detectable with a blood sugar test. The doctor has you eat some sugar, or injects a sugar solution into a vein. An abnormally high rise in blood sugar indicates an inability to handle the load of sugar properly. In that case the next step is a glucose or sugar tolerance test. A blood sample is drawn after you've fasted, and then a measured amount of sugar is given, with more blood tests at intervals—usually half an hour, one, two and three hours—to determine the efficiency in metabolizing the sugar.

Beating Diabetes

With the advent of insulin, and then in 1957 with drugs you can take in tablet form, doctors and patients had major weapons to bring diabetes under control. These drugs are only part of the defense.

At the famous Joslin Clinic in Boston, Dr. Elliot Joslin and associates were among the leaders in indicating over the decades that good control of diabetes through diet and weight control may prevent complications in the disease even though people have had diabetes for years. Good control means starting early, and sticking rigorously to the diet, the proper dosage of drugs, and other measures. Controlling total calories and intake of carbohydrates, especially refined sugar, are very important for the diabetic regardless of whether he needs insulin or the oral drugs. Many middle-aged diabetics can reach an apparently normal way of handling sugar through a well-balanced diet, and correction of obesity. Many mild diabetics then have no need for drugs. For others insulin or oral drugs are essential.

The tendency of diabetics to develop high levels of blood cholesterol and other fats interested such investigators as Dr. William Connor of the State University of Iowa, and Dr. Laurance Kinsell of Highland-Alameda County Hospital in Oakland, Calif. Proper diet, they suggest, may prevent the atherosclerotic complications of diabetes. The diets are low in saturated fat, in cholesterol, and higher in poly-fats with careful balancing of calories to meet the person's need for weight control—the kind of diet described in Chapter 10.

Exercise and more activity, within the limits of a person's capability, are important in keeping diabetes under control. Greater activity helps burn up the sugars and fats that tend to concentrate in the blood stream. Some topnotch athletes are diabetics, including tennis stars William Talbert and Hamilton Richardson. They attest as well as anyone can that a normal and fully active life is very possible for the person with diabetes. Half the battle is early detection, while diabetes is easier to control, and before it can cause serious harm to blood vessels and organs.

Diabetes to some extent is probably a genetic or inheritable disorder, and some research indicates the hereditary influence may be quite significant. So you should be especially alert if one or both parents or close relatives have been diabetic.

Heredity may set the stage for numerous metabolic or regulatory diseases, including susceptibility to high blood pressure and high blood cholesterol. But the genetic code of life, now being unraveled, does not bear out a tattoo of inevitable doom because of a few faulty genes among the hundreds of thousands governing human life.

18

Heredity—
Sheathing the Sword

PERHAPS HEART ATTACKS OR STROKES HAVE OCCURRED IN your family.

But this doesn't mean a naked sword hangs over your head, destined inevitably to fall upon the children and cousins and uncles and aunts. Even if there are grounds for suspecting an hereditary tendency, you can certainly act to sheath the sword, by reducing your exposure to risks arising from diet, inactivity, smoking, obesity, diabetes or other factors.

Heredity or a family history does appear overall to mean a 2 to 1 increase in the risk of a heart attack, although one or two recent studies fail to confirm this association. At the most, a family history positive for premature blood vessel disease (high blood pressure and/or hardening of the arteries) may mean an increase in risk of up to 2 to 1, or less. For a bit of perspective, though, high cholesterol levels alone, mean a 3 up to 6 to 1 increase in risk; hypertension, alone, a 3 up to 6 to 1 greater risk; obesity a 2 up to 3 to 1 greater risk, and heavy cigarette smoking a 3 up to 6 to 1 greater risk.

First, Look at the Records

Before assuming that heredity has sealed your doom—and given you a fatalistic invitation to live it up because tomorrow will never come—ask yourself first if you really do have a family history of high risk. Perhaps a grandfather or father or uncle died from a heart attack or stroke. But if he was 85 years old at the time, and had lived a full life, that's scarcely a significant sign of a family tendency toward high risk. Quite the contrary. All that signifies is that a little bit of luck—and sane living—may enable you to cash in on that good family history and do as well.

If your parents and grandparents lived to a high age, the chances are you *will* too, and you need not be unnecessarily concerned about hereditary influences in atherosclerosis. You've already done what the geneticists wryly suggest: Chosen long-lived ancestors.

What happened to your close relatives is meaningful—in a negative sense—only if they died prematurely from the penalties of atherosclerosis, at age 40 to 50 or 60.

Heart specialists and geneticists generally agree that there is some hereditary influence in atherosclerosis, just as there seems to be in hypertension and diabetes. But no specific gene is known that causes it. Studies of twins indicate a genetic influence on cholesterol levels. Identical twins (coming from one fertilized egg cell and thus sharing identical hereditary traits) were compared with fraternal twins (born at the same time, but beginning from two separately fertilized egg cells, and hence different in their hereditary traits). The identical twins were found to be more alike in their cholesterol levels than the fraternal twins, or nontwins in the same family. The twins all shared the same kind of environment and habits, in at least one of two such studies.

As usual, the problem in atherosclerosis and many diseases is to separate genetic influences from environmental ones—or to unravel the relationship between the two. Heredity does nothing more than confer a propensity or predilection toward atherosclerosis and premature heart disease. How we live, our environment and habits, these can determine if this predisposition is dampened and muted, or allowed to run wild. A family history of disease such as atherosclerosis does not mean it inevitably must happen to you also. The end result in any man's life comes from an interplay of his own constitution and his habits, what happens to him in his environment.

Are You Acting the Part?

A familial tendency toward atherosclerosis is not a complete mystery. Probably at least 80 per cent of the familial tendency can be accounted for by familial tendencies to such risks as obesity, hypertension, excessive blood cholesterol, diabetes, heavy smoking, and inactivity. If our parents and brothers and sisters eat too much, we tend to do the same. If parents smoke, or our friends smoke, it's easier for us to smoke, and over-smoke. No gene is known that makes us smoke. If the food at our dinner table is heavily salted, we grow accustomed to reaching for the salt shaker when we dine out, with some possible hazard therein to kick up blood pressure. If the whole habit of the family is to "take it easy" and ride rather than walk, we tend to go along with the custom, and might feel peculiar in doing differently.

If we do happen to have genes that somehow encourage high levels of blood cholesterol, we can either speed the process by the manner in which we eat and live, or we can be far more careful about our diets and habits to counteract the genetic tendency. If the metabolic mechanism is very badly off, as it is in a few people, then no dietary measures by themselves will completely offset it. Except in the most severe rare cases of faulty cholesterol metabolism, the control of blood cholesterol levels does seem to be affected by a combination of various factors. Some persons are more resistant to control merely through diet, while others can bring the level down and keep it down.

It's Control that Counts

As a single risk, any hereditary tendency toward atherosclerosis and heart attacks means very little. If blood pressure and weight, blood cholesterol and sugar metabolism are all normal, and you're a non-smoker, it's very likely you can relax and forget about the family tendency—provided you keep those risk factors under control. If one or more of these are not in order, there's something else highly in your favor: A really significant family history can become apparent quite early, before a man reaches middle age and the high risk years. If parents and grandparents have been victimized in young middle-age by atherosclerosis, a man can have early warning, while still in his 20's or early 30's, that he should change his habits and act against all the other risk factors or co-conspirators to escape the same premature fate. For the mystery has been removed. We now know—by and large—how family tendencies operate to increase risk. And this means we can dispense with paralyzing fatalism and do something meaningful to protect ourselves, by bringing our specific risk factors under control.

In time, scientists may discover much more information concerning genetic causes of errors in cholesterol and fat metabolism, just as they have recently learned about a few other specific metabolic faults. One example is a disease known as phenylketonuria (PKU in abbreviation), an inability to metabolize or make use of one amino acid, phenylalanine. In babies, PKU can produce mental retardation. They lack one enzyme, or chemical governor, which acts upon this amino acid. The gene to make the enzyme is missing. But now this metabolic fault can be detected quite early, and the mental harm can be avoided by feeding for a time a diet that doesn't contain the amino acid. The babies then come along fine.

Future genetic and biochemical research may turn up similar knowledge to help us avoid high blood pressure, diabetes, high cholesterol in the blood and atherosclerosis, at least of the premature type.

Meanwhile if some genes are boosting your risk of atherosclerosis and an early heart attack or stroke, you do have a great ability to influence the tendency, to step in and block off the co-conspirators and reduce the risk. There is no reason for fatalism or pessimism. To a very great extent, you can be master of your fate.

19

Some Matters of Sex

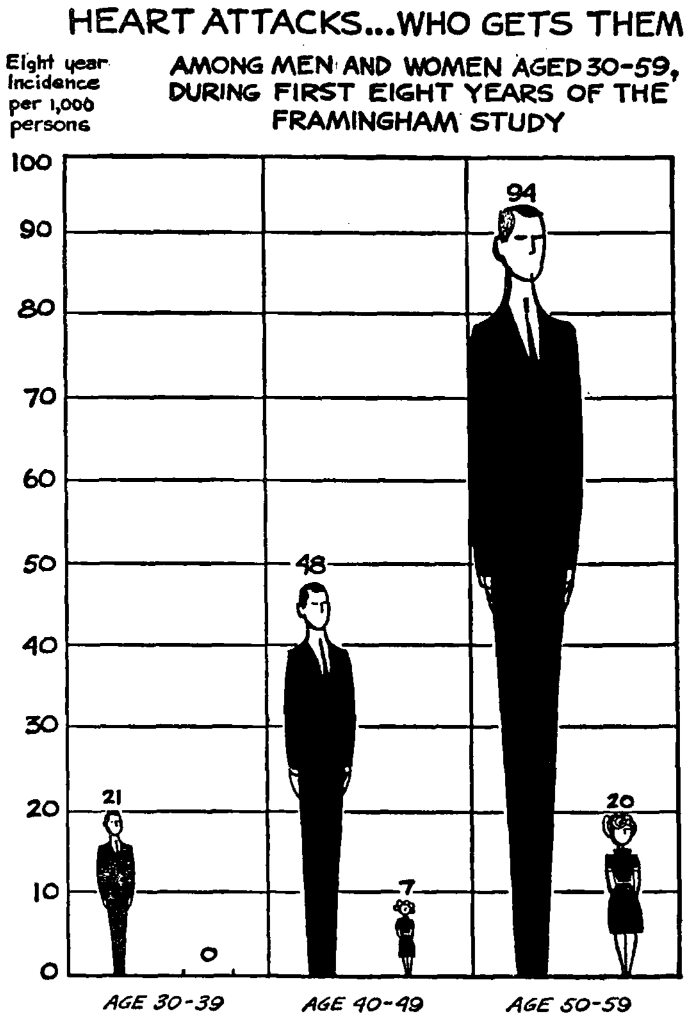
IT DOESN'T SIT WELL WITH MANY MEN TO BE TOLD WOMEN are the stronger sex, biologically speaking. But American women do live longer than men on the average, and one great reason is their remarkable freedom from coronary heart disease, at least during middle age.

Various checks show American men to be five to twenty times more vulnerable to "coronaries" during middle age than women. In the Framingham population, no woman under age 40 has had a heart attack. On the average, women are about ten to twenty years older than men at the time of their attacks.

The Woman's Advantage

Their sex somehow gives advantage to women, to most American women anyhow. But this blessing gradually diminishes at older age, starting five to ten years after the menopause, or change of life. After about age 65, heart attacks strike women almost as frequently as men.

The main reason for women's advantage could be the female sex hormone, estrogen. After the menopause, a woman produces less estrogen, and this marks the time of her progressively rising susceptibility to coronary disease. On this basis, estrogens have been given to men who have already suffered heart attacks in hopes of preventing further trouble


HEART ATTACKS...WHO GETS THEM
Eight year incidence per 1,000 persons
AMONG MEN AND WOMEN AGED 30-59, DURING FIRST EIGHT YEARS OF THE FRAMINGHAM STUDY
100
90
80
70
60
50
40
30
20
10
0
21
0
48
7
94
20
AGE 30-39
AGE 40-49
AGE 50-59

(See Chapter 22). As noted earlier in Chapter 5, when chicks were fed estrogen, signs of the artery disease disappeared, a further clue that estrogen acts as a protective shield. The gland systems of men and women produce both male and female sex hormones, with a preponderance of male hormone in men, and a preponderance of female sex hormone among women.

One way to check whether estrogen is the protector is to learn what happens to young women who have their ovaries—the main source of estrogen—removed before the usual age of menopause. The ovaries sometimes are taken surgically because of disease. Several—but not all—research groups report that women who lose their ovaries prematurely this way become much more susceptible to coronary attacks, and their levels of blood fat also tend to rise. One team of physicians reports a four times higher rate of cardiovascular disease in women who lost their ovaries compared with those in whom only the uterus was removed. When women were given estrogen after loss of their ovaries, the evidence of coronary disease was reduced.

Some physicians recommend giving women small doses of estrogen after natural menopause, in hopes of maintaining the apparent sex hormone protection against coronary disease. How effective this might be has not yet been accurately measured, and some physicians think the extra estrogen could have other drawbacks or hazards.

Women in the other economically well-developed countries also enjoy the same advantage against the epidemic of heart attacks. But estrogen is not the total story, for in nations less highly developed, there is much less of a difference in male versus female rates of coronary disease. The principal reason seems to be that men there are not hit by heart disease at anywhere near the rate of Americans and other men living the "better life."

Apparently the female resistence to severe atherosclerosis, and the male susceptibility to it, really operate only when the conditions of life create a potential for the disease. In countries less well off economically, the basic conditions for high incidence of coronary heart disease do not exist among the mass of the population. Those people have diets lower in fat and cholesterol, and they have lower blood cholesterol levels on the average. They are much more active. They aren't running high risks. And whatever innate propensity there may be for the two sexes to get or not get atherosclerosis is not put to test.

Men have a greater biological propensity for the artery disease and its dire results, but the conditions of life in those countries dampen the chances it will become manifest or obvious. Thus, differences between the sexes do not appear, at least so sharply. Only when the dietary and other conditions exist over a period of years to stimulate the disease do men show their weakness or susceptibility. For atherosclerosis is due to a complex of causes.

There's another example of this among Negroes and whites in the United States. Middle-aged Negro women seem to be much more prone to fatal coronary attacks than white women. They also suffer more from high blood pressure. Negro men in middle age are about as susceptible to heart disease as white men, or even less so, but have more hypertension.

If this seems paradoxical, it becomes understandable if other facts are considered. Chicago studies find that middle-aged Negro men are leaner than white men, have lower blood cholesterol on the average, and smoke fewer cigarettes. This is true, at least, for large groups of low income workers. So the Negro men are better off in regard to several of the risks or conspirators, although worse off in the one risk of hypertension. This single higher risk is balanced off by less risk from the other factors, so they wind up having about as many heart attacks as white men.

Negro middle-aged women tend to have more obesity, high blood pressure and diabetes than white women. They are worse off in three major risks, though they have blood cholesterol levels about similar to those among white women. It would be expected they would have more heart attacks than white women, and they apparently do. If Negro women, as a group, reduced their risks from obesity, hypertension and diabetes to the level of white women, they might well have the same incidence of heart attacks.

American women did not always have a great edge over men in avoiding heart attacks. U.S. vital statistics in 1920 showed very little difference between the sexes in middle-aged death rates from cardiovascular disease. But the advantage for women had become clearly apparent by 1940 and earlier.

"Cardiovascular" unfortunately includes many diseases, although it mainly means hypertensive and atherosclerotic disease, and there are no reliable long-term figures for deaths from basic atherosclerosis alone. So only limited conclusions can be deduced from these national figures. But over the decades, there seems to have been a true increase in atherosclerotic diseases during middle age, particularly among men. In rheumatic heart disease and in hypertensions, the trend has been downward in both men and women, with a greater decline in hypertension among women. For men since 1920, there was a steady rise in cardiovascular death rates until the late 1940's when it began to decline slightly. Much of this decline can be attributed to the saving of lives from high blood pressure and its damaging effects.

Many epidemiologists and heart experts are convinced there has been an absolute increase in middle age death rates of men from coronary artery disease. Certainly there has been a relative increase among men, compared with women in the short time from 1920 to the present, quite aside from questions about the reliability of diagnoses or the full reporting of figures then and now.

And they've speculated about reasons. Some suggest it's because women are making greater efforts to stay slim, due to fashion. Overall, the food habits of men and women tend to be similar, but women may eat less, or forego more of the richest foods. On the average, American white women are much less overweight than men. They're actually slimmer than they used to be forty or fifty years ago. This is not true for men, who are today fatter than forty or fifty years ago, and are generally eating richer diets, higher in calories, total fats, saturated fats and cholesterol.

Researchers have also wondered whether tensions make a difference, with the husband meeting greater stress and strain on his job than the woman in her home despite the duties and frustrations encountered by a wife and mother.

It has also been recognized that laborsaving devices have freed women from much drudgery and overarduous work. Nevertheless—with many women holding down two or three jobs nowadays as employee, housewife and mother—they are still plenty active. They have a more healthful level of daily activity compared with many men who are very inactive physically.

Generally improved health among women could be another reason. Their death rates from almost all causes have gone down more than men's. Women often tend to be more careful of their health, to seek earlier treatment of illness, including high blood pressure. Perhaps they are more resistant to atherosclerosis, perhaps they simply have a biological superiority under equal or similar conditions and habits of life. Most likely, their better record against premature heart attacks involves a combination of these or still other reasons.

Hearts and Sex

Quite another question concerns sex life after a heart has been damaged, or when a person has angina pectoris. The man who has had a heart attack may fear it means an end to sex. A woman may have the same fear, or worry she can never have children safely because she has a heart murmur.

The sexual orgasm does put demands on the heart, increasing pulse rate and blood pressure to a degree which might be harmful to a weakened heart. It does not involve strain for a healthy heart any more than vigorous exercise does, and to that degree could be physically beneficial.

In general, good recovery from a heart attack does not mean a prohibition upon sex, or call for a drastic change in sex habits. A heart murmur or a rheumatic heart problem may be quite minor. The answer for each person is highly individualized. Every person with a heart problem should discuss it very frankly and fully with his doctor who can judge the condition of the heart, what the heart has suffered and how well it has recovered, and then advise about the resumption and conduct of sex life.

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The Good Medical Checkup—and Some False Alarms

THE CONSPIRATORS IN THE HEART ATTACK SYNDICATE KEEP busy.

Which ones are you perhaps entertaining? Sitting in an armchair, you can answer about obesity, smoking habits, and relative activity or exercise. But you cannot read your own blood pressure, or blood cholesterol, or detect a tendency toward diabetes, or assess the general health of your heart and arteries.

Only a thorough medical checkup can answer these questions, for an inventory of where you really stand concerning all the risks, and how best to begin reducing any hazard or combination of them.

We do hear very occasionally of a man who drops dead of a heart attack right after having been pronounced in apparently excellent health. This can happen because doctors have no easy way yet of directly examining the coronary arteries to learn what shape they are in, or how much rusting has occurred, especially in a very critical area. But for every man missed this way in the medical net, doctors spot hundreds of men who have telltale symptoms or are running high risks.

Thousands and probably millions of persons are concerned about their hearts in varying degree. They may have chest pains or other symptoms which they are afraid mean heart trouble. A checkup and frank discussion with the doctor frequently brings good news—that the pains don't involve the heart at all. Indigestion, spasms of the esophagus, tightness of muscles from nervous tension, arthritis, gallbladder disease, certain infections and other conditions can be responsible, exonerating the heart altogether.

The Antidote for Fear

Fear of having a bad heart has literally turned a legion of men and women into heart cripples, afraid of overdoing, convinced that disaster or death waits around the corner. Some are terribly worried because they had once been told they had a heart murmur. But, as doctors well appreciate now, a murmur is not always significant. It is often functional or innocent, and not due to damage to heart structures. Or it may be dynamically insignificant in terms of heart function. A thorough analysis can determine if a murmur really means anything.

On the other hand, up to 15 per cent of people may have already had "silent" heart attacks with no symptoms at all, and be courting extra risks unless they learn about it, and so can take steps to prevent a recurrence. An ECG can frequently find telltale electrical fingerprints of the silent attack.

It's only wisdom to seek good, regular checkups as sound health insurance. And be entirely frank with your doctor, telling him of any symptoms or concerns so he can seek the reason, or reassure you that you are unnecessarily concerned. Some people deny that they have pains which might come from angina, for fear of losing their jobs, or being changed to another job, or out of desire not to worry their families. You can talk about these or other concerns in strict confidence with your doctor. Doctors are trained to a degree to be detectives, and can frequently tie together physical or emotional symptoms for insights into our health. But we get far less than the best assessment of our health, and what we pay for, if we challenge a doctor, in effect, to guess what we are hiding, on some theory that if he doesn't see it then it must not be serious. The patient's frankness aids the doctor sometimes in deciding what tests are needed, or not needed.

Get the Full Benefit of the Checkup

We should ask our doctors to be completely frank and clear. It's very easy for anyone to fall into his specialized jargon, forgetting that other people don't understand it as well as he does. If what the doctor says is not clear, ask him to explain further so you have no misunderstanding. Trying to interpret his preoccupied grunt or "Hmmm . . ." can lead you astray. If, in a doctor's office or hospital, you overhear a conversation by doctor or nurse that disturbs you, ask the doctor whether it really applied to you. The trained doctor is aware you are naturally concerned with yourself, and aware he can unintentionally cause iatrogenic disease, meaning disease or incapacity from what he says or does.

What should you expect from a good medical checkup?

The doctor needs a history of your past ailments, especially any symptoms that might mean early vascular disease, and a family history of any heart attacks or strokes. He may well inquire into your habits of eating, smoking, exercise, gains or losses of weight over the years, your occupation, perhaps your reactions to situations in your job, family or social life. He will want to know your weight to judge any degree of obesity or serious underweight in terms of height and bone structure.

He will take your pulse and check your blood pressure, being well aware that merely having it registered may boost the blood pressure. He may repeat the measurement if he thinks your nervousness is not enough to explain an abnormal reading, and may even ask you to come back for repeated measurements over a period of time.

He will listen to your heart and lungs, and take an ECG record. This is entirely painless, through wires fixed to your chest and limbs. The wiggles and tracings of the electrocardiogram tell him if your heart is working steadily and normally, or tell him of meaningful abnormalities. The ECG can detect an enlargement of the left ventricle or pumping chamber, or left heart strain which is associated with a several-fold higher risk of developing a heart attack. It can also detect the so-called non-specific "T" wave abnormalities which—if persistent—may indicate "early" coronary disease. The ECG can spot this in people who seem to be perfectly well, in time to take better care of their hearts. The ECG can also detect other abnormalities, for example in the conduction of impulses in the heart. These are significant if they develop in the heart of a middle-aged man and have not always been present from birth due to some congenital defect that really has little or no meaning.

Don't be alarmed if the doctor repeats the ECG. Certain of the tracings may be due to your nervousness, or minor infections, metabolic upsets, even the fact you had drunk ice water before having an ECG. The wiggles in the "T" wave of the ECG can be transitory and meaningless. If they are not due to such causes, then usually they are signs of cardiovascular disease, with consequent higher risk of suffering a heart attack unless remedial steps are taken.

It's a very good idea to have an ECG taken early in young adult life, to be kept on file by your doctor—or kept in your own files in case you move away—so it can be compared with the ECG's in physical checkups in later years. ECG patterns vary among perfectly normal people, and the doctor needs to know whether some "wiggle" always existed, or has only recently appeared. The early "baseline" ECG gives him a simple way of getting this answer.

The doctor will test your blood for signs of anemia and its sugar content, and might even run sugar tolerance tests if diabetes is suspected. He may draw additional blood samples for a check on your kidneys and uric acid if gout comes under suspicion, or to test liver function.

He will want to know your blood cholesterol level, and one test may not satisfy him, particularly if the first reading is high. The cholesterol testing should be done by a first-rate laboratory, since an accurate reading is by no means the simplest of all laboratory techniques.

One test may not be enough because blood cholesterol levels can vary from time to time in the same person. Tensions may have pushed it up some. It may even vary by seasons, being higher in winter than summer months, one survey indicates. In some persons, cholesterol levels vary only slightly day by day over a period of time, but in others there are large swings. By and large, these ups-and-downs are moderate.

A high blood cholesterol reading is a sign of risk, especially if repeated tests show it to be high. Some specialists think the risk associated with high cholesterol levels has actually been underestimated in statistical studies where only single samples were taken, and were interpreted as being the *usual* reading for each person.

Of great importance is the question of what a "normal" cholesterol reading really is. If we take an average of the levels among thousands of persons, we wind up with exactly that—an average, and a range of low, medium or high levels. In this country, the general average (230 or 240 for middle-aged men) may not be normal—what it should be for a really healthy person—but on the high side. On hospital slips, "normal" is listed as anything up to 240 or 260 or sometimes even 300.

If we analyze the *mean* level and range for men who have had heart attacks in middle age, compared with men who haven't, it seems more reasonable from figures such as those from Framingham to set "normal" as less than 215 milligrams per cent. A reading above 250 would be definitely abnormal or high. Going a step further and considering the levels in healthy middle-aged men in countries where coronary disease is rare, then it is pretty clear that the optimal or best level is under 200, or even under 175. But few American men are so fortunate.

The doctor will look carefully at little arteries in the back of the eye, for these can give some visible evidence of hardening and narrowing, and disclose signs of vascular damage from high blood pressure and/or diabetes. He may also listen for murmurs from blood vessels in the neck, leading to the brain, and in the belly, and in the groin region, and in the legs and ankles for signs of partially blocked or narrowed arteries. He may well ask whether you have pain in the calves of your legs, brought on by exercise, or occurring at night when you're in bed.

He will check urine for sugar and for signs of kidney disease. He will also check to see if your thyroid gland is enlarged, and may seek by further testing to find out if it is underactive or overactive. High blood cholesterol might be due to underactivity of this gland.

As part of his physical examination, he will want to perform a thorough check upon various organs and systems, fluoroscope and X-ray the chest, do a brief neurological checkup, and a survey for any signs of tumorous growths, and search for signs of hidden disease, conducting various tests as indicated by what he finds.

In checking your heart, he may give you an exercise tolerance test to see just how efficiently your heart really works, what happens to your pulse and blood pressure, and your ECG, with exercise. This also provides a measure of general physical fitness.

Electronic Detectives

New electronic techniques—stimulated partly by the space age—now promise a far more accurate way of checking up on your heart and health. Astronauts in orbit are fitted with devices to record and then radio back to earth continuous reports on their pulse rate, ECG, body temperature, and periodic measurements of blood pressure. These automatic reports flowing back to physicians at ground stations and in the control center are very important in determining whether a flight is going well, or whether the astronaut should be brought back to earth sooner than planned.

Now, similar miniaturized devices are coming into wider use, so the doctor can find out exactly what happens when you are active. Your pulse rate, ECG, and blood pressure taken while you are lying down give him some information about your heart and its capabilities and its reactions. Similar readings taken immediately after exercise tell more. But measurements obtained instantaneously while you are exercising can be more revealing, really indicating what happens to you when you run for a bus, engage in heavy work, meet an emotional crisis, or go about your daily duties.

All this is being done, experimentally at least, with electronic devices which are lightweight, easily and painlessly attached to the body, which broadcast all these measurements to nearby equipment or equipment in another room, or at even greater distances. There's no need for wires attached from body to the recording devices or consoles. Radiotelemetry of this nature may be tomorrow's routine equipment in the doctor's office. Just such radio-telemetry of people in action is already contributing to refinement of medical knowledge about the work of the heart, and what is good or bad for human hearts. One gadget includes a pocket tape recorder, for continuous monitoring of the ECG as people go about the day's ordinary affairs. These and other electronic aids for research, diagnosis and treatment of human diseases are just beginning to introduce a new chapter in medicine.

The physician today already has a great number of proven methods, and experience, to check out your heart and your health. His findings, especially from annual examinations, permit him to write a prescription, even if it be just verbal advice, of what you can do for the surest protection of your heart and your life.

PART III

RECOVERY

21

Road to Recovery

WITHIN THE NEXT TWENTY-FOUR HOURS, 4,000 TO perhaps 10,000 American men and women will suffer heart attacks—their first, or a recurrence.

For some the first warning will be a slight and growing pain in the chest, perhaps extending into the left arm. For others, a feeling of pressure in the chest. For still others, just a vague discomfort, or an attack of "indigestion." Many will have silent attacks giving no signs at all. Some will be seized suddenly and severely.

A twinge of chest pain, even in an apparently healthy person, can trigger the chilling fear a heart attack is developing. We know too well that a heart attack can strike massively, killing a robust man as by a blow from a sledgehammer. Aside from fear of death, our worry is intensified by fear that even one attack almost inevitably means an end to normal family and social life and work, a sentence to an uncertain, burdensome half-life, anxiously awaiting a further, fatal attack.

But the President Carried On

This fear has deep and ancient roots, but is unjustified. In September, 1955, probably a majority of citizens would have wagered that Vice-President Richard M. Nixon would soon become President. With shocking unexpectedness, President Eisenhower had been stricken with a heart attack. Millions of citizens assumed this finished his ability to carry on the awesome duties of President, if indeed he survived at all. And certainly, they said, a man with a damaged heart never could make the strenuous campaign to serve another four years. The pessimism was a hangover from the time, twenty to thirty years earlier, when the outlook had been rather gloomy.

President Eisenhower and his physicians dramatized the new road to recovery, based upon deeper understanding of what goes wrong and how to restore a heart and its anxious owner to health.

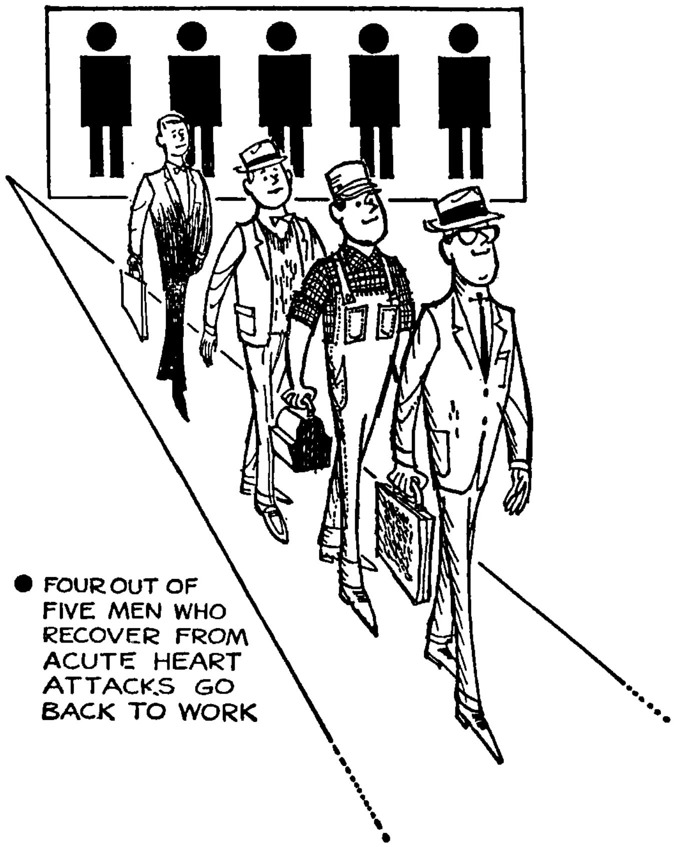
The fact is that over 60 per cent of men and women do survive their sudden, acute heart attacks. Four out of five of these middle-aged survivors resume normal living and return to work, although sometimes at less strenuous jobs. With good treatment, years of productive, happy life can lie ahead. Top heart specialists had known how to produce these favorable odds for some years before President Eisenhower fell ill. Now these fundamentals of effective treatment are well known among most physicians, and research is producing more refinements and techniques to increase the ratio of good recoveries.

Whatever we do to minimize the chances of an initial attack—as through attention to diet, weight, smoking, exercise and blood pressure—can stand us in good stead if trouble comes. We can have sounder hearts to withstand the assault, and very likely be less prone to be among the 40 per cent of people who die early or within six months after an acute attack.

Hearts Revived

Heroic new measures are even rescuing hundreds of persons dying or even "killed" by sudden heart attacks. They are literally snatched back from the dead by massaging the heart or the chest, or by shocking a twitching heart back to its steady lub-dub, life-sustaining rhythm.

In a hospital emergency ward one day, a middle-aged man waiting for treatment of an injured leg moaned and keeled over, his heart stopped. Quickly, physicians opened his chest and began rhythmically squeezing his heart, forcing it to


FOUR OUT OF
FIVE MEN WHO
RECOVER FROM
ACUTE HEART
ATTACKS GO
BACK TO WORK

squirt out pulses of blood to the brain, until his heart resumed normal beating again. A few weeks later he went home, well on the way to recovery, in a sense living a second life. Throughout the country, many scores of persons have thus been revived in hospitals, in doctors' offices, even on the street when a quick-thinking doctor was at hand. Hearts "too good to die" have been restored, even though a person is considered clinically dead when his heart quits. Unless his heart and lungs can be put back into action, his organs and tissues will die irrevocably, although at different time periods after blood flow has halted. The brain is most susceptible to loss of oxygen, and generally can get along for only four to five minutes before it suffers hopeless damage.

Heart massage obviously involves some risks of complications on its own, such as infection, and frequently the heart is too far gone to be teased back to work.

A simpler method is closed chest massage, developed at the Johns Hopkins Medical School by a team including William D. Kouwenhoven, James R. Jude, and G. Guy Knickerbocker. With both hands, pressure is applied rhythmically on the chest, just over the heart, while artificial respiration is carried on simultaneously. The pressure on the chest cage compresses and relaxes the heart to keep the brain supplied with blood, until the heart may again resume its own forceful beating. Ideally, this method might save many thousands of heart attack victims, and at first blush it appeared to be a method that a friend or even a passerby might use to fight off certain death.

But even a physician needs some special training to perform chest massage properly, to avoid damage to ribs, liver, or the heart itself. And chest massage might be harmful in conditions, as from fainting, other than a heart attack. Many doctors and rescue teams are being trained now in the method, and chest massage is saving more victims of heart attacks, drownings and electrocutions.

Electrical shocking is performing some miracles, too. Often the injured heart twitches wildly, its electrical governor gone haywire, in a condition known as ventricular fibrillation. Rhythmic shocks from a special device, the defibrillator, can restore the normal beat, and such machines are becoming part of the regular equipment in hospitals. Recently Dr. Bernard Lown in Boston greatly improved the utility of this method by developing a safer, better defibrillator, using DC current rather than AC.

Researchers at Johns Hopkins are developing a portable machine, about the size of a heavy suitcase and powered by batteries, which could be taken to the scene of an emergency. In Baltimore a few years ago, a 68-year-old man succumbed to a heart attack, his second within a short time, and a first aid rescue team reached his home within a few minutes of his seemingly fatal attack. They immediately began chest massage and artificial respiration, continuing their work during the ambulance dash to the hospital. There, the portable device shocked his heart back to normalcy, just twenty-three minutes after his attack. It has revived several other persons stricken in the emergency room at Hopkins, but failed to benefit a handful of others.

Some cardiologists predict that fuller development of these and other techniques ultimately could save thousands of persons ostensibly dead from heart attacks each year. Right now, any individual's chances involve tremendous luck in having such help quickly at hand. And when they are pulled back from oblivion, they still need skilled medical care to restore health.

With a heart attack, as in most illnesses, each person requires individual care according to his condition and his progress. The road to recovery can follow various byways, but some general guidelines apply to most patients.

First Steps on the Road Back

In the days immediately after the attack, complete and total rest in bed is the first rule, to take all unnecessary burdens from the stricken heart. The stoppage of blood flow has damaged or killed some heart tissue. Just like an injured muscle, the heart needs time to repair itself, and any additional demands or stresses can increase the injury. With time, scar tissue forms in the wounded area. With time, if part of the coronary artery channels has been blocked, other arteries can switch blood around the blockade and grow to distribute nourishment to the deprived region, at least in part.

Morphine or other drugs help relieve the pain—which usually doesn't last long—and help keep the patient quiet and still. Sedatives can partially relieve the perfectly natural anxiety and aid in assuring sound sleep nightly. The doctor may use an oxygen tent to supply extra oxygen and thereby reduce the work the heart has to do. He has at hand adrenalin, adrenalin-like compounds, digitalis, and other drugs to restore falling blood pressure from shock, to stimulate a failing heart, to correct uneven rhythm, and a defibrillator to straighten out electrical twitching.

If you're called on to help a heart patient until a doctor arrives, never give him whiskey, for alcohol is a depressant, not a stimulant. Smoking is forbidden also, even if the patient asks for a cigarette.

Treatment proceeds as the physician determines the extent and site of damage, and its precise nature. The ECG is one of his key diagnostic tools, and so also are blood tests to measure the amount of certain enzymes released in reaction to damage done to heart muscle tissue. Depending upon diagnosis, the doctor may prescribe an anticoagulant in order to prevent complications from thrombi and emboli (abnormal clots).

As recovery advances, the patient may soon be sitting up in a chair, briefly at first, and then for longer periods. Lying on one's back is not only no fun, it can even induce complications. Sitting up aids in maintaining normal circulation, and minimizes any tendency for blood to form clots in other vessels. With passing days, again depending upon severity of the attack, the patient begins some chores of caring for himself. Such light activity can be beneficial.

New Habits to be Acquired

The trencherman of the dinner table may start complaining about the skimpy food he's allowed, for most heart specialists immediately put patients on a low-calorie diet. Digestion involves some work for the heart, aside from the fact that excess calories and weight add to the heart's burden, and are linked with high serum cholesterol, particularly in an inactive person. If serum cholesterol is high, the physician will most likely prescribe a diet to bring it down. He most likely will say no smoking, or no cigarette smoking, although some physicians think denying the patient's desire could be more of a strain than moderate smoking itself.

In general, the rules for recovery and avoidance of a second attack will embrace most if not all the elements of the mode of life, described in earlier chapters, aimed at reducing the risks of suffering any premature attack at all.

Medicinal Aids

The physician may or may not continue giving the heart patient an anticoagulant drug, such as heparin or dicumarol, to reduce the hazard of blood clots in his coronary pathways. These drugs are also efficacious in the patient running a high risk of blood clots forming in the heart. Such clots can break loose, and be carried by the blood stream to lodge in the arteries supplying the brain, kidneys, limbs or other organs. And when thrombi form in the veins, they may break loose and embolize to the lungs. Anticoagulants may avert these serious complications. Some of our most prominent heart specialists regard long term anticoagulants as very beneficial in warding off further attacks and complications, at least in some patients. Others equally prominent doubt their value, and the question is still under study. The dosage has to be adjusted carefully, with repeated checks made on the coagulation time of the blood to avoid dangers of hemorrhage or side effects. Obviously, anticoagulants are not used with the person suffering from peptic ulcers, or certain other conditions in which hemorrhage is more likely if the normal clotting mechanism of the blood is delayed.

Other researchers are working with enzymes (chemical digesters or fibrinolysins) which could dissolve the clot in coronary arteries. In animal experiments, these agents have reduced damage to starving heart tissue, below the obstruction, by 25 to 50 per cent. This research is one new exploration toward cutting the toll of death and disability from heart attacks.

The Emotional Stance

A vital factor working in favor of or against the heart patient is his own pattern of emotions and attitudes. As one wise physician remarked, the trouble occurs "in a heart, but the heart is in a human being, and the human being lives in a family." The faltering engine in our automobiles is a cause for concern. The faltering engine of life itself is a cause for alarm—and the most experienced heart specialist who has a coronary will not deny it—when the attack comes to "me."

Drugs—morphine and sedatives—can help the patient over this initial alarm. But he needs emotional support and encouragement, and frank information, lest he delay his recovery by needless fear. One man may be beset by worries that he will become a cripple burdening his family, besides having to change or abandon his plans for his wife, his children, even his own retirement. Tragically, his heart may have recovered, but he doesn't believe his doctor, and is crippled by his mind and emotions.

He needs to know that 80 per cent of middle-aged heart patients who recover from an acute attack are able to return to work. The still too-prevalent idea that no one who has had a heart attack is ever really well again is a ghost from the past. Beginning some twenty years ago, careful tests and studies of the work capabilities of recovered patients began spelling out the principles for guiding heart patients back to work, the type of work, and when they could safely resume a full day's activity. The airline pilot or bus driver may not return to the driver's seat, but to a job of responsibility, interest and income. The man doing physical work is frequently back at his old job, as is the business man, lawyer, or newspaperman or salesman. Business and industry leaders are aware now that a heart attack is not a sentence to inactivity or coddling types of jobs. Many have an enlightened view.

The ability to resume normal activity and work is promoted during convalescence and rehabilitation, when the doctor prescribes increasing motion and light exercises as the heart is mending. Cardiologists are beginning to prescribe exercises as carefully and methodically as they do drugs. Exercise tolerance tests can accurately measure a man's ability to carry on his duties and desires safely.

Every patient should talk frankly with his doctor about his progress, his prospects, the date when he can go back to work (perhaps on a half-day basis initially), and resume hobbies or sports, or sex relations. Anything puzzling or bothersome should be brought into the open.

The family also plays an important role in recovery, by following the physician's advice, by helping the patient follow his new health rules, by expressing confidence in him, by giving him affection without being oversolicitous. Self-pity is harmful to anyone, at any time, and no family member should even unintentionally give the impression that the patient is somehow "responsible" for his physical illness, temporary though it may be. Mild depression is not uncommon even in perfectly healthy middle-aged men, and is compounded by illness. An understanding wife, children, friends and relatives can act as antidotes.

Many heart patients find better health than they had ever enjoyed before, partly by changing habits which had not been health-promoting, or because they find new interests in a wider world. The flirtation with death from a heart attack can deepen a man's appreciation of elements and viewpoints in life which he had been overlooking. Some come around to the type of philosophy expressed by the famous golfer, Walter Hagen: "Don't hurry and don't worry. You're only here on a short visit, so be sure to smell the flowers."

22

What of the Future?

ONCE A HEART ATTACK, INEVITABLY ANOTHER?

Hundreds of thousands of heart patients attest the answer, a hopeful "No!" They live out normal lifespans. It's not uncommon for a man of 60 at the time of his first attack to live to 80 or 90.

The middle-aged man who has a simple, uncomplicated first attack and makes a good recovery has an 80 per cent chance of living at least five years, and a 50–50 chance of living for ten years or more. The one who has a complicated attack, or has had two or more earlier attacks, has only even chances of surviving another five years. The better his recovery, the better his outlook.

The Well-Planned Defense

The heart patient, through the way he lives, plays an active role in the effort to ward off repeat attacks. Let's follow George Byers, aged 51 when a first attack struck–it had seemed to him–right out of the blue, with no earlier warning. George worried that his days were sharply numbered. He has a sit-down job, managing a section in an insurance company, and lives the familiar mortgaged, time-payment life of many Americans, with little reserve in the bank or investment portfolio.

Despite his own company's generous sickness-disability medical insurance program, his son had to drop out of college for a year during his illness, saving funds to return for his junior year. George considered himself fortunate there was no greater disruption in his family life in the six months before he went back to work.

Reassured by his doctor that his heart was mending well, George faithfully followed the advice to escape a second attack. Before and after his attack, his blood pressure was within normal range, and he had no diabetes, so his physician had no prescriptions to give on those scores.

But George had been twenty-five pounds overweight, and his blood cholesterol had been 300. Right at the start, he had been put on a low-calorie diet to lose weight, and to reduce his total calories from saturated fats and cholesterol. He and Mrs. Byers followed the diet instructions with care, assisted by a pamphlet prepared by the American Heart Association to guide Mrs. Byers in planning nutritious and satisfying meals supplying 1,600 calories a day, with low-fat content.

Four months later, with his weight down to the desired 165 pounds, he could eat more generously, while still de-emphasizing total fats, saturated fats and cholesterol. His cholesterol count declined, and stayed within normal range. His doctor increased the calorie quota, and Mrs. Byers found it easy to follow the suggestions on shopping and cooking. The sample menus and recipes—spelled out in another Heart Association pamphlet—helped greatly to assure continued adherence to the desired eating pattern. It also guided George in learning what food to choose or avoid at lunch in the city, and when dining out.

A heavy cigarette smoker before his attack, George was urged to cut out the cigarettes, and reduce his tobacco consumption to a very moderate level. After some battle with himself, he succeeded, by switching to a pipe.

He's had periodic ECG's to chart his progress and watch for signs of changes in his heart action that might signify more danger—but none has appeared. For a short time in the hospital, his doctor had given him an anticoagulant to halt any further formation of clots within his coronary artery, and to prevent complications.

For nearly twenty-five years, George had been fairly inactive, working at a desk, riding every day to and from the bus station 1½ miles from his house. He played some golf, only on weekends, and gave it up during the winter, without substituting anything else. Now he took his doctor's advice to walk to the bus stop as often as time and weather permitted, and to take daily noon-hour walks, or swim in a pool at least twice a week, and play more golf if he could.

Keenly interested now in heart disease, George Byers told his doctor he'd read about drugs to reduce blood cholesterol, and how about giving him one of them? His doctor said there are some interesting drugs and hormones and other preparations being tested, but most of them are still experimental and not generally applicable, and besides, George was doing very well in bringing down his cholesterol count through the food he ate.

The idea of a pill or tablet to knock down blood cholesterol is intriguing and logical enough, the doctor might have gone on to explain. The rub is it must be safe, and there must be proof that it really *prevents* another attack, or that it might even prevent a first attack. There have been some candidates.

One synthetic drug, triparanol or MER-29 in nickname, was widely prescribed recently, and it did reduce cholesterol levels in many patients. It blocked the making of cholesterol within the body at the point where a precursor chemical, desmosterol, had been formed. But the drug was withdrawn from use in the spring of 1962 following reports linking it with cataracts in some men, and loss of hair or skin changes in others. Desmosterol was also found closely to resemble cholesterol in its tendency to accumulate in the blood and form part of the atherosclerotic "rust."

The B vitamin—nicotinic acid—the pellagra fighter, was one of the first agents shown effective in reducing blood cholesterol, when taken in large daily doses. But the large amounts cause burning or flushing sensations, itchings, and sometimes stomach upsets and liver damage.

"Cousins" of thyroid hormone are also being assessed. It's long been known that blood cholesterol tends to be high in persons with a deficiency of thyroid hormone, and low in those with a highly active thyroid gland. Some doctors suspect that one benefit from regular and even strenuous exercise is that it stimulates the thyroid gland to pour out more thyroid hormone.

Giving heart patients regular thyroid hormone wasn't the answer to cut down their blood cholesterol, however. For this hormone speeds up the rate of bodily processes, or metabolism, and that can be harmful to people with existing heart trouble. Now, several types of altered thyroid hormone are found able to reduce cholesterol levels significantly in some patients, although not all. Some people get side effects, such as an increase in anginal pain. Hopefully, this line of research will discover how the thyroid preparations work against cholesterol, and turn up safe and effective thyroid hormone analogues or cousins.

In healthy middle-aged men, who have not had heart attacks, moderate doses of an adrenal hormone, hydrocortisone, and thyroid preparations can reduce blood cholesterol to youthful levels even while the men keep eating regular diets, report Drs. Campbell Moses, Jr. and Thaddeus S. Danowski of the University of Pittsburgh School of Medicine. No side effects were noted. The two hormones seem to combat a tendency for cholesterol levels to go up with age, they find. Their studies are aimed at understanding "normal" processes of aging and metabolism, the variations that occur, and possible controls.

There are other entries. One is a plant oil or sterol, sitosterol, which is the equivalent in plants of the cholesterol in animals. Taken as a swig before meals, sitosterol has been reported effective in bringing down cholesterol levels in some people. It appears to combine in the intestine with cholesterol contained in normal foodstuffs, so the body doesn't absorb the cholesterol. Unhappily it has a chalky taste and is expensive and effects aren't constant. Another agent is a synthetic resin, nicknamed MK-135, which binds bile acids and so interferes with the absorption of fats, including cholesterol, in the body. Pharmaceutical firms are actively looking for other synthetic drugs which would safely block the manufacture of cholesterol within the body.

Female sex hormone seems to protect women from heart attacks—and it reverses atherosclerosis in chicks, as we have seen. Can it protect men? Encouraging experiments suggest that it can.

In a five-year study in Chicago, one sex hormone preparation cut the death rate from subsequent attacks among men by 50 per cent. Ordinarily, 20 per cent of middle-aged men with a single uncomplicated heart attack die within five years, usually from a second attack. But among men taking the hormone (a preparation of mixed, conjugated equine or horse estrogens), less than 10 per cent succumbed to another attack.

As for men who had already had more than one attack, or a single and complicated attack, the death rate during the five years was cut to 27 per cent compared with the usually-expected 50 per cent or greater. In men taking the hormone (about half of 275 men got the hormone and the rest didn't), blood cholesterols tended to come down, and the male pattern of blood fats and cholesterol changed to the pattern found in women of young middle age.

In the doses given, the hormone had feminizing effects, such as enlargement of breasts and loss of sex drive. Some men didn't like this, while others said it was worth the chance of escaping another heart attack. This study indicates the estrogen treatment should not be started until three months after an acute heart attack, allowing a reasonable time for recovery, with small doses of hormone at first and then gradual increases.

This study was made by the medical author (J.S.), Drs. Ruth Pick, Louis N. Katz, Alfred Pick, B. M. Kaplan and D. M. Berkson, and Dolores Century, research assistant, at Michael Reese Hospital. In essence, the meaning so far is this: Among 100 men who have had a single uncomplicated heart attack, ninety-three will still be alive five years later if they take the hormone, and only eighty-three out of 100 would live that long if they didn't get it.

A similar study at the University of Southern California School of Medicine by Dr. Jesse Marmorston and associates finds good results using small doses of the same hormone, small enough so the men had only slight feminizing effects. At these low doses, there was also no reduction in blood cholesterol. Fifteen to eighteen months later, men getting the hormone had a 55 per cent lower death rate, and after two years time a 40 per cent lower death rate, than men not being treated. Most likely to benefit, says Dr. Marmorston, are men with a relatively poor outlook, men under age 55 who have had one single prior attack, and men with severe complications of heart disease.

Interestingly also, not a single stroke occurred among men taking the hormone, while 4 per cent of men not taking the hormone did have strokes. Associated with Dr. Marmorston in this study were Drs. Frederick J. Moore and Oliver T. Kuzma, Carl E. Hopkins, Ph.D. and John M. Weiner, B.S.

These experiments are encouraging physicians to use estrogens after their patients recover from a heart attack. However, they are not unequivocal answers to the problem. They don't give a green light to put all the George Byerses on doses of female sex hormone. More research is needed. From Scotland comes a contrary report from Drs. Michael Oliver and George Boyd that female sex hormone really doesn't help. In Britain, doctors are experimenting with a combination of male sex hormone and a synthetic female sex hormone. First reports say this has no feminizing effects, and that it seems effective in reducing blood cholesterol.

No Substitute—Yet—For Diet

In general, the research with most drugs to cut down cholesterol hasn't gone on long enough, or with large enough numbers of patients, to make sure they are safe, or really prevent heart attacks. This approach needs very careful further evaluation and study before doctors can confidently recommend the pills to most of their patients. Ultimately, they may find a place, perhaps only in treating resistant cases. Diet changes do safely cut down cholesterol in most heart patients, and in men not yet stricken who have high levels.

George Byers, meantime, is acting against all the known risks conspiring to bring on heart attacks. Oh yes, practically everyone advised him to avoid emotional upsets and strains. The advice is easily given, but acting on it is quite a different matter. Just being alive involves some stress, and people differ in their reactions to stress and problems.

Stress, as with other things, is as we find it—tougher on some people than others. But we can avoid excesses, and George Byers is acting on the advice to seek equanimity as best he can, and not worry too much. He's acting intelligently concerning all the known conspirators, and living a full life.

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Treating Angina Pectoris

"THE ATTACK IS VERY SHORT AND LIKE A STORM. IT usually ends within an hour. I have undergone all bodily infirmities; but none appears to me more grievous."

Thus, 1,900 years ago, did the Roman philosopher Seneca write what some medical historians regard as the first description of angina pectoris, the painful cry of a heart hungry for enough blood and oxygen. Nearly 200 years ago the English physician, William Heberden, capsuled the ailment in one sentence: "They who are afflicted with it are seized while they are walking (more especially if it be uphill, and soon after eating) with a painful and most disagreeable sensation in the breast, which seems as if it would extinguish life, if it were to increase or continue; but the moment they stand still all this uneasiness vanishes."

Not only exertion but strong emotion can produce anginal pain, and Dr. John Hunter walked from a London hospital board room, after having been flatly contradicted in an argument, "in silent rage and in the next room gave a deep groan and fell down dead," Dr. William Osler has written. Hunter had predicted that an emotional crisis could kill him.

Autopsies long ago disclosed the cause of this painful and dangerous disease—the coronary arteries often were narrowed or ossified. The symptoms produced the name—angina (pain) pectoris (of chest). Angina may develop after a person has had one or more heart attacks, or it may come on before a frank heart attack has ever occurred. Sometimes the anginal distress goes away after a few attacks with no further trouble for years. In time, extra or collateral circulation may develop so the heart becomes better nourished and can do more work without pain. Too frequently, the angina tends to become worse.

Its Many Disguises

Chest pain, particularly under the breast bone, is not the only warning. Instead of pain, some patients feel a sense of constriction, tightness, indigestion or "gas," or a pressure or aching heaviness. Curiously, the pain or discomfort sometimes flares in the shoulders or pit of the stomach, or arms, in the throat, jaws, or upper part of the back with no chest pain at all.

The pain can be severe enough to make the sufferer stop all activity, while others find they can "walk through" the initial pain. One man feels some chest pain everytime he plays golf, but only when he addresses the ball on the first tee. After that he can play the entire course, up and down hill, with no discomfort at all. Another man, fond of poker, feels chest pain only when he wins and not when he loses. Whenever he takes a nitroglycerin pill after inspecting his hand, his opponents are tipped they need mighty cards to raise his bet.

Chest pain similar to angina can be caused by other things, such as hernia of the diaphragm, gallbladder disease, arthritis or bursitis, irritation of the esophagus, true acute indigestion, or stretching of the stomach through excessive swallowing of air. Instead of worrying that chest pains mean angina, check with your doctor. His verdict may relieve unnecessary fretting, or give you a head start toward an effort against the artery narrowing if it really is angina pectoris.

In some cases, true angina may be difficult to diagnose. One useful diagnostic technique is a two-step exercise test developed by Dr. Arthur Master of New York. Or dyes may be injected to see, under X rays, whether the coronary arteries are open or narrowed. Dr. Mason Sones of the Cleveland Clinic has done outstanding research in perfecting this valuable new method for looking at the diseased arteries.

Each angina patient soon learns what he can or cannot do without getting pain. Doctors generally advise doing things slowly, avoiding sudden strains from exertion or unaccustomed activities, or lifting heavy objects, or shoveling snow, as well as trying to avoid great emotional upsets. Patients are advised not to overeat at any one time, and many are advised to rest after meals, preferably sitting up in a chair rather than lying down. Excess pounds should be trimmed off to ease the heart's work, and smoking is often forbidden. Cold weather and sharp winds bother many angina patients, and they learn to avoid walking in bad weather.

Such general advice hasn't varied greatly since physicians began recognizing angina pectoris as a disease. In a medical journal 150 years ago, Dr. John Warren told of a minister from Portsmouth, N.H., who consulted him in 1806 because of chest pain when he walked rapidly. When he stopped, he recovered and could walk on. Slow-moving and rather corpulent, the minister appeared younger than most patients Dr. Warren had heard of displaying the "new" disorder of angina, but the physician suspected this was the cause.

The Sunday after this examination, the minister halted during his sermon, then "sallied back on his seat and became insensible." With rest and bloodletting, in the medical fashion of the time, he recovered and told of the seizure of severe chest pain. Dr. Warren gave him tincture of opium to relieve pain, had him give up the strain of sermons and public speeches, and avoid sudden and forcible exertion or emotional stress as best he could. He also gave "the strictest injunction that his meals should be sparing," and added the best medicines of the day. The minister found a winter in Georgia, away from severe New England cold, made him feel much better—as angina patients do today—but upon his return to New Hampshire his attacks became more severe, and he died in the summer of 1808.

Modern physicians have refined the diagnosis and the advice, and now angina patients have the great boon of nitroglycerin tablets that quickly relieve pain. Long-acting derivatives—recent products of laboratory research—may be useful in preventing pain. Many doctors advise patients to take nitroglycerin before doing anything that usually brings on angina. This medicine apparently dilates the coronary arteries, increases blood flow to the heart muscle. There's no need to worry about building up a tolerance. Nitroglycerin does not become less effective no matter how long it is used. The physician can select one or more drugs that work best so angina often need not curtail normal activities.

Surgeons are taking up the challenge, sometimes with apparent success, often to no avail, trying to devise means of restoring health to desperate victims of coronary artery disease and angina.

Surgery's Daring Techniques

One bold technique is to clean out the biological rust blocking a coronary artery. At the University of California at Los Angeles, Drs. Jack A. Cannon, William P. Longmire and Albert Kattus first locate the blocked or narrowed area or areas by injecting dyes and taking X-ray movies of the arteries. Then the heart is exposed, and the artery is slit open and the plaques or plugs removed while the patient is kept going with a heart-lung machine. Only volunteers with serious disease are accepted for this experimental surgery, with the hazards fully explained to them. One professional man, 45, had become an unemployed heart cripple due to atherosclerosis, with the slightest exertion sending pain rippling through his chest. His margin between life and death was so narrow, he knew, that the excitement of a football or baseball game on TV might kill him. He was scared, but brave. He gambled on surgery, and won. Another man had such severe angina he was gulping forty to ninety nitroglycerin pills a day.

Among the first twenty patients, four won new health, with one man playing tennis again. Nine died during or soon after the surgery, and two others some months later. One man had 2½ more years of robustly active life until atherosclerosis again closed a heart artery, fatally. Three other volunteers appear definitely improved, while two others did not benefit.

"Always when we lose, we feel we never want to try again," Dr. Cannon said. "But then as you operate on a blocked artery in the leg and see the pulse return, you realize it is the same kind of thing causing the trouble up there in a man's heart. You walk through hospital wards and watch men die from the same cause. You know something must be done. You know there has to be a way. What man can imagine, man can do."

A different method of removing the artery plug, by going down to the blocked area through the aorta, brought normal life again to a 47-year-old man who had such severe angina he couldn't even shave himself. Five months after surgery, conducted by a team headed by Dr. John E. Connolly of Stanford University, X-ray movies showed the artery was fully open again.

Surgery is a last resort—a cure attempted after the damage has been done by years of atherosclerosis—and it seems unlikely many victims can be helped this way. This artery plug has to be highly localized and not diffuse, as it often is, and many persons' hearts are also too weak to take the stress of operations. But surgeons are hoping to develop some safe and effective techniques, and are trying other methods of helping oxygen-hungry hearts.

Dr. Claude S. Beck of Cleveland, for example, devised a method to irritate and abrade the surface tissues of the heart with powdered asbestos. This sets up an inflammatory reaction to produce new small arteries distributing blood more evenly through the heart, and Dr. Beck says the technique has benefited many scores of patients. Surgeons around the world are experimenting with other methods of stepping up the blood flow within ailing hearts or bypassing blocked arteries.

An even more audacious challenge beckons other imaginative researchers—a completely artificial or mechanical heart which would be implanted in the human chest to substitute for a person's own diseased heart. In dogs, initial experimental models have successfully pumped blood and maintained life for a few hours or up to a day's time. Within ten years, a substitute heart may be keeping some persons alive and healthy, says Dr. C. Walton Lillehei, famous University of Minnesota heart surgeon. "Important advances already have been made and the remaining problems to be solved are considerably less complex than those related to placing a man on the surface of the moon," he says. Miniaturized electronic equipment and mercury batteries good for five years time are stimulating development of substitute hearts.

Already, electronic pacemakers no larger than a package of cigarettes have been placed inside the chests or abdomens of several hundred men and women to keep their hearts beating regularly. Their hearts were beating so slowly, only twenty to thirty times a minute, that they felt faint or blacked out. The normal electrical stimulus to make the heart contract doesn't get through from auricle to ventricle and the ventricles pump independently and slowly. The ingenious pacemaker supplies regular electric shocks to time a normal beating rhythm.

One man had been blacking out ten times daily for several weeks because of the "open switch" in his heart, until he was given a pacemaker. Batteries for these devices can be replaced by fairly simple surgery. Still other pacemakers are worn outside the body, with wires leading to the ventricle of the heart, or involving use of radio sources outside the chest to broadcast the signals to electrodes implanted in the heart.

Scientists and surgeons are intrigued with still another prospect—the transplanting of a healthy heart from a person killed in an accident, for example, to replace a diseased human heart. Nature has posed a roadblock, for transplanted tissues or organs are usually rejected by the recipient in a kind of allergic reaction, except among identical twins. But one of the liveliest medical-scientific investigations now is giving clues as to how the roadblock can be bypassed. Kidneys have occasionally been transplanted successfully between non-identical twins or strangers, and have kept living and working for many months to a few years so far. The day is perhaps not too distant when we can get new organs for old—kidneys, hearts, glands, limbs.

Even when these dreams come true, their effect in total saving of lives may still be small. The principal goal always must be to prevent atherosclerosis with its toll from heart attacks and angina, to halt its progress, or reverse the deadly process. There lies the greatest real hope for conquering angina pectoris.

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Progress Against Strokes

His stroke hit suddenly.

He remembered sitting in the living room after dinner, talking with his guests, and he remembered a flash of pain, then his memory was hazy. He couldn't recall what he had been saying, and how he slumped over to become unconscious.

Hours later, his first memory was of lying in the hospital bed, and the ghastly sound of his voice, ghastly because he was saying words but there was no sense in them. His brain wouldn't obey. And later he remembered the doctor telling him he had suffered a stroke, reassuring the 60-year-old architect that he would be all right. The doctor was right, and the architect is back at his creative job.

He knows, now, that his stroke had given him warning signals it was coming, signals he had ignored. For a few weeks beforehand, he had noticed the brief spells of feeling faint or confused, but they had passed. He'd noticed, too, the intermittent pains in the calves of his legs, another sign of arteries in trouble from impeded blood flow. Had he acted then he might have escaped or delayed the full-blown stroke that could have cost his life, which did cost months of time and much expense in recovering. He is taking action now to cut the risk of another attack.

Strokes once were better known as apoplexy, and for centuries were a matter of dreary hopelessness. Apoplexy has claimed millions of the famous and obscure by death and crippling. Michaelangelo died of a stroke. So did Catherine the Great, and Joseph Stalin.

President Woodrow Wilson was a victim, and had he made a good recovery rather than sinking into lasting illness, he might have won his struggle to lead the United States into the League of Nations—with what effect on the course of modern history? A sudden stroke killed President Franklin D. Roosevelt, and thirteen years later President Eisenhower reportedly had a minor stroke or warning signal.

Marching through our population, strokes claim 200,000 American lives a year—ranking as our third killer disease—and it's estimated that 2,000,000 men and women have had strokes. Some are severely crippled; others completely well. Strokes are not just a hazard of old age—a significant percentage of younger men and women is hit in their years of greatest productivity. Nor are most strokes fatal. About six out of seven persons recover.

Strokes slay and cripple because the human brain with its marvelous complex of ten billion nerve cells is even hungrier for oxygen than is the heart. The brain consumes one-fifth of all the oxygen used in the body, and one quart of blood goes coursing through the brain every minute, rising up from the heart through the carotid arteries on each side of the neck. If the supply of oxygen is choked off, you can fall unconscious within seconds, and the brain can be irreversibly damaged, with millions of its cells dying, within four or five minutes.

The mysteries of strokes are being solved, and now we have better defenses against this saboteur of the brain. The why and how of strokes are becoming far better understood.

Some strokes cause massive damage. But thousands of them are "little strokes" bringing minor changes in judgment, abilities, skills, speech, memory or behavior. A little stroke can be the reason why a grandfather with a sunny disposition suddenly becomes cantankerous, childish or confused. Little strokes can take their toll with the victim never being really aware of the changes or harm, or unwilling to admit he's been hurt. And little strokes are often a forerunner of massive strokes.

Thousands of other persons suffer temporary, transient stroke-like attacks, from a brief inadequacy of the blood and oxygen being piped to the brain. Signs vary. They include short periods of numbness or weakness in one side of the face or in arms or legs, fingers or hands, wooziness and fleeting blackouts, double vision or temporary blindness in one or both eyes, slurred speech or faulty memory, headaches—depending upon what part of the brain sputtered in its functions.

How Strokes Happen

The causes of strokes vary and so do the types. A vast majority is brought on by atherosclerosis stuffing up arteries in the chest and neck and in the brain itself. In small vessels of the brain, a plug no larger than a small BB shot can form a dam, with disaster for cells beyond the point of closure. We can become candidates all too easily. After age 50, recent studies indicate, about half of Americans have some blockage of main arteries feeding blood into the brain, and by age 70, four out of five face this same hazard. Fortunately, it often is not severe enough to precipitate a stroke, any more than atherosclerosis of heart arteries always produces a heart attack. The choking off of vessels in or to the brain usually develops later than in coronary arteries. At age 60, the average degree of cerebral atherosclerosis is about equal to that in the coronaries at age 50. Later, the degree of atherosclerosis in the brain tends to rise rapidly.

The artery narrowing can produce transient strokes, or minor ones, or severe strokes when a vital artery is choked off altogether.

Or the stroke may stem from a blood clot or thrombus forming within the artery, sometimes around a plaque or plug, with blood flow halted permanently. Recovery depends upon how seriously the brain is affected, and in what areas.

Still another serious threat is an embolus, a blood clot which breaks loose—usually in the heart—and is carried upward to log-jam an arterial channel in the brain. Some emboli come from heart valves thickened and scarred by rheumatic fever, and others from clots growing in the wall of the heart ventricle after myocardial infarction.

High on the list of causes of stroke is elevated blood pressure, whether or not abetted by atherosclerosis. High pressure can burst smaller blood vessels which have somehow become weakened or damaged, and blood flowing from the wound can destroy brain cells to produce temporary or permanent damage. Severe headache is one warning sign of brain hemorrhage. Drugs to control blood pressure have led to a counterattack on this cause of strokes among middle-aged men and women. Since 1950, deaths from stroke in middle-aged persons have apparently been cut by 25 to 30 per cent. Almost certainly, this great advance stems chiefly from improved treatment for high blood pressure.

Some strokes are also caused by aneurysm, the ballooning out and bursting of the weakened wall of an artery, frequently due to an inherited weakness of the wall. Such a blister, ticking like a time bomb, occasionally gives signs it is present, and surgeons are able to locate it and operate to repair or strengthen it with a plastic jacket or other means.

If this all sounds terribly grim, the very understanding of causes is stimulating remedies. Thinking about atherosclerosis, Dr. Michael DeBakey of Houston and others realized that very often—perhaps one-third of the time—the trouble is not in the rather inaccessible brain, but farther downstream, in the neck or carotid arteries, or in the chest, in places the surgeon can reach. They began operating to remove the plugs in the carotid arteries, or to substitute a length of artificial artery for the diseased portion. Hundreds and perhaps thousands of persons have already undergone this surgery to clear artery pathways to the brain.

This surgery can even be preventive when impending strokes give warning. An intermittent interruption of blood flow can give such signs as borderline or temporary weakness of legs or arms, or blackouts, or inability to speak, or hallucinations lasting a few minutes. Such signs are similar to the anginal pain of a heart. And there are ways to detect the arterial insufficiency. A stethoscope on the carotid artery may pick up murmurs from impeded blood flow, or the absence of normal pulsations in arteries may supply a clue. Measuring the pressure needed to stop the blood flow in arteries of the retina is another useful technique. Dyes and X rays can frequently show where an artery is blocked.

Even if a man or woman already has suffered damage from strokes, this surgery may still be able to restore some functions, if the artery has not been plugged completely. One school teacher's faulty speech was corrected a year after she had suffered a stroke, due to blockage of a neck artery. As in all surgery, this operation carries some risks, but the death rate is low compared with the benefits to be won, and a number of surgical teams are reporting very promising results.

Our great computer, the human brain, was almost a complete enigma not long ago, but scientific studies now have mapped its parts and functions fairly well. Most people know that the left side of the brain controls motor or activity functions on the right side of the body. Research has also located areas controlling speech, vision, hearing and other functions. The effects from a stroke provide a way of pinpointing the site of the trouble, and even the type of stroke. Diagnostic methods can tell the difference between pressure from a brain tumor and interference with blood flow from a blocked artery or hemorrhage. Spinal fluid gives a clue, for if it contains blood this usually means a hemorrhage in the brain. Having a clearer diagnosis, doctors can start the best treatment to minimize the damage and speed recovery or prevent new episodes.

Logic and insight suggested that anticoagulants could be helpful in some types of major or minor or transient strokes, or strokes brought on by blood clots progressing so much that bits of them break loose and slam into the brain. The anti-clotting drugs obviously would be harmful in strokes due to hemorrhage—they would worsen the trouble—and must be used cautiously with frequent blood tests. Research groups began careful studies.

Dr. Irving S. Wright of Cornell University Medical School is one of the early researchers, and finds that the anticoagulants can help prevent recurrent attacks in some people who have had a stroke, and face the threat of having more. He and Dr. Sigmund S. Groch of Bellevue Hospital in a long-term study report less incidence of complications from blood clots or floating blood clots in patients taking the drugs. At the Mayo Clinic, Drs. Robert Siekert, Clark Millikan and J. P. Whisnant found anticoagulants helpful in overcoming some transient strokes, and in apparently preventing a clot from developing to a more dangerous degree.

Other studies find little benefit, and the questions as to when and for whom anticoagulants should be chosen have not had final answers.

In any case, all is not lost even if a stroke has occurred, despite severe paralysis or interference with the normal functions everyone accepts so matter-of-factly. Modest improvement usually comes spontaneously unless the damage is very extreme, and it can be promoted by early passive exercising, by heat treatments, and by positioning limbs or muscles so they don't become deformed.

The Brain's Resources

In its long evolution, the human brain has become well equipped to struggle for its own survival. The brain doesn't have to rely upon one small group of cells to carry out a given duty. It has extra potential methods of moving legs or arms or making speech sounds if a primary center or pathway is knocked out. Great portions of the brain have even been removed in rare operations yet the person not only survives but is able to carry on many ordinary duties and functions.

With improved methods of rehabilitation, seeming miracles are coming in retraining the brain, although the road back can be long and difficult. Paralyzed stroke patients often learn to talk or to walk again, and the apparently hopelessly sick can make astonishing recoveries, spontaneously or with intelligent help. Recovery depends primarily upon perseverance and desire, and good care. One example of what is possible is the record of the Institute of Physical Medicine and Rehabilitation headed by Dr. Howard A. Rusk at New York University–Bellevue Medical Center. Teams of specialists including neurologists, psychiatrists and psychologists, speech and occupational and physical therapists, orthopedists, trained nurses and others combine their skills to win the fullest recovery. As yet, there are far too few such centers.

At home, family members can contribute the difference between a good and poor recovery. They can help the patient greatly with prescribed passive exercises, putting arms and legs through specified chores until volitional control is established once again. Mechanical devices to substitute for impaired body functions are becoming more lightweight and ingenious. Hope is one of the greatest medicines in the road to recovery, and the hope certainly is justified from the experience of thousands of stroke patients. One great point to remember is this: the person who is unable to talk today may be able to talk within a month or more, or recover the use of paralyzed legs or hands.

As with heart attack, good measures to care for the surviving stroke patient—important as they are—are not enough. Much more needs to be done to spotlight the people running high risk of strokes, to detect the people with serious disease in brain arteries before strokes happen, and to prevent strokes.

But you are not defenseless right now. You can act against high blood pressure, a major common cause of strokes. And you can act against atherosclerosis, the main cause, so it is less likely to dam up the arteries leading to or within the brain. There is ample evidence that diabetes and excess weight are handmaidens of hypertension and atherosclerosis in strokes, and both of these are within your own control. Whatever you do to make your heart less vulnerable to atherosclerotic attack can also be applied as a shield against strokes, particularly strokes that cause tragedy too soon.

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Aiding Other Arteries

PERHAPS YOU'VE SEEN HIM, THE ELDERLY MAN ON A SUNDAY stroll who grimaces and stops once in every block. He rests half a minute, and then walks on.

He, or she, has angina—pains coming not from the heart this time, but from the legs. The cause once again is the artery-pinching disease, atherosclerosis, which can attack arteries almost anywhere in the body, and which brings severe suffering and loss of limb and life.

It can and does develop in the aorta, the great artery carrying blood down through the abdomen, or the iliac arteries branching off to channel blood into each leg, or the femoral arteries in the thighs, and arteries farther down the line in the legs and feet. Or it may close off blood flow to the kidneys, damaging those vital filters and so becoming one cause of high blood pressure.

But now doctors have much better techniques of locating the sites of the artery blockage, and also of detecting aneurysms or blowouts of abdominal arteries, or troubles from blood clots. They have far better methods now of dealing with all these dangers. And whatever we can do to prevent atherosclerosis from harming arteries to the heart or brain also probably serves to protect these other arteries from the same dangerous hazards.

Diabetes is a principal co-conspirator in this kind of artery trouble, particularly in the peripheral arteries nourishing the legs and feet. The diabetic is subject as well to disease of still smaller blood vessels that can lead to blindness and other damage if diabetes is not kept in check.

The elderly man went lame and had cramps of the calf muscles from one form of peripheral atherosclerosis, known as arteriosclerosis obliterans. As the name implies, in severe form the disease can block arteries entirely, crippling legs or feet, or even going on to cause gangrene and necessitating amputation of toes, feet or legs. This artery disease usually does not come along until age 50 to 60 or beyond, but may occur among younger persons. With more people living to higher ages now, this form of atherosclerosis has been taking a higher toll.

Act on These Signs

One early sign of distressed leg arteries is pain in the calves, or sometimes in the feet, thighs or hips. The pain often comes only during walking, with relief when the person stops and rests, but it also can appear at night during bed rest. Or it may give warning through numbness of legs, feet or toes, through pallor or whitening when the leg is elevated, or a bluish or purplish color when the person stands upright. Sensitivity to cold, and ulcers of the feet or toes, or slow healing of infections are other signs of this poor circulation.

If leg pains develop suddenly, it can mean an artery has been blocked by a wandering blood clot (embolus), or that a clot has started to grow rapidly within a narrowed artery, perhaps at a spot where blood is flowing over and around a roughened plaque on the wall of an artery.

Any of these signs calls for an immediate checkup. To determine the source and kind of trouble, the doctor gets some clues from the color and temperature of the skin when the leg is elevated, or when you stand or sit. He gets others by feeling for pulses and listening for murmurs over arteries in the legs, or higher up in the groin or in the abdomen, for the leg trouble could be coming from blockage of the flow in these higher channels rather than within the leg itself. Blood pressures from arteries in various regions help him locate the trouble zone. He may also take readings of pulse vigor with a special instrument, an oscillometer. And, if indicated, he can put dyestuffs into the bloodstream so X rays can show the point where a dam has formed.

Much Can Be Done

He also has defense weapons to help you directly, or to put into your own hands. He may use anticoagulants to prevent clots from getting larger, or to prevent more from forming. He may use drugs that dilate the leg arteries. New experiments are testing enzyme drugs that show promise of dissolving clots sticking within the arteries.

To prevent more trouble, the doctor will likely advise dropping some pounds, if you are overweight, and diet changes to reduce blood cholesterol and try to halt the atherosclerosis troubling the legs—and possibly developing in heart or cerebral arteries. He likely will advise against smoking. And, with poor circulation of the legs, he will advise specialized hygienic care including keeping your feet warm and dry. He will spell out precautions to avoid even slight infections or minor injuries or wounds, and tell you not to wear tight shoes or garters or girdles that could constrict circulation.

Depending upon the circumstances, he may well advise specific exercises to promote collateral or extra circulation through small arteries to nourish leg tissues better. Our increasingly inactive life may be making people more susceptible to the leg artery complications. Dr. William Foley of Cornell University Medical Center is conducting research showing promising results from carefully prescribed exercise among patients with leg artery disease, including some who had it so badly that their tissues were being destroyed by gangrene.

Early treatment and good care can greatly improve the outlook in this peripheral artery disease, halting the progression toward increasing pain and crippling, and avoiding sacrifice of feet or legs by amputation as a last resort.

More and more, surgery is relieving if not curing this and other kinds of artery disease. Just as arteries in the neck can be cleaned out or replaced with artificial or natural vessels to improve blood to the brain, so also can narrowings or obstructions be overcome in the aorta, the groin, and thigh or other leg arteries. Surgery of this nature is winning impressive results, and is becoming far more common. Surgeons now can also operate to repair an aneurysm or ballooning or bulging of the aorta in the abdomen, even very close to the heart, if this particular trouble is detected in time.

Surgeons are also stepping in when kidneys suffer from blocking of the arteries bringing blood to those hard-working organs. Atherosclerosis of these renal arteries is by no means uncommon, and one suspicious sign that it is happening or has happened is a rather sudden rise in blood pressure in middle age. One kidney can be so badly hurt that it must be removed, and people do live quite normally with only one efficient kidney. Surgeons also recently developed techniques to remove the narrowed section of a kidney artery and substitute an artificial channel. Whenever the day comes that healthy kidneys and their service arteries can be transplanted routinely and permanently from one person to another, one reason for doing so will be kidneys damaged by the greatest killer of them all, atherosclerosis.

With knowledge, with drugs, with surgery, doctors today are bringing relief to more and more arteries of limbs, trunk and kidneys fallen into trouble. Prompt action at the first signs of any problem is your best defense now, and prevention of the basic disease would be far better.

PART IV

PLAN FOR LIVING

26

For Men: Care of Your Heart

"Diseases do not come to men suddenly but are collected and pile up bit by bit."

This observation by a most famous physician is perhaps too sweeping, overlooking such deadly onslaughts as from plague, smallpox and influenza. It comes from the "father of medicine" himself, Hippocrates, who lived into his 80's.

But it applies very aptly to the rusting disease of men's arteries that piles up bit by bit. Special warning flags begin flying when a man is 25 to 30, in the morning hours of his life, brimming with apparent health, optimistically certain he has an inexhaustible plenitude of days and years ahead to spend or waste and enjoy. Others come when he's 50 to 60, when life still is sweet, when there's a vintage of years to savor, and so much still to be done.

At any age, a man can recognize the distress signals for his heart, if he knows about them, and can act to correct them.

Shakespeare in *As You Like It* divided the years of man into seven ages—the mewling infant, the snail-paced schoolboy, the lover "sighing like furnace," the soldier "sudden and quick in quarrel," the justice "in fair round belly with good capon lined," the "lean slipper'd pantaloon with spectacles on nose and pouch on side," and last of all "second childishness and mere oblivion."

The Five Ages of Modern Man

Medically, Dr. Paul Dudley White prefers to divide man's life into five ages, reaching ultimately perhaps to a full century when oblivion then might come quickly and painlessly from coronary atherosclerosis during sleep.

The first age is from *birth to 20,* when nowadays the main hazard in life for U.S. children is accidents.

The second age span the years *20 to 40,* and these "are the critical years. It is in this period of life when all seems to be going well that atherosclerosis gets going even while the candidates for trouble look so healthy, in fact too healthy, robust, with high color, and symptomless. These are the critical years for countless numbers of men in whom this process of atherosclerosis begins to be laid down. The average man in America settles down at about 25 to a life of physical indolence although often with great nervous activity in his profession or business. He has no more time to exercise or to have relaxing recreation of any sort. He has an automobile and can hardly move without it. He has a television set before which he lolls in the evening on the return from his office. And his wife cooks too well."

In the third age, *40 to 60,* the hazards tolerated earlier begin to ripen into heart attacks and strokes. But there is an antidote, through "middle-age fitness," Dr. White declares. And "what we do from 40 to 60 will decide what will happen to us" in the next two ages, *60 to 80,* and *80 and beyond.*

Each heart beat measures the length of a man's life beginning before his birth. How he lives and what he encounters affects this clock of his destiny. He can live to speed up the artery rusting, or to keep it in check, and there are clues even that he can reverse the process.

It does start early. Yellow streaks of cholesterol deposits are found in the arteries even of children. Young American soldiers, as noted earlier, had some degrees of coronary atherosclerosis. By age 25, men's arteries contain gross streaks and deposits from cholesterol and fats. At this young age, there may be little difference among nationalities and races—various surveys differ in their findings. But by age 30 to 35, very significant differences do appear in the extent and severity of the pearly artery plaques—and American men have more than men in countries where diets are lower in animal fats and cholesterol.

Young men are not immune from heart attacks. Coronary heart disease takes about one in twelve of all young Americans who die between the ages of 25 and 34 from *all* causes, and almost one in four of all those whose lives end between the ages of 35 and 44. And for every man who dies of a heart attack, two others have nonfatal seizures. Then the rate continues to rise with coronary disease being responsible for one in three deaths of men about age 50 and almost half of all deaths of men who reach 60 and beyond.

And, almost like a thermometer of atherosclerosis, the average blood cholesterol level rises with each decade of life from young adulthood to middle age among men in this country.

A first potential danger period comes when our physical growth ends. From appetite and need, the late teen-ages are often a time of prodigious food intake, when six to ten hotcakes at a sitting, a huge steak, big desserts, anything and everything serve as fuel for growth, especially if the young man is physically very active. Right then calories almost don't seem to count, because we put them to use for growth, or burn them up. High food consumption then is a habit which many young men are able to afford with impunity so far as weight at least is concerned. When growth ceases, the need for food declines, but the old habit can continue. After high school or college, most young men drop out of team sports such as basketball, track, swimming, hockey, baseball, and no longer need to stoke their energy furnaces as generously, unless their jobs call for heavy work. These also are the years when the smoking habit usually becomes fixed—so that our man acquires the grim triad so common among us—eating too richly and too much, sitting too much and exercising too little, and smoking too heavily.

A second danger point comes with marriage, when many young men not only begin to eat better and richer food than they did as bachelors, but as husbands and fathers lack the time or money to continue regular exercise in a gym or athletic club, or on the squash or handball or tennis court or golf course.

Take home pay rises with promotions and seniority, and the young man can afford to eat even more high-calorie and high-fat foods. His take-home poundage can also creep up if his promotion puts less call upon muscular energy and more on his brain power and decision making. The sit-still evening and weekend hours in front of TV, with something to munch on the side, and power machinery and laborsaving devices add more fat to his body and likely more rust in his arteries. The laborsaving tools and devices are very fine, reducing drudgery and boredom, but what does a man do, what do you do, with the savings in time and calories and muscle power? Freeing you to do enjoyable activities to keep the human machine fit is one thing. Just saving time and effort to permit more sitting certainly won't diminish the danger of artery disease, and likely will accelerate it.

Many young men gain weight most rapidly in their 20's and 30's, life insurance statistics find. Half of American men are at least 10 per cent over desirable weight when they are only 30 years old, and one-fourth of them add 20 per cent to the pounds they were carrying when they were first able to vote.

With youthful years being a time of general good health, most young men never seek a physical checkup—nor do most of their employers insist upon this. The doctor is someone to call for the kids, or for a wife, or when something is obviously wrong, or flu strikes. Young men rarely have checks upon blood pressure, blood cholesterol, or tests for incipient diabetes, or other co-conspirators in premature heart disease.

Barring accident or mass disaster, most young men will find their 40th or 50th birthday anniversaries coming along. This is then a time of far graver average risk of heart attacks and strokes or other artery disease, unless they have lived sensibly. More danger flags begin flapping at this time.

One such flag is resignation to the idea that a heart attack is inevitable sooner or later because of hereditary susceptibility based on some family history of this disease. But we do not inherit high blood pressure, or high blood cholesterol, or diabetes. While we may inherit some susceptibilities or predispositions to these hazards, the outcome depends upon what we do about them, how we live to give them chances to be effective, or to blunt the risks.

By middle age most of us have become rooted in familiar habits of living and eating, and thinking. While we know that young middle-aged men are dying by the hundreds each day from heart attacks, or getting into trouble, the confidence may still exist that it "won't happen to me." But the thousands of men who this year were already hit by heart attacks probably felt the same way, and ignored the risks they might have side-stepped.

"Risks? My life is full of risks. I can't avoid them, and I'm not the kind of guy who wants to live dangerously—far from it," says one middle-aged man. "Look, I risk the future of my family and my business career with my daily decisions. I risk being killed by some nitwit when I drive my car out of my garage, especially on weekends. I risk being blown up in a nuclear war. I run dozens of risks every day, even every hour, risks I don't even know about."

He is right. But this same man also insures his house and his possessions against the risk of fire. He drives more carefully on an icy street than a dry, wide highway. He has his children vaccinated against smallpox and polio and whooping cough. As a thoughtful man, he does measure and take steps to reduce the risks he knows about, and in most decisions he tries to foresee the consequences.

He is influenced by statistics telling him that more pedestrians are killed or injured crossing in the middle of a busy block than at intersections controlled by traffic lights, even those with the annoying "walk" and "don't walk" orders. He knows those orders are pretty silly at midnight on an empty street. He also knows that not everyone gets hurt or killed crossing the mid-block in the rush hour. He judges his chances accordingly.

From many years of research, we now have reliable insight into the factors favoring or diminishing the chances of premature heart attacks and strokes. Thousands and millions of men court risks 3 to 5 to twenty to thirty times higher than others, and many of them die from the insults of atherosclerosis.

By middle age, most men have gained weight, lengthening belt spans at heavy danger of reducing life-spans. The Society of Actuaries found 60 per cent of men in their 50's to be at least 10 per cent over their desirable weights, and one-third at least 20 per cent over those levels.

Carrying this extra weight around might be considered a little bit of exercise in a way, Dr. White remarks, though it's a bit hard to bend down. The fat under the skin is not the real problem—it's the few ounces of fat accumulating in dangerous places in the arteries.

In the third stage of life, he adds, "much of the disease that has been slowly building up becomes apparent by symptoms, signs or sudden death." It's a time particularly when high blood pressure, angina pectoris, and fatal and non-fatal heart attacks begin taking victims, along with little and big strokes, artery disease of the legs, and cancer too.

20 to 40—The Crucial Years

Health at this time becomes largely dependent upon what happened–not in childhood–but in the years from 20 to 40. Besides physical fitness in childhood, Dr. White urges physical fitness in middle age. It's the time particularly for men to take stock of their risks, because they can do something about most or all of them. If they do, there could well be fewer widows during the fourth age of man, from 60 to 80. And really old age, from 80 to 100, can be much healthier if men have tried to combat the rusting process that takes seed and grows in the smooth inner lining of arteries.

You can eat heartily on a diet lower in saturated fats and cholesterol, without overdoing on calories, and you can lose weight thereby. You can seek better physical condition, recovering the young feeling of being fit, alert and vigorous. But, of course, don't rush off into some sudden and intense change of habits, especially if you're a man who finds himself puffing on climbing a short flight of steps. A program of new activity must start at a low or very moderate level, building up tolerance, and you should first have sound medical assessment of how you stand now, and how you can begin to change back and readjust without danger.

Your Goal—Fitness

After years of overeating, smoking, sitting and being inactive, you cannot in an instant recapture that verve and endurance you had as a youngster. But you can work slowly, at activities you like, to restore them and the sense of physical well being, and aid your arteries and your heart in the process. The key is to start a new habit that undermines and replaces the old deadly habit.

Dr. White has vast expert company when he says that "intemperance in food may be more dangerous than intemperance in many other things," and "the habit of regular and vigorous exercise is a necessity in a program of positive health."

"We seem to delight in the absurd belief that we must avoid strains, either physical or mental, that we must pamper ourselves and not walk upstairs or work physically hard or mentally either—whereas on occasion the midnight oil should be burned," he adds.

Early retirement, too short a week at work, and other seemingly wonderful attractions may penalize our arteries unless we are careful, he and others warn.

Many intelligent men in all walks of life "think nothing of continuing in their 70's to row, play tennis, climb mountains or walk many miles daily. And they continue to be more mentally alert than if they were sitting in an armchair waiting for an end to their retirement in life."

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Hearts, and Women

THAT MORNING—SHE ALWAYS REMEMBERED—THE TELEphone rang while she was having her second cup of coffee.

Diane and Bob had gone off to high school, and she was planning details of the coming day, and mentally phrasing the sprightly letter, larded with maternal advice, she would be writing to her son in college.

At the telephone, she put the cup down and the coffee still was swirling, and somehow that little fact had helped, just being able to focus on something familiar as her world shattered.

". . . afraid bad news . . ." the voice said, ". . . your husband . . . heart attack . . . top of the steps . . . so very sorry. . . ." Those were the main words announcing she was suddenly a widow at 43.

Little more than an hour before her husband had left for work, cheerful enough and seemingly in perfect health. Several hundred times a day, American women learn the news of death from the heart killer of their middle-aged and young middle-aged husbands, or see them die, or wake to find them dead.

Very likely, many wives could have helped to prevent or postpone these premature heart attacks, had they only known how. In complete innocence they may be dooming their own sons to early disaster from heart disease through lifelong habits which they permit or encourage children to adopt and follow.

The Lives in Her Hands

In this affair of the heart, women have a personal and threefold interest—not only the hearts of their husbands and of their children, but their own hearts as well. For women as for men, the stealthy killer is atherosclerosis. In our society, this biologic rusting doesn't come along so early or so brutally among women. Between the ages of 35 to 44, heart attacks kill seven men for every woman. From then to age 65, the odds reduce to three men to every woman. After 65, women are victimized almost as often as men.

Female sex hormone, as already mentioned, could be a prime reason for relative immunity against heart attacks, until after menopause. Other differences could be significant. Fashion stresses slimness, with its lesser penalty compared with being overweight. A woman rearing children and running a household often engages in more actual exercise than her husband at a desk or doing his daily work with muscle-saving machinery. Women eat many of the same foods as their husbands, but may eat less. And in early decades of adult life, relatively high blood cholesterol levels are not as ominously frequent among women.

But young women and young middle-aged women do not escape scot-free from the ravages of artery diseases. A significant number die prematurely, and their risk is higher if they have a family history of early heart disease, or have high blood pressure, or diabetes, or high blood cholesterol. One or a combination of these conspirators can lessen their "immunity" as compared with women in general. Each of these risks becomes far more serious after menopause.

Extra pounds hike the risk, and can come along all too easily, with critical epochs in the lives of many women.

The Feminine Risks

One such period can arrive with marriage, if the girl who has scrupulously watched her weight and calories for a trim figure (often sacrificing a really balanced diet to indulge in some rich delicacies) lets herself go once she has a wedding band, or because she begins oversampling her own cooking.

After her first baby, she may continue eating more than she really needs, and slowly gain weight. Or as children grow up she may become less active physically, or be able to afford help in running a well-ordered, well-dusted household, and not offset her savings in calories by eating just a bit less. Food can become a major comfort in coping with disappointments, unhappiness, or depressions. And a habit of passive living with automobile, TV and electrically powered servants can be an easy invitation to a few more pounds of fat.

For women the danger period in weight gain usually comes in the mid-30's and mid-40's, roughly a decade later than for the average American man. In weight as in fashion, women show more variability than men, with a higher proportion of women being definitely overweight compared with men, but also a higher proportion being underweight, life insurance statistics show. Excess pounds are less dangerous for women than men, perhaps or even probably because of the sex hormone, estrogen.

Cigarettes are statistically linked with a three- to six-fold greater risk of heart attacks among men. Whether smoking carries similar risks for women has not been investigated. But women now are smoking much more than they did thirty years ago, and this might be having a detrimental influence, particularly in combination with diabetes or high blood pressure or other conspirators.

Just recently, a special hazard of repeated or chronic bladder and kidney infections has been recognized among girls and women. If the infection involves the kidneys, it can be a cause of high blood pressure and greater risk of artery damage. One cause is bacteria from the intestinal tract, invading the urinary system. Painful urination is one sign of bladder infection, but the infection of bladder, urinary tubes or kidneys can be present with no symptoms at all. A survey in one Virginia county found 2 per cent of girls aged 5 to 20 had bacteria in their urine, with no apparent signs of disease.

Such infections can go on for years, and then in older age flare up as chronic advanced kidney disease. And they can be especially dangerous in pregnancy. At Boston City Hospital, Dr. Edward H. Kass found that 6 per cent of pregnant women coming to a prenatal clinic had significant bacteria in their urine, and about 1 per cent of the others developed the same signs of infection, with no symptoms, during pregnancy.

Half of the women were treated to knock out the infection, the others were not. Among those *not* treated, nearly one in five developed kidney infections during pregnancy. *One-fourth* of all untreated women had premature babies, and one in seven of their babies died soon after they had been born. But, among women treated to clear up the infection, none had kidney infections, only 7 per cent had premature babies, and none of all the babies born to treated women died.

Only by such a method of treating the infection in some women, but not in others, could the impact of this hidden cause of disease and infant death be discovered—and the benefit of treatment. If this same incidence of urinary infections holds true among American women in general, the detection and treatment of the infections could mean a great forward step in preventing many premature births and stillbirths. A new simple test of the urine fortunately makes it possible to diagnose these infections.

Be An Influence for Good Health

As guardian of family health and as chef, a woman can make a major contribution to her husband's effort to protect himself from the risks of premature heart attacks and strokes. To start with, she can urge and even cajole him to get moving down that road—to have regular physical checkups with particular attention to blood pressure, diabetes, blood cholesterol, and ECG recordings, and to follow a doctor's advice on controlling health hazards. She can buy and prepare foods to keep blood cholesterol down, and calories under control. She can help him obtain enough rest and relaxation, to avoid unnecessary emotional stresses and turmoil, encourage him to get more exercise beyond policing the yard or painting a room.

Look at your husband. Is he the slim young man he was five to ten or twenty or thirty years ago? Are you giving him more food than he really needs, or the wrong kinds? Is his daily activity confined mainly to easing into and out of an armchair —on top of a desk job or physically easy work day? Has he had a good medical checkup in the last year or several years? Are his arteries healthy, or rusting, or is he—and can you know?—one of those so endowed he could run every risk and live practically forever? Or is he drifting like millions of others closer to disaster?

From knowledge about this artery disease, a wife can help her husband reduce his risks. She knows better than suddenly to crack a whip with startling and austere changes in his breakfast and dinner, or to thrust a golf club or tennis racquet or even a rake or broom into his unwilling hand, or to spray her conversation with references to human butterballs, and otherwise alarm or offend a puzzled husband. The counterattack on atherosclerosis involves changes in our ways of life, and can best be achieved on a foundation of information, judgment and cooperation.

As a mother, are you pointing your children toward early trouble from degenerative diseases of civilization? From eating too much, and exercising too little, are their arteries destined for premature rusting? The first signs of the artery disease appear in childhood and teen-age years. Habits acquired then can persist and sabotage health and heart.

Maybe the chubby child was the popular hallmark of health in the days when tuberculosis and infectious diseases reigned supreme. Modern mothers still worry too much whether a child is eating enough each and every day, and some live by the "clean plate" rule, cajoling and even bribing a child to eat everything served up to him, at a risk of turning him against nutritious foods. But a child is not a human garbage pail. Growing children are hungrier at some times than others, and their own appetities are pretty good guides as to what their bodies really need, unless they are allowed to overdo with goodies and soft drinks too soon before dinner. Making an issue over meals, or a heap of vegetables or any food he needs, can seed rebellion. Or, if you win, can make him a glutton in terms of his real physical needs for food. Good and sensible food habits can and should be set up in young years.

As child or teen-ager, is your youngster developing sound physical health through enough exercise and play at school, after school and around home? Or is he already well on the way to being one of the army of habitual sitters, riders, and spectators rather than performers? Are you overdoing the role of family chauffeur for child as well as husband on pretty short trips to school, station, parties, homes of friends and appointments? Arteries and hearts can only suffer as legs come to be regarded as mere supports for standing, or troublesome appendages to be folded into cars.

Social customs put teen-agers under heavy pressures, and bring mothers some of their keenest worries. But many a mother may not be deeply enough concerned with her child's health in these years.

Afternoon and evening snacks tend to be very high in calories and saturated fats with soft drinks, rich confections and ice cream creations, cookies, chips, fatty hamburgers. Maybe an active or vigorously growing teen-ager can afford these foods, but girls particularly may ignore well-balanced meals at home in order to be part of the crowd and still stay slim. Teen-agers needn't forego these refreshments, but parents by example and quiet, frank discussion of health can give children a sounder perspective on the best choices of foods. And by example, parents can also guide a child not to abuse smoking no matter how much it is presented as an essential for fun and sophistication.

Sound or careless health habits take root in childhood and teen-age years. Ahead in another twenty-five to thirty years lies the greatest danger of artery rusting and its premature toll. How a mother teaches her children to live now may determine if they are alive and well a quarter century hence. And along the way, a woman can strive to benefit her own heart as well.

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Research and the Future

IT LOOKS AND TASTES EXACTLY LIKE A FAMILIAR FRANKfurter, but it's a special hot dog.

The vanilla ice cream looks and tastes just like the ice cream you buy at the store, but is made from skim milk and vegetable oils. The cherry pie and chicken casserole and chili con carne are as tasty as ever, but they also are deceptively low in saturated fats.

These and other foods are special ammunition in a major test of the idea that millions of Americans can eat to *avoid* heart attacks. No one doubts that diets low in hard fats and cholesterol can usually bring blood cholesterol down. That's been amply proven in many human experiments.

But—is it readily feasible for American men or woman generally to alter their diets while living their normal lives—and keep them altered? Can they lower their blood cholesterols—and keep them down for months and years? And then—will they actually have fewer heart attacks?

These are the critical questions, answerable only through a huge and bold field trial similar in basic respects to the field trial with children which proved the Salk polio vaccine to be safe, potent and effective. In the Salk testing, you may remember, thousands of children received the actual vaccine while other thousands unknowingly only had shots of sterile water. The thrilling verdict came when vaccinated youngsters got less paralytic polio the next summer, compared with youngsters given the "dummy" shots or no injections at all. Science had put a question to objective test, and received an objective answer.

The National Diet-Heart Test

In five cities, 1,500 volunteer married men aged 45 to 54 now are engaged in the first step of the diet test. If they show they can stick to their diet, and that this does reduce their cholesterol levels, then up to 100,000 middle-aged men may be asked to sign up for a trial lasting up to five years or more. If those men *escape heart attacks* as compared with men who keep on eating typical diets, we will have nailed down definitive proof that diet changes can prevent heart attacks, and there would be little question that most or all people should change their food habits.

This diet study is only one experiment in lively and expanding research to pin down all the answers to how to stop the needless tragedies from heart attacks.

Right in the front line of research are the 1,500 men—and their wives who feed them—chosen from among many hundreds of volunteers for the Diet-Heart Study launched early in 1963 in Baltimore, Boston, Chicago, Minneapolis, and Oakland, Calif. All are healthy and free from heart disease or diabetes. Some are chubby and some lean; some smoke and others don't; some are physically active and others scarcely exercise at all.

The only thing deliberately changed in their lives is the fat and cholesterol content of their food—the amounts of saturated fats, polyunsaturated fats and cholesterol. None is going hungry, and none is radically switching from the types of food he likes, thanks mainly to the substitute foods developed in the last years.

Each housewife plans meals for a week in advance, and orders all the fat-containing foods from a special store or food center in her city. She can buy specially trimmed lean meats such as leg of lamb roast, veal steaks, tenderloin steaks, pork chops. She can order special hot dogs, hamburger, bologna, sausage and liverwurst, and from a gamut of dishes including chili, salad oils, milk, cheese, ice cream, cookies, and cakes. She buys everything else at her usual favorite stores—fruits, vegetables, bread, fish, seafood, poultry, cereals, nuts, beverages.

By intention, most of the items from the special store vary in their proportions of different kinds of fats, for this feasibility study also seeks to evaluate a range of changes in the fat and cholesterol intake—from slight to moderate—always in the direction tending to lower blood cholesterol. Neither the men, nor their wives, nor participating nutritionists and doctors know what each individual is getting. Each volunteer has a code number, and that code determines what his particular formula of altered fat and cholesterol intake will be. The codes are set up by the study's statisticians, Jerome Cornfield and Joseph Schachter at center staff in Bethesda, Maryland. They will not be cracked until the study ends, to assure objectivity, in a similar kind of "double blind" trial as with the polio vaccine. At that time neither the doctors giving injections, nor the children, nor anyone else but the statisticians knew until the end which children had received real or dummy injections.

When a volunteer dines out, he's asked to follow general instructions already presented in Chapter 10, on what to choose, and asked to report how often he does take meals elsewhere than at home. Each is being checked periodically at the research center in his city for weight, blood pressure, cholesterol, and general health. About 250 men were chosen in each city, with two such groups taking part in Minnesota. The feasibility study is supported by research grants from the National Heart Institute, and Dr. Page heads a committee supervising the trial. Major investigators include Dr. Benjamin M. Baker of Baltimore, Dr. Ivan D. Frantz, Jr., and Dr. Keys in Minneapolis, Dr. Laurance Kinsell of Oakland, Dr. Fredrick J. Stare of Boston, and the medical author in Chicago.

It's generally anticipated that the altered diets will reduce average blood cholesterol in the groups of men under study, judging from past smaller experiments, but this remains to be seen.

Developmental work on the special foods—available only for the participants and their families—has been going on in Cleveland for several years. As a pilot study to the bigger feasibility test, Drs. Jerome Green, Helen Brown and Page and Miss Alla P. Meredith enlisted fifty married medical students, with half receiving the special foods. They not only liked and stayed with the diets, but their cholesterol levels soon declined by 14 to 15 per cent, staying down for the ten months of that study.

Scientists, nutritionists and food processors developed the special foods, including a scrambled egg substitute tasting like the real McCoy. Sausages and frankfurters are made from very lean cuts of meat, with specially compounded fats added to alter the usual ratio of polyunsaturated to saturated fats. Cookies, sweet rolls, doughnuts and pies are also specially made to control the amount and type of fat. One manufacturer developed cake mixes of a similar nature. Ice cream in which butterfat was replaced with a vegetable oil fooled a taste panel judging palatability of these new foods. Fatty meat was replaced with lean cuts in preparing frozen casseroles including chili con carne, chicken chow mein, and beef stew.

Similar foods containing less saturated fat are already on the market, and more likely will be coming. If the diet studies confirm all the previous evidence that too much cholesterol and fat of the wrong kind are bad for our hearts, then we may expect intensified research to breed pigs and beef cattle with leaner meat and less fat. Changed methods of feeding animals could also reduce the fat content of meats, favoring more muscle than fat. In Chicago, the dairy industry is producing a low-fat, high-protein milk, selling in the stores for at least a cent less than regular milk. It contains less butterfat and more solid non-fats, the nutritious high-protein powder remaining when butterfat and water are removed.

Whatever the verdict from the diet trial, Dr. Page reminds that "nobody ever said diet was the only important aspect," and "if you pin your whole hopes on diet as a means of avoiding heart attacks, you are going to be wrong." Other elements in our life are obviously involved.

There are many questions concerning some aspects of control over heart attacks. But the research effort is steadily increasing, with hundreds of scientists contributing their skills, with the National Heart Institute and the American Heart Association and other groups mobilizing funds to support research. It is truly an international effort, and includes cooperation with the scientists and physicians of East and West who are very concerned with the ravages of heart attacks in their countries.

Goals of the Researchers

Research is spelling out the detailed story of how arteries begin and continue to "rust." We know the first step is the infiltrating into the wall of an artery by cholesterol and fats, and their excessive deposition there with formation of a microscopic plaque or lesion. The plaque or plug grows mainly by taking up cholesterol circulating in the blood. Intensive studies are forming a much clearer picture of the complex chemistry of fats and fat-carrying molecules in the bloodstream, including the role or possible influence of triglycerides or other materials.

Other researchers are following up clues that enzymes or chemical governors are involved in producing the artery disease. Some teams are growing cells from healthy and damaged arteries in test tubes or tissue culture, to trace the precise changes occurring under varying conditions, and so illuminate the exact mechanism, and its trigger or triggers. Other investigators are probing the question of whether body build, especially the stocky muscular build, influences susceptibility to heart disease. Some have found a lesser incidence of cardiovascular disease and high blood pressure among people drinking hard water rather than soft water, and are trying to isolate a suspected "water factor." Clinically, physicians are continuing research studies to assess the value of anticoagulant drugs in preventing second or third heart attacks and strokes.

We need more knowledge about the effects of stress in bringing on heart attacks, and what influence stress or rapid social changes may have on blood fats and the underlying atherosclerotic disease. We need to know the mechanism to explain the high risk associated with heavy cigarette smoking, and the lower risk associated with estrogen. More specific studies are needed on the combined effect of a lower-fat diet plus more exercise in reducing risks. We also need more basic knowledge about strokes and diabetes.

High consumption of coffee has come under suspicion as playing a part, but we do not yet know whether this is really so—or anything about the mechanism if it's true. As yet we know practically nothing about the effects of alcohol, particularly whether excessive consumption with its empty calories is damaging to human arteries. We need better studies of any effects from too little sleep or rest.

We need especially to learn why an occasional low-risk person, by all usual tests, develops a coronary early in life, while another courting high risk escapes the disease.

More exploration is needed into individual differences in the way people react to our customary way of life with its diet rich in fats and calories, its low physical activity and heavy smoking. Some get high blood pressure but others don't, and some get atherosclerotic disease and others do not. Among middle-aged American men living and eating similarly, blood cholesterol levels vary over a wide range, from 140 to 320. Why the differences? Undoubtedly they partially reflect hereditary differences or tendencies, but hormone levels and the effects of earlier life experiences could also be involved. What are the biochemical mechanisms, at the cellular and subcellular level, accounting for these differences in response? This is a major basic problem needing research and resolution.

It is important to keep on refining the ways of detecting men and women susceptible to heart attacks and strokes, so they can begin earlier to reduce their risks. Physicians already can identify susceptible persons on the basis of cholesterol in the blood, excess weight, cigarette smoking, inactivity, tendencies to diabetes or hypertension, and can often predict the disease in seemingly healthy persons years before it arrives, Drs. Dawber and Kannel of the Framingham study group point out.

New detection tests and clues can be expected from research, with a helping hand from computers and automation. Computers promise to speed up and simplify the analysis of ECG's and the calculations of risk. Automatic techniques are already available for analyzing blood samples for cholesterol. A start has been made in automatic recording of ECG's, blood pressure and pulse rate—by radio telemetry from devices attached to the body—as men go about daily activity or as they exercise. These results could provide far more detailed knowledge of the healthy or ailing heart at work, or pinpoint subtle signs of impending trouble. Undoubtedly there will be much more research to find more direct and effective ways of inspecting coronary arteries for the biologic rust. Coronary "inspection" with dyes and X rays marks an important advance toward this goal, but it is expensive and not altogether unrisky, and isn't applicable to a mass detection program.

"Within another generation," says Dr. White, "in fact I believe within a decade, with the present increasing tempo of vigorous research, we should have some definitive answers that will allow us to protect our men and to extend increasingly the expectation of a long and healthy life."

29

Your Heart and Your Future

Now you can make a vital decision.

You can choose to do nothing, and await the consequences.

Or—You can begin disarming the conspirators that are so powerfully implicated in promoting premature heart attacks. Your hope lies in living, and living very well indeed, while keeping all the known risks under control.

It is not difficult, nor does it take forever to achieve.

"Tom Stevens' " Choice

In only a matter of weeks, for example, Tom Stevens transformed his risk of a premature heart attack from high to low.

Through a planned loss of two pounds a week he dropped twenty-four pounds without going hungry. He slashed his blood cholesterol level by 40 per cent within a few weeks. His ECG—which had shown some abnormal tracings—returned to normal. His blood pressure came down a bit, even though it hadn't been abnormally high. He had been suffering periodic leg cramps and had almost no pulsations in one foot and lower leg, two warnings of rusting in his leg arteries. This trouble also was controlled over the next years.

All he did was make some moderate changes in his living habits. Four years later he's holding on to all these benefits, and he and Mrs. Stevens find the new habits completely comfortable, pleasant and reasonable. Tom Stevens (he's an actual man although that is not his real name) is one of hundreds of volunteers who have been counterattacking against the high risks of early heart attack under the Coronary Prevention Evaluation Program of the Chicago Board of Health. Tom is quite a typical example of what any middle-aged man can easily do.

An executive in a business firm, Tom was 50 when he had his initial checkup for the program in November, 1959. A tall man, he weighed 222 pounds. Creeping gains with the years had put him 25 pounds over his desirable weight. And there were those telltale soft skinfolds of fat.

But he'd always been fairly healthy, with never any major diseases such as TB, diabetes, high blood pressure or heart disease. He did have some aches and pains blamed on a low-grade arthritis. He did complain of spells of "tension stomach" and constipation and in 1954 had been diagnosed as having a stomach ulcer. As part of his treatment for ulcer, he had quit smoking then, after habitually lighting up to three packs of cigarettes a day for more than twenty years.

Emotionally, Tom said he had tended to become easily upset and excited as a young man, but now had a more philosophic view of life and events. He still found it hard to relax completely; and quite often there were times when he simply felt tired for days.

His blood cholesterol ranged from 323 to 374 in several tests, a reading very definitely on the high and dangerous side. His ECG in 1959 showed what are known as non-specific changes in the "T" wave. Several years earlier, Tom said, his chest had hurt for hours one day after he had run to catch a train, but that hadn't happened again since. He did, however, get leg cramps whenever he walked rapidly for a couple of blocks. About two years earlier, Tom had tried to bring down his blood cholesterol, but rather half-heartedly, and became discouraged and quit.

After his medical checkup, Tom kept a record for a week or so of everything he ate and drank. It showed that he was consuming about 3,000 calories-plus a day, with a diet high in saturated fats and cholesterol, and low in polyunsaturated fats. He was eating fairly liberal amounts of whole milk, eggs, butter, bacon, sweet rolls, and meats five to seven times a week, although taking care to cut away the excess fat. Mrs. Stevens regularly used butter to cook eggs or to dress meats, and flavored vegetables and potatoes with butter or bacon drippings.

In December, 1959, Tom switched to a new diet, like that described in Chapter 10. Now he drew only about 30 per cent of his calories from fats of all kinds, and hard or saturated fats accounted for only one-third of all the fats. The diet cut his cholesterol intake by two-thirds. Proteins supplied about 25 per cent of all calories, and carbohydrates the rest. He limited total calories to 2,300 a day, and began spending more through mild exercise.

In less than a month, his blood cholesterol curved down to 220, and has stayed at that healthy level—or below—ever since. His weight has held within a few pounds of his desirable goal of 195. His ECG became normal within a year, and has stayed so. His chronic stomach trouble and constipation both eased. With moderate exercise—walking at least three miles a day and preferably six—his leg trouble has been kept well controlled. Tom comes in for periodic physicals, and all tests now are within normal limits. His known risks of a coronary are down, and so are those of a majority of his fellows in the prevention experiment.

The Next Thing to the Sure Thing

Is Tom Stevens—and any man who counters his risks—going to escape a premature heart attack, or live five to ten years or more longer? All the evidence indicates he probably is protecting his heart, and could have fashioned a sturdier shield had he started earlier in life. The definitive proof is still to come. But the evidence continues to grow.

The heart plague is definitely linked with life habits. More and more heart specialists point to one great general cause —an abuse of our prosperity, the abundance and temptations of modern times.

Knowing this, why do we gamble and delay in adopting new and simple habits that cannot do any harm and offer the only known means of protection? Some people rationalize their delay, and some raise doubts or objections. But are these doubts and arguments really valid and pertinent?

How Valid Are the Doubts?

Some delay because "the experts differ, so I can just wait until they settle the matter, and prove what I should do." The fact that some specialists disagree is not the issue. Every major step in science and medicine has generally encountered resistance, objections and debate. It is not at all surprising or highly significant that specialists—those who have no new products to sell nor old products or advantages to preserve—differ, with some insisting on complete prior proof that a change in habits will work.

The crucial issue is whether we should act now toward saving lives. It is ironic that quite a few voices are raised saying "it's too early" and "wait for more evidence" in the matter of reasonable and safe dietary changes—while almost no one cautions about drugs. Antihypertensive drugs, for example, were introduced and accepted long before there was proof that they prevented heart attacks and strokes and prolonged life. It just seemed reasonable to try them, and so they were used. Similarly, when a drug to lower blood cholesterol was brought out, it was prescribed for hundreds of thousands of patients—until it was found to be hazardous.

Now, if it's proper and fitting at this time to counter high blood cholesterol with a drug, in the hope of averting heart attacks—is it not equally proper and fitting to treat with diet—especially when no hazard is involved?

An ancient illusion paralyzes action for sensible, effective health habits. It's the illusion that there must always be a neat and simple solution to any health question, with or without a touch of magic about it. The earliest witch doctor knew of this human weakness, and it has been used profitably ever since by food faddists, quacks and promoters of expensive but useless devices to cure arthritis or cancer or any other of man's many ills.

This illusion is even fed by the brilliant successes of some specific drugs and vaccines. From aspirin and antibiotics to salvarsan and steroids, old and new drugs and compounds have earned fame and our gratitude. They have also encouraged many people to look to the laboratories of the biochemists for a magic pill by which to control blood cholesterol, thus somehow solving the entire matter of heart disease and banishing all worries. But elevated blood cholesterol is only one of the risks in great susceptibility to heart attack. If a drug were found that *really prevented the artery disease itself,* then possibly we might gorge and laze to our heart's content. This manner of life still would be hazardous, though, to other organs such as the kidneys or liver or lungs and muscles and joints, and could promote high blood pressure or diabetes or other diseases.

Rarely is there really one single cause or factor of a disease, and this artery disease is a prime example of many causes, of a gang of dangerous agents. Acting against one but not others is comparable to putting out one small fire in a forest but letting others spread.

Some people object that our knowledge of risks—high blood cholesterol, high-fat foods, smoking, inactivity and others—is based merely on statistical studies and associations. So they are, at least in part. The evidence from animals is not merely association—it is experimentation. And it reaches the same conclusions. The findings on ability to correct risks—to lower blood cholesterol for example—came from experiments with man himself. In any case, statistical and epidemiologic methods are among research's most powerful tools, as pointed out earlier. Just such research has detected the causes of other health hazards, from infectious diseases like once-dread yellow fever, nutritional deficiencies like pellagra, cancers such as bone cancers from the radium licked off from brushes by women painting luminous watch dials. And epidemiology has also pointed the way to means of protection.

Some argue that the knowledge about heart risks is based upon small numbers of persons in prospective or retrospective studies. Some of them are. But a number of investigations involve not just thousands but tens of thousands or hundreds of thousands of persons, observed for years, here in the United States and abroad. And what is most significant is that scores of such studies come up with the same conclusions, with similar weights given to each of the risks. In toto, a vast army of men and women varying in their life habits have come under epidemiologic analysis. Laboratory experiments have supported these findings.

Today we are on solid scientific ground in our knowledge of the risks and causes of heart attacks. The challenge in medicine is to *prevent* the dangerous and debilitating and degenerative diseases, of which heart disease is the greatest killer. We must all readjust our thinking, including the doctors. For years the main concern of the physician has been to fight off death from particular infections, to bind up particular wounds, to remove some particular diseased or damaged organ. With great advances in the control of infectious diseases, people and doctors must turn to the greater task of preserving sound health. Pediatricians giving babies vaccines and advising mothers about their diet and growth are engaged in preventive medicine. So are obstetricians advising habits for safe and successful pregnancy and birth of a healthy baby, and to assure the mother's health afterward. So are those doctors alert for signs of physical or emotional changes in patients which warn of coming trouble.

These doctors are concerned *with the way their patients live*, whether infants or grandparents, and this is precisely the issue in our chances of avoiding heart attacks. Through moderate changes in our way of life, a bounty is likely in preventing many premature heart attacks and strokes. Acting in this way to prevent hazards is not a new chapter in medicine. Milk was pasteurized and water chlorinated for safety—over loud objections at the time, and a vociferous crusade is being mounted now against fluoridating water to reduce tooth decay.

For years now we have been giving cod liver oil—or, more recently, vitamin drops—and orange juice daily to our babies. It is so routine we scarcely remember doing differently not long ago. But as a result of this change in infant feedings, many young parents have never seen a bowlegged youngster, nor anyone with rickets or scurvy. Parents have acted wisely and well based on scientific information to prevent deficiency diseases. They changed ways of living.

In the case of heart disease it is most impressively significant that once a man has had a heart attack, doctors almost invariably urge him to *change his way of life*. They alter his diet, bring down his blood cholesterol and weight, advise him to be more active, to stop smoking or smoke moderately, suggest he try to maintain a more even emotional keel. Why? In hopes of *preventing* a second attack.

Then why not also try to protect the man who is heading for a heart attack, before it happens? *Before* his arteries get into so much trouble that when the first attack comes, he may be one of those 30 to 40 per cent of victims who die immediately or within a few weeks?

Well, it is argued that it is premature to apply these measures across the board. Those who object say, in effect: Not everyone is equally susceptible to atherosclerosis and its consequences, so not everyone really needs to be careful, and many apparently could go on eating and drinking and smoking or loafing or getting fat or whatever they please without any danger for their hearts. It's held to be unfair to suggest that some people do some things which may not be necessary. The only ones who should be careful, it's said, are those who are susceptible to early attacks.

This might be reasonable except for one tremendous flaw: The central fact is that a solid majority of us are more or less susceptible in terms of the known risks we are harboring. In terms of our abundant, high-fat and high-cholesterol food intake, most of us are more or less constantly running some hazard. At least 20 per cent of middle-aged men are in the very high risk groups from several factors and most of the rest show considerable proneness to coronary disease. Less than 5 per cent are low risk. The terrible fact is that more than half of all American deaths now are caused by the artery disease. By doing nothing, thousands and millions of men and women are being abandoned to their fate when they have a hopeful chance to prevent disaster.

The hard facts are that this threat is almost everybody's business. As the American Heart Association statement said, it behooves *particularly* the higher risk people to act now. The inference is quite evident: What is especially urgent for some has obvious implications for all. The recommendation is not exclusive—quite the contrary—especially since the moderate changes in habits needed to combat the coronary conspirators are themselves entirely safe and without risk.

Those who argue against general application of present knowledge offer no hope for years to come against premature heart attacks. They should face this fact about their position, and consider whether they are being properly cautious and truly careful about human lives.

As Dr. White remarks, ways should be found to assess coronary proneness very early in adult life. Until then, ". . . perhaps for all of us, simple measures may be advisable even now before we have all the proof, such measures as the avoidance of any gain in weight after age 25, the reduction of the animal fat content of our very rich American diet, and the institution of programs of regular exercise and relaxation of other sorts, too, with an effort to neutralize at least somewhat the emotional stress that is so characteristic of current urban life."

Mere watchful waiting and "judicious" neglect of our present evidence will not stay heart attacks. By being too slow and too cautious in correcting our abuse of abundance and prosperity, young and middle-aged men will keep on collision course with heart attacks. Each year, there are 500,000 new American widows, and many lose relatively young husbands to heart attacks. The shame of it is that these might have been *avoidable* heart attacks.

Your defense, at any age, is in your own hands. Your counterattack is neither "radical" nor difficult. The countermeasures are simple, and alluring old habits can be modified. No one need become a hypochondriac, fearful of every shadow and statistic, every egg on his plate, every cigarette or cigar smoked, and every vague pain.

"Understand heart disease and you will not fear it," Dr. Page declares. "Reduce weight if you are obese, eat less in hopes you will live longer to eat more; increase the amount of daily exercise. Reduce blood pressure if it is even moderately elevated. If blood cholesterol is high, see a doctor and change your dietary habits. Stress is man's challenge to greatness—meet it with equanimity. Avoid excess of all kinds, but don't miss anything. Do not forbid things—they are for use, not abuse."

Our error, he points out, is overindulgence in the easy pleasures of living. Many men abuse cigarettes, food, liquor and their muscles.

Adult people "must learn to distinguish between moderation and abuse. Two packs of cigarettes a day to me is an abuse. Too much fat or too many calories is an abuse. Drinking during most parts of the day is an abuse. Doing no physical work is an abuse. The answer lies in disciplining oneself, not in forbidding."

The best prescription now is one you can formulate for yourself—stop abusing the good things of our abundant life, and use today's knowledge in hopes of saving your heart.

TABLE OF FOODS
and
THEIR NUTRIENT VALUES

Table* of Foods and Their Nutrient Values

The values shown in this table are reasonable averages based on currently available data. Reasonable variations may be expected due to the natural differences in foods, different varieties of the same foods, differences in recipes for prepared foods, differences in chemical analytical methods, and statistical rounding of averages.

Measured in grams (gm): protein (Pro.), total fat (T. Fat), saturated fatty acids (SF), unsaturated fatty acids (UF), polyunsaturated fatty acids (PF) and carbohydrate (CHO).

Measured in milligrams (mg): cholesterol (Chol.).

DAIRY PRODUCTS	**Amt.**	**Cal.**	**Pro.**	**T. Fat**	**SF**	**UF**	**PF**	**CHO**	**Chol.**
Cheese									
cheddar grated	1 tbsp	30	2.0	2.0	1.0	1.0			8
cheddar processed 1 slice	1 oz	105	7.0	9.0	5.0	3.6	0.6		32
cottage, creamed	1 oz	30	3.8	1.4	0.8	0.6	0.1	1	1
cottage, uncreamed	1 oz	25	5.0					1	1
cream	1 tbsp	55	1.0	6.0	3.0	2.7	0.7		9
Swiss Camembert	1 oz	105	7.0	8.0	4.0	3.6	0.6	1	41
Chocolate milk drink	1 oz	24	1.0	0.8	0.4	0.4	0.2	3	
Cocoa									
whole milk	1 oz	29	1.1	1.4	0.8	0.5		3	4
skim milk	1 oz	19	1.2	0.2	0.1	0.1		3	

* oz—ounce, tsp—teaspoon, tbsp—tablespoon, lg—large, sl—slice, med—medium, pc—piece, Cal—calories

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	Amt.	Cal.	Pro.	T. Fat	SF	UF	PF	CHO	Chol.
Corn starch pudding	½ cup	138	4.5	5.0	3.0	1.8	0.3	20	17
Cream									
half and half (12% fat)	1 tbsp	20		1.8	1.0	0.7	0.1	1	6
light; also sour cream (20% fat)	1 tbsp	35		3.2	1.8	1.3	0.2	1	10
medium (27% fat)	1 tbsp	45		4.9	2.7	1.9	0.3	1	14
heavy (35% fat)	1 tbsp	55		5.8	3.2	2.3	0.4		18
restaurant creamer	¾ oz	30		2.7	1.5	1.1	0.1	2	9
Custard, baked or tapioca	½ cup	143	6.5	7.0	3.0	3.7	1.2	14	152
Egg									
whole	1 lg	80	6.0	6.0	2.0	3.7	0.7		234
white	1	15	4.0						
yolk	1	60	3.0	6.0	2.0	3.7	0.7		234
scrambled dry	1 egg	110	6.0	8.0	3.0	5.0	1.0	1	234
Ice cream, plain	½ cup	145	3.0	9.0	5.0	3.6	0.6	15	35
Ice milk	½ cup	143	4.5	5.0	3.0	1.8	0.3	21	6
Metrecal—liquid	1 oz	28	2.2	0.6	0.2	0.4	0.2	4	
Milk									
whole	1 oz	21	1.1	1.2	0.8	0.4		2	4
skim (reconstituted or fortified)	1 oz	11	1.1					2	
evaporated	1 tbsp	22	1.1	1.2	0.7	0.5	0.1	2	9
dry non-fat powder	1 tbsp	18	1.8					3	

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	Amt.	Cal.	Pro.	T. Fat	SF	UF	PF	CHO	Chol.
Ovaltine powder	3 tsp	51	2.2	0.3	0.2	0.1		10	1
Pream	1 tsp	11	0.6	0.6	0.3	0.2		1	
Whipped topping (can)	1 tbsp	18	0.1	1.7	0.4	1.3	0.1	1	
Yogurt (partially skimmed milk)	1 oz	15	1.0	0.5	0.2	0.3	0.2	2	
FISH AND SEAFOOD									
Clams, raw	1 oz	23	3.7	0.3	0.1	0.2	0.1	1	35
Crabmeat, canned or cooked	1 oz	30	4.7	0.7	0.2	0.5	0.2		28
Fishsticks, breaded	1 pc	40	3.8	2.0	0.5	1.4	1.0	2	14
Herring	1 pc (25 gm)	53	5.6	3.2	0.7	2.2	1.5		23
Ocean Perch, breaded, deep fat fried	1 oz	65	5.3	3.7	0.8	2.7	0.4	2	18
Oysters, raw (2 or 3 medium)	1 oz	20	2.5	0.5	0.2	0.3	0.2	1	32
Salmon, pink canned	1 oz	40	5.7	1.7	0.3	1.3	1.0		18
Salmon, red smoked	1 oz	50	6.0	2.8	0.8	1.8	0.9		17
Sardines (drained)	1 oz	60	7.3	3.0	0.7	2.2	1.5		23
Shrimps, lobster	1 oz	37	7.7	0.3	0.1	0.2	0.1		42
Tuna, anchovies, caviar	1 oz	57	8.3	2.3	0.7	1.6	1.3		17
Fish: cooked, smoked, lean	1 oz	46	7.0	2.0	0.6	1.3	0.7		18
MIXED DISHES, SOUPS, SALADS, ETC.									
Baked beans canned, with pork	¼ cup	83	4.0	1.8	0.8	1.0	0.3	14	2

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	Amt.	Cal.	Pro.	T. Fat	SF	UF	PF	CHO	Chol.
with salt pork, homemade	¼ cup	90	3.4	3.9	1.4	2.3	0.6	11	9
with oil, homemade	¼ cup	98	3.1	4.9	0.4	4.4	3.0	11	
Borscht with sour cream	¼ cup	26	0.3	1.8	0.8	1.0	0.2	2	3
Cheese blintzes, baked	1 oz	56	3.1	4.0	2.0	1.9	0.5	2	37
Chicken chow mein, noodles separate	½ cup	132	11.4	8.6	2.4	6.2	1.3	2	28
Chicken livers, chopped	½ oz	28	1.5	2.1	0.7	1.3	0.4	1	28
Chili									
with beans, canned	¼ cup	84	4.8	3.8	1.8	1.8	0.1	8	25
no beans, canned	¼ cup	128	6.5	9.5	4.5	4.6	0.3	4	36
Chop Suey									
lean pork	¼ cup	50	6.2	2.6	0.9	1.7	0.5	1	21
American ground beef	¼ cup	87	6.6	6.5	2.5	3.9	0.3	1	27
Chow mein noodles	⅓ cup	73	2.0	3.5	0.9	2.6	0.3	9	
Corned beef hash, canned	1 oz	40	4.0	1.7	0.7	0.9	0.2	2	12
Denver sandwich: fried eggs, ham	1 sand	318	13.4	18.0	6.8	10.3	2.2	28	274
Dumpling	1 oz	89	2.2	3.8	1.2	2.6	0.2	12	2
Egg roll, deep fat fried	1 pc (1 oz)	83	3.1	6.7	1.2	5.2	3.6	3	16
Gefullte fish	1 oz	37	5.0	1.6	0.5	1.0	0.5	1	19
Gravy									
with beef fat, flour	1 tbsp	34	0.1	3.5	1.7	1.7	0.1	1	4
with oil, flour	1 tbsp	34	0.1	3.5	0.2	3.2	2.2	1	

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	Amt.	Cal.	Pro.	T. Fat	SF	UF	PF	CHO	Chol.
Kreplach									
meat, boiled	1 oz	73	5.1	3.0	1.3	1.6	0.1	6	44
cheese, boiled	1 oz	53	4.0	1.5	0.6	0.8	0.2	6	26
Macaroni and cheese	¼ cup	119	4.5	6.3	3.5	2.5	0.5	11	22
Meat loaf	1 oz	101	7.0	7.6	3.7	3.5	0.2	1	45
Noodles and cottage cheese	¼ cup	76	4.6	3.7	1.8	1.8	0.4	6	30
Potato									
pancakes	1 sm (2 oz)	68	1.3	4.8	1.3	3.5	0.4	5	24
patty or cake	2 oz	106	2.0	8.4	3.0	5.1	0.5	6	56
Pot Pie									
beef	½ pie	230	9.0	14.0	5.0	8.3	0.8	16	54
poultry	½ pie	243	8.5	14.0	4.0	9.3	1.8	20	35
Pizza with tomato and cheese	3" wedge	90	4.0	3.0	1.5	1.5		12	2
Rice									
pilaf	¼ cup	64	1.0	2.0	1.0	0.9	0.3	11	7
fried	¼ cup	132	2.0	8.1	2.9	4.8	1.3	12	47
Salad									
chicken	1 oz	64	4.9	4.6	1.1	3.4	1.9		16
kidney bean	¼ cup	87	2.1	6.1	1.1	4.8	3.2	6	5
potato, German	¼ cup	63	2.5	1.5	0.6	1.0	0.2	11	3
potato, with mayonnaise	¼ cup	124	1.0	9.6	1.7	7.4	5.0	8	7
shrimp	1 oz	52	4.8	3.3	0.7	2.5	1.6		37

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	Amt.	Cal.	Pro.	T. Fat	SF	UF	PF	CHO	Chol.
tuna or salmon (restaurant)	1 oz	57	4.6	3.4	0.8	2.6	1.9	1	11
Waldorf	¼ cup	57	0.3	4.8	0.8	3.8	2.7	4	3
Salmon loaf	1 oz	49	5.1	2.8	0.9	1.7	0.7	1	36
Soup									
bean	¼ cup	48	2.0	1.3	0.5	0.7	0.2	8	3
beef with meat	¼ cup	25	1.5	1.0	0.5	0.5		3	1
broth: bouillon, consommé, onion	¼ cup	3	0.5						
clam chowder, no milk	¼ cup	21	1.3	0.5		0.5	0.5	3	13
cream, canned (all varieties)	¼ cup	50	1.8	3.0	1.8	1.1	0.1	5	10
cream, homemade	¼ cup	66	2.8	4.4	2.6	1.7	0.3	5	14
noodle or rice	¼ cup	29	1.5	1.0	0.3	0.8	0.3	3	1
pea	¼ cup	35	1.5	0.5	0.3	0.3		6	9
vegetable, tomato	¼ cup	23	0.5	0.5	0.3	0.3	0.2	5	
Spaghetti									
with meat sauce	¼ cup	71	3.3	2.5	0.8	1.7	0.9	9	7
with tomato and cheese	¼ cup	53	1.5	1.3	0.5	0.8	0.5	9	39
Stew									
beef vegetable	¼ cup	46	3.8	2.5	1.3	1.2	0.2	4	27
oyster, made with whole milk and butter	¼ cup	50	2.8	3.0	1.4	1.4	0.2	3	66
Tomato aspic	¼ cup	18	2.0					3	
Veal									
curried	¼ cup	101	12.2	5.8	2.4	3.3	0.3		48

(Cont. next page)

	Amt.	Cal.	Pro.	T. Fat	SF	UF	PF	CHO	Chol.
scallopini (restaurant)	¼ cup	161	10.3	12.2	4.9	6.9	0.5	2	53
VEGETABLES									
Asparagus									
fresh	½ cup	18	2.0					3	
canned	½ cup	20	2.0					3	
Beans									
lima (small)	½ cup	75	4.0	0.5	0.1	0.4	0.2	15	
green or wax	½ cup	13	1.0					3	
Beets, diced	½ cup	35	1.0					8	
Broccoli spears	½ cup	23	2.5					4	
Brussels sprouts	½ cup	30	3.0	0.5	0.1	0.4	0.2	6	
Cabbage									
raw shredded	½ cup	13	0.5					3	
sauerkraut or plain cooked	½ cup	20	1.0					5	
coleslaw with dressing	⅛ cup	18	0.1	1.5	0.2	1.2	1.0	1	2
Carrots									
raw (½ medium)	1 oz	10	0.5					3	
diced	½ cup	23	0.5	0.5	0.1	0.4	0.2	5	
Cauliflower	½ cup	15	1.5					3	
Corn	1								
ear		65	2.0	1.0		1.0	1.0	16	

(Cont. next page)

	Amt.	Cal.	Pro.	T. Fat	SF	UF	PF	CHO	Chol.
canned (all varieties)	½ cup	85	2.5	0.5	0.1	0.4	0.2	21	
Greens, all except spinach	½ cup	15	1.5					3	
Lettuce, celery, other salad vegetables	½ cup	6	1.0					2	
Okra	½ cup	30	2.0					6	
Onions	½ cup	40	1.0					9	
Parsnips	½ cup	48	1.0	0.5	0.1	0.4	0.2	11	
Peas									
green fresh or frozen	½ cup	55	4.0	0.5	0.1	0.4	0.2	10	
green canned	½ cup	85	4.0	0.5	0.1	0.4	0.2	16	
Potatoes									
boiled or baked	½ med	45	1.5					11	
French fried in cottonseed oil (5 pc)	1 oz	78	1.0	3.5	0.8	2.7	2.0	10	
French fried in hydrogenated fat (5 pc)	1 oz	78	1.0	3.5	1.2	2.3	0.3	10	
French fried in corn oil (5 pc)	1 oz	78	1.0	3.5	0.3	3.0	2.1	10	
French fried, frozen (5 pc)	1 oz	48	1.0	2.0	0.5	1.5	1.0	8	
mashed with milk and butter	½ cup	58	1.0	3.0	1.8	1.0		7	11
roasted	½ med	82	1.5	4.0	1.0	3.0	0.3	11	
scalloped	½ cup	120	3.9	5.4	2.4	3.1	0.2	15	8
Potato chips	5 lg pc	55	0.5	3.5	1.0	2.5	1.5	5	
Pumpkin, canned	½ cup	38	1.0	0.5	0.1	0.4	0.2	9	
Spinach	½ cup	23	3.0	0.5	0.1	0.4	0.2	3	

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	Amt.	Cal.	Pro.	T. Fat	SF	UF	PF	CHO	Chol.
Soybean sprouts, raw	½ cup	25	3.5	0.5	0.1	0.4	0.2	3	
Squash									
summer diced	½ cup	18	0.5					4	
winter baked or mashed	½ cup	48	2.0	0.5	0.1	0.4	0.2	12	
Sweet potatoes									
boiled	½ med	85	1.0	0.5	0.1	0.4	0.2	20	
candied	½ med	148	1.0	3.0	1.0	2.0	0.5	30	
Tomatoes									
raw	½ med	15	1.0					3	
canned	½ cup	23	1.0					5	
Tomato catsup	1 tbsp	15						4	
Turnips, diced	½ cup	20	0.5					5	
Vegetables, average	½ cup	24	1.4	0.2		0.2		6	
FRUITS									
Apple	1 med	70						18	
Apple juice, also grape, pineapple	½ cup	63						17	
Applesauce, also ½ pear, canned	¼ cup	45						12	
Apricots									
fresh	3	55	1.0					14	
canned (4 with 2 tbsp syrup)	4 halves	105	1.0					27	
dried (¼ cup)	10 halves	98	2.0	0.2		0.2	0.1	25	

(Cont. next page)

	Amt.	Cal.	Pro.	T. Fat	SF	UF	PF	CHO	Chol.
juice, also peach	½ cup	70	0.5					18	
Avocado	¼ cup	65	0.8	6.5	1.2	5.0	2.0	2	
Banana	1 med	85	1.0					23	
Blueberries	½ cup	43	0.5	0.5	0.1	0.4	0.2	11	
Cantaloupe	¼ med	20	0.5					5	
Cherries, raw (8–10 large)	½ cup	33	0.5	0.5	0.1	0.4	0.2	8	
Cranberry sauce	1 tbsp	34		0.1		0.1		9	
Dates, fresh dried (3–4)	1 oz	80	0.6	0.2		0.2		21	
Figs, fresh dried	1 lg	60	1.0					15	
Fruit cocktail, heavy syrup	½ cup	98	0.5	0.5	0.1	0.4	0.2	25	
Grapefruit									
grapefruit	½ med	50	1.0					14	
sections, raw	½ cup	38	0.4					10	
juice, fresh	½ cup	48	0.5					12	
juice, canned sweet	½ cup	65	0.5					16	
Grapes: 15 malaga, 40 green seedless	½ cup	50	0.5					13	
Honeydew melon, fresh pineapple	½ cup	38	0.5					10	
Lemon juice	1 tbsp	5						1	
Lemonade, sweetened	½ cup	56						14	
Orange									
orange	1 med	70	1.0					18	

(Cont. next page)

	Amt.	Cal.	Pro.	T. Fat	SF	UF	PF	CHO	Chol.
juice, canned fresh or frozen	½ cup	56	1.0					14	
Peach, fresh	1 med	35	1.0					10	
Peaches									
canned with juice	1 half	45						12	
dried (4 med halves)	1 oz	75	0.9	0.2		0.2		20	
Pear, fresh	1 lg	100	1.0	1.0	0.2	0.8	0.4	25	
Pineapple, canned sliced	1 sl	95						26	
Plum, fresh	1 lg	30						7	
Prunes, dried	4 med	70	1.0					19	
Raisins	¼ cup	115	1.0					31	
Strawberries									
fresh	½ cup	28	0.5	0.5	0.1	0.4	0.2	7	
frozen	1 oz	30	0.2	0.1		0.1		8	
Watermelon, 4" x 4" wedge	1 pc sm	60	1.0	0.5	0.1	0.4	0.2	15	
Fruit fresh, average	½ cup	58	0.8	0.2		0.2	0.1	15	
CEREALS, BREADS, BAKED GOODS									
Biscuits, baking powder	1 med	130	3.0	4.0	1.0	2.8	0.8	18	2
Bread crumbs, dry grated	1 tbsp	23	0.5	0.5	0.1	0.4	0.1	4	
Bread									
Boston brown	1 sl	100	3.0	1.0	0.2	0.8	0.1	22	1
white enriched	1 sl	60	2.0	1.0	0.2	0.8	0.1	12	1

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	Amt.	Cal.	Pro.	T. Fat	SF	UF	PF	CHO	Chol.
white unenriched, raisin, French	1 sl	60	2.0	1.0	0.2	0.8	0.1	12	1
whole wheat	1 sl	55	2.0	1.0	0.2	0.8	0.3	11	1
Brownie, 2" x 2" square	1	124	1.5	8.0	2.9	4.7	1.4	13	39
Cake, without frosting									
angel food, 2" wedge	1 pc	110	3.0					23	
chiffon cake, 1¼" wedge	1 pc	141	2.8	5.6	1.3	4.1	2.6	19	39
cheese cake, 2" x 3"	1 pc	196	4.6	11.0	6.2	4.3	0.8	18	51
chocolate plain, 2" wedge	1 pc	144	2.7	6.0	3.0	2.7	0.6	21	39
fruit, 2" x 2"	1 pc	105	2.0	4.0	1.0	2.8	0.8	17	22
plain, 2" wedge	1 pc	180	3.9	5.1	0.9	3.9	0.9	30	24
pound, 3" x 3"	1 pc	130	2.0	7.0	2.0	5.0	1.0	15	36
sponge, 2" wedge	1 pc	105	3.0	2.4	0.8	1.5	0.3	17	88
white cake with oil, 1½" wedge	1 pc	210	3.6	5.6	0.3	5.0	3.3	36	
Cereals									
dry	½ oz	55	1.0					12	
dry sweetened	½ oz	60	1.0					13	
Cookie, small, 1½"									
med fat	1	35	0.7	1.0	0.3	0.7		6	7
high fat	1	35	0.4	1.4	0.3	1.0	0.1	5	3
chocolate chip	1	31	0.4	1.3	0.5	0.8	0.1	4	4
peanut butter	1	32	0.6	1.4	0.3	1.0	0.2	4	3

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	Amt.	Cal.	Pro.	T. Fat	SF	UF	PF	CHO	Chol.
Corn grits									
enriched	¼ cup	30	0.8					7	
unenriched	¼ cup	30	0.8					7	
Corn meal, enriched	2 tbsp	66	1.4	0.2		0.2	0.1	14	
Corn muffins, cornbread	1 med	155	4.0	5.0	2.0	2.8	0.8	22	32
Cracker									
graham	1 med	28	0.5	0.5	0.1	0.4	0.1	5	
saltine	1	18	0.5	0.5	0.1	0.4	0.1	3	
Ritz	1	11	0.2	0.5	0.4	0.1		1	1
Doughnut	1	135	2.0	7.0	2.0	5.0	3.0	17	27
Farina, enriched	½ cup	53	1.5					11	
Fig bar	1	55	1.0	1.0	0.2	0.8	0.1	12	
Flour enriched	1 tbsp	25	0.8	0.1		0.1		5	
French toast with butter	1 sl	153	5.0	8.1	3.9	3.8	1.0	15	144
Macaroni, noodles, spaghetti	½ cup	96	3.0	0.6	0.2	0.4		20	
Muffin									
plain	1	135	4.0	5.0	1.0	3.8	0.8	19	23
English, matzo	1 sl	56	2.0	0.2		0.2		12	1
Oatmeal	½ cup	75	2.5	1.5	0.5	1.0	0.5	13	
Pancake									
with hydrogenated fat	1 med	60	2.0	2.0	0.5	1.4	0.9	8	23
with oil	1 med	62	1.9	1.6	0.1	1.4	0.9	10	

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	Amt.	Cal.	Pro.	T. Fat	SF	UF	PF	CHO	Chol.
Pie crust with shortening	1/7 crust	94	1.4	5.1	1.1	3.8	0.4	10	
Pies									
custard	1 pc	265	7.0	11.0	4.0	7.0	1.0	34	87
all fruit	1 pc	330	3.0	13.0	4.0	8.4	1.4	53	11
lemon meringue	1 pc	300	4.0	12.0	4.0	7.4	1.4	45	59
mince	1 pc	340	3.0	9.0	2.0	6.6	0.6	62	3
pumpkin	1 pc	265	5.0	12.0	5.0	7.0	1.0	34	87
Popcorn, no fat added	½ cup	28	1.0	0.5	0.1	0.4	0.1	6	
Pretzels, small stick	5 sticks	20						4	
Rice	½ cup cooked	102	2.0					22	
Roll, hard	1 lg	160	5.0	2.0	1.0	1.0		31	2
Rye wafers, Rye Krisp	2 pc	43	2.0					10	
Strudel, all types	1 small	165	1.5	6.5	2.0	4.2	0.7	27	6
Stuffing									
with hydrogenated fat	¼ cup	64	0.8	4.6	1.2	3.4	0.5	5	
with oil	¼ cup	68	0.8	5.2	0.7	4.2	2.5	5	
no added fat	¼ cup	36	0.8	1.6	0.5	1.1	0.3	5	
Waffle	1 med	240	8.0	9.0	3.0	6.0	1.0	30	128
BEVERAGES AND SPIRITS									
Beer	8 oz	114	1.0					12	

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A MESSAGE FROM CORN PRODUCTS COMPANY

The Role Of Corn Oil In Family Nutrition

Food . . . physical activity . . . smoking—these are three key aspects of a person's way of life which may determine whether he falls into the high or low coronary risk category. Childhood habits of diet and exercise are reflected in the adult health picture. An individual's diet, exercise regimen and smoking habits are open to broad changes, provided one is sufficiently motivated. And research studies of the past 10 years have shown that suitable changes in eating, smoking and exercise habits at any age may considerably decrease the risk of a heart attack.

When do we find the first signs of atherosclerosis?

Apparently, it has its beginning very early in life. Characteristic lipid deposits have been found in the arterial intima of young children and even infants. These early fatty streaks are probably reversible but may be the sites for later development of atheromata. During adolescence there is an increase in the extent of such plaques, particularly in males in countries where the usual diets are rich in saturated fats and cholesterol. In the same cultural groups, there is a high coronary death rate among young and middle aged men.

For the family, the important fact is that these products are foods, not medicines. They can play their part unobtrusively in providing every member of the family with the best possible diet. Mazola Corn Oil and Margarine are really aids to preparing more delicious foods. They are easily digested and provide variety in the family meals.

Mazola Corn Oil fries foods light and tasty. It may also be used as a shortening in baking—and makes delicious salad dressings. Mazola Margarine meets American Medical Association specifications for "special" margarines. It is an ideal spread for use on breads, biscuits, pancakes, in preparing pan-fried foods, and as a shortening.

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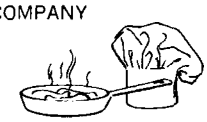
A MESSAGE FROM CORN PRODUCTS COMPANY

Services of the Corn Products Institute of Nutrition



The Institute was established in 1961 to coordinate the nutrition research activities of Corn Products Company and to provide a nutrition information service for the professional community and the general public. It sponsors research in nutrition by outstanding investigators not only in the United States but in other countries as well. Primary emphasis has been on studies about how corn oil and other fats affect cholesterol metabolism and blood coagulability. Other studies have explored the effects of prolonged use of controlled fat diets, particularly in relation to cardiovascular disease.

Of immediate interest to you and your patients are certain booklets relating to diet planning and food preparation. These include the following currently available material of value in planning and preparing controlled fat diets:

Guide to Corn Oil Cooking—helpful recipe hints for tasty, everyday meals.

Planning Controlled Fat Meals—two booklets that explain the principles of controlled fat diets at different levels of saturated fat (Booklets I & II).

The Use of Corn Oil In Controlled Fat Diets—an outline of principles for professionals.

Nutritive Values of Food Products made by Best Foods Div., Corn Products Company—a handy chart for professionals.

For physicians and nutritionists, the Institute of Nutrition also has available comprehensive literature reviews on a wide variety of nutritional and diet problems. These currently include cholesterol control, weight reducing, and diabetic diets. The Institute is always pleased to discuss special diet problems and to recommend diet guides and recipes for your patients. Your inquiries are invited and will be given prompt individual attention.

Write to: Corn Products Company
Medical Department
717 Fifth Avenue
New York, New York 10022

	Amt.	Cal.	Pro.	T. Fat	SF	UF	PF	CHO	Chol.
Carbonated beverages, average	4 oz	53						14	
Cocktails									
Manhattan	1 oz	68						1	
Martini	1 oz	78		0.6	0.1	0.4		1	
Old Fashioned	1 oz	86						1	
Whiskey Sour	1 oz	71						2	
Ginger ale	4 oz	40						11	
Grasshopper	1 oz	99		2.0	1.1	0.8	0.1	7	6
Liqueur or fruit cordial	½ oz	48						4	
Rum	½ oz	48							
Wine									
light dry 12% to 14% alcohol	1 oz	28						2	
dry 20% alcohol	1 oz	41						2	
sweet 20% alcohol	1 oz	45						4	
CANDIES, SWEETS, RELISHES, SAUCES									
Baking chocolate									
bitter	½ oz	73	1.0	7.5	4.0	3.1	0.1	4	
sweet	½ oz	68	0.5	4.0	2.5	1.5		9	
Candy bar, average, chocolate covered	½ oz	73	1.0	3.8	0.7	2.7	1.3	9	
Caramels	½ oz	60	0.5	1.5	1.0	0.5		11	7
Cocoa powder, unsweetened	1 tsp	7	0.2	0.6	0.3	0.2		1	

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	Amt.	Cal.	Pro.	T. Fat	SF	UF	PF	CHO	Chol.
Chocolate									
soufflé	¼ cup	123	2.8	6.2	3.1	2.9	0.5	15	74
milk (candy)	½ oz	73	1.0	4.5	2.5	1.8	0.3	8	
syrup	1 tsp	13						4	
Cornstarch	1 tsp	10						2	
Frosting									
boiled, ½ oz	1 tbsp	50						12	
chocolate	⅔ tbsp	60	0.1	2.8	0.8	1.9	0.6	9	5
cream	⅔ tbsp	59	0.1	2.4	0.5	1.8	0.6	10	6
Fudge, plain	½ oz	58		1.5	1.0	0.5		12	1
Gelatin									
powder	1 tbsp	35	9.0						
dessert	½ cup	78	2.0					18	
with fruit	½ cup	86	1.6					22	
Hard candy, non-fat	½ oz	55						14	
Lecithin	1 tbsp	60		5.3	0.7	4.5	3.0		
Macaroon	1 sm	47	1.1	3.0	2.4	0.5	0.1	4	6
Olives									
green	3 lg	16	0.3	1.8	0.3	1.4	0.2		
black	3 lg	21	0.3	2.3	0.3	2.0	0.3	1	
Parfait, chocolate	½ cup	216	0.8	51.6	27.6	21.6	4.0	24	96

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	Amt.	Cal.	Pro.	T. Fat	SF	UF	PF	CHO	Chol.
Pickles									
dill	1 oz	4	0.3					1	
sweet	1	20						5	
Postum, Instant	2 tbsp	36	0.6					8	
Sauces									
barbecue with butter	1 tbsp	58		6.0	3.0	2.7	0.7	2	20
• chili or mustard	1 tbsp	15						4	
chocolate, rich	1 tsp	46	0.4	2.0	0.7	1.2	0.3	7	3
hollandaise with butter	1 tbsp	68	0.9	7.5	3.6	3.5	1.0		90
meat, restaurant	2 tbsp	41	2.0	3.4	1.3	2.0	0.2	1	9
tomato with oil, no meat	1 tbsp	19		0.9	0.1	0.8	0.1	3	
white with butter	1 tbsp	27	0.6	2.1	1.1	0.9	0.2	1	7
Sherbet	½ cup	118	1.6	1.0	0.6	0.4		28	4
Sugars									
white, brown	1 tsp	17						4	
confectioners	1 tbsp	31						8	
SPREADS, OILS, FATS									
Butter	½ tsp	17		2.0	1.0	0.9	0.2		7
Chicken fat	½ tsp	23		2.5	0.8	1.6	0.6		
Lard, bacon fat	½ tsp	23		2.4	0.9	1.4	0.4		3
Margarine									
average	½ tsp	17		1.9	0.5	1.3	0.2		
modified	½ tsp	17		1.9	0.3	1.5	0.5		

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	Amt.	Cal.	Pro.	T. Fat	SF	UF	PF	CHO	Chol.
Mayonnaise	1 tsp	37		4.0	0.7	3.1	2.1		3
Oils									
coconut	½ tsp	21		2.3	2.0	0.2	0.1		
corn	½ tsp	21		2.4	0.2	2.1	1.5		
cottonseed	½ tsp	21		2.4	0.5	1.8	1.3		
olive	½ tsp	21		2.4	0.4	2.0	0.2		
peanut	½ tsp	21		2.3	0.4	1.8	0.6		
safflower	½ tsp	21		2.3	0.2	2.0	1.7		
soy bean	½ tsp	21		2.4	0.4	1.9	1.4		
Salad dressing									
cheese	1 tsp	30	0.3	3.3	0.7	2.4	1.7		37
French	1 tsp	20		2.0	0.3	1.6	1.3	1	
mayonnaise type	1 tsp	20		2.0	0.3	1.6	1.3	1	3
Thousand Island	1 tsp	25		2.7	0.3	2.3	1.6		5
Vegetable fat, hydrogenated	½ tsp	18		2.0	0.5	1.5	0.2		
NUTS AND LEGUMES									
Almonds, shelled (3–4)	⅛ oz	21	0.7	1.9	0.2	1.7	0.4	1	
Beans, dried, canned, Navy, etc.	¼ cup	58	3.8	0.3	0.1	0.2	0.1	11	
Brazil nuts (1)	⅛ oz	23	0.5	2.3	0.5	1.7	0.6		
Cashews, roasted (2)	⅛ oz	20	0.7	1.7	0.3	1.3	0.1	1	
Coconut, shredded	½ tbsp	11	0.1	0.8	0.7	0.1		1	
Cowpeas, cooked	¼ cup	48	3.3	0.3	0.1	0.2	0.1	9	

(Cont. next page)

	Amt.	Cal.	Pro.	T. Fat	SF	UF	PF	CHO	Chol.
Peanuts, roasted (4)	⅛ oz	21	1.0	1.8	0.4	1.3	0.5	1	
Peanut butter	1 tsp	30	1.3	2.7	0.7	2.0	0.7	1	
Peas, split, cooked	¼ cup	73	5.0	0.3	0.1	0.2	0.1	13	
Pecans, halves (3)	⅛ oz	24	0.3	2.5	0.2	2.2	0.6	1	
Pecans, chopped (tbsp)	¼ oz	50	1.0	5.0	0.4	4.4	1.3	1	
Walnut, halves, shelled (2)	⅛ oz	23	0.5	2.3	0.2	2.0	1.7	1	
MEATS AND POULTRY*									
Cuts of beef, veal and lamb having	2 gms. fat per oz	53	9.4	1.7	0.8	0.8	0.1		36
Trimmed—									
Sirloin tip roast, heart, all trimmed cuts of veal except breast									
Cuts of beef, veal and lamb having	3 gms. fat per oz	61	9.0	2.8	1.4	1.3	0.1		36
Trimmed—									
Cube, flank and round steak; leg of lamb									
Untrimmed—									
Leg and round of veal									
Cuts of beef, veal and lamb having	4 gms. fat per oz	64	7.5	3.8	1.8	1.8	0.1		36

* Nutrient values for meats and poultry are on cooked, edible portions.

(Cont. next page)

	Amt.	Cal.	Pro.	T. Fat	SF	UF	PF	CHO	Chol.
Trimmed— Arm pot roast, rump roast; porterhouse, sirloin, strip and tenderloin steak; loin lamb chops, loin and crown roast of lamb									
Untrimmed— Sirloin tip roast, veal cutlet, rump and shoulder veal roast									
Cuts of beef, veal and lamb having	5 gms. fat per oz	72	7.5	4.7	2.3	2.2	0.1		36
Trimmed— Blade pot roast, rib and T-bone steak, arm and shoulder lamb chop, tongue									
Untrimmed— Leg of lamb, veal blade steak									
Cuts of beef, veal and lamb having	6 gms. fat per oz	82	7.5	5.8	2.8	2.7	0.1		36
Trimmed— Beef brisket, restaurant roast beef, club steak, rib lamb chop, lamb stew meat									
Untrimmed— Round, strip, and tenderloin steak; loin lamb chop, loin and crown lamb roast, rib									

(Cont. next page)

	Amt.	Cal.	Pro.	T. Fat	SF	UF	PF	CHO	Chol.
veal chop, sirloin of veal, arm and sirloin veal steak									
Cuts of beef, veal and lamb having	8 gms. fat per oz	96	6.9	7.6	3.7	3.5	0.2		36
Untrimmed—									
"Barbecue" beef (restaurant)									
Ground beef									
Arm and blade pot roast, restaurant roast beef, rump roast, sirloin steak, arm and shoulder lamb chops, loin of veal, veal stew meat									
Cuts of beef, veal and lamb having	10 gms. fat per oz	113	5.7	10.0	4.8	4.7	0.2		36
Trimmed—									
Short ribs of beef									
Untrimmed—									
Corned, cured beef; beef club, pinbone sirloin, porterhouse, rib, T-bone steaks; beef chuck stew meat; lamb rib, stew meat, rib chops									
Cuts of beef, veal and lamb having	14 gms. fat per oz	144	5.0	13.8	6.7	6.5	0.3		36

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	Amt.	Cal.	Pro.	T. Fat	SF	UF	PF	CHO	Chol.
Untrimmed— Beef oxtails, plate or boiling beef; rib, rolled or standing roasts; short ribs; lamb breast									
Cuts of fresh pork having	3 gms. fat per oz	63	9.1	2.9	1.1	1.7	0.5		36
Trimmed— Pork chops, butterfly, loin, rib; fresh ham; roasts, crown loin, rib, neck, sirloin; pork steak, tenderloin									
Cuts of fresh pork having	5 gms. fat per oz	77	8.2	4.9	1.8	2.9	0.8		36
Trimmed— Pork picnic shoulder, pork Boston butt									
Untrimmed— Ham sirloin—if highly marbled; highly marbled chops									
Cuts of fresh pork having	7 gms. fat per oz	95	7.3	7.3	2.8	4.1	0.8		
Untrimmed— Pork tenderloin; picnic shoulder; roasts, crown, loin, neck rib; arm and blade steaks									

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	Amt.	Cal.	Pro.	T. Fat	SF	UF	PF	CHO	Chol.
Cuts of cured pork having	4 gms. fat per oz	64	7.8	3.6	1.3	2.1	0.6		36
Trimmed—									
Ham-butt and shank									
Untrimmed—									
Canadian bacon									
Cuts of cured pork having	8 gms. fat per oz	95	5.9	7.9	2.9	4.6	1.1		36
Untrimmed—									
Fresh ham, shoulder butt, neck bones									
Cuts of cured pork having	10 gms. fat per oz	116	5.7	10.4	3.8	6.1	1.7		36
Trimmed—									
Pork sausage									
Untrimmed—									
Ham hocks									
Bacon regular sliced	1 sl	48	2.5	4.0	1.5	2.5	0.5	1	8
Beef, chipped or dried	1 oz	58	9.5	2.0	1.0	1.0			36
Bologna, salami	1 oz	86	3.4	7.8	3.2	4.2	0.8		28
Chicken canned	1 oz	57	8.3	2.3	0.7	1.5	0.5		23

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	Amt.	Cal.	Pro.	T. Fat	SF	UF	PF	CHO	Chol.
Corned beef, canned	1 oz	60	7.3	3.3	1.7	1.4	0.1		36
Duck, goose, etc.	1 oz	93	4.6	8.2	2.1	5.7	2.0		20
Frankfurter	1 avg	156	6.0	14.0	6.0	7.4	1.4	2	56
Ham, boiled	1 oz	85	6.5	6.5	2.5	3.7	1.2		36
Liver fried in hydrogenated fat	1 oz	60	6.5	2.0	1.0	1.0		3	96
Luncheon meats	1 oz	83	4.0	7.0	2.5	4.2	1.2	1	28
Organ meats	1 oz	41	5.9	1.0	0.3	0.6	0.2	2	96
Poultry									
with skin	1 oz	62	7.7	3.0	1.0	2.0	0.7		23
no skin	1 oz	34	6.1	0.8	0.3	0.5	0.3		22
Salami, kosher	1 oz	103	3.3	9.9	5.1	4.4	0.2		36
Salt pork	½ oz	102	0.9	10.9	3.9	6.2	1.6		26
Spareribs, 2 av. ribs	1 oz	144	5.0	13.8	5.3	7.8	1.9		36

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