

LOOKING YOUNGER--LIVING LONGER

The Art and Science of Youth

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Let's not fool ourselves. Looking and feeling younger is a matter of our physical and mental health. Some people buy youthful looks. Some people work at it. And some people do both. But if we are to do it intelligently we must set out intelligent goals then proceed to accomplish all of them.

We can buy improved looks from our doctors and dentists. Some people go way overboard on this. Some look far worse after their surgeries. Most look better. Some may die. The same is true of other attempts to improve our health. Some people die from over exerting their bodies when they decide they want to look better,

feel better or live longer. Of course there are risks to nearly everything we do-- driving a car, eating bacon and eggs, or drinking a Coke or a scotch.

You already know that smoking and high cholesterol are negatives to your health, just as is stress at home or at work. You already know that endurance exercise is good for you. But you may not have all of the best scientific evidence of today at your disposal.

In a recent study of 1000 people between the ages of 50 and 99 in California, in San Diego County, when asked to rate how well they felt on an aging scale of 1 to 10 the mean score was 8.2. You can enjoy aging as long as you accept it. The survey found that people in their 90s rated themselves happier than those in their 50s. There may be some aches and pains and some friends may have gone to that great golf course in the sky, but there are a number of positives. The worries at mid-life have been solved. Nearly 100% of one's time is free to: play golf, read, help others, be more deeply involved in politics, or any number of stress free enjoyable pastimes.

In this book we will look at both the positives and the negatives then you decide what you want to do-- and what you are willing to do. If you decide to lose weight to get back to where you were in your early 20s, the intelligent thing is to make a diet change that you can keep forever. It is worse to go on and off diets than it is to remain overweight. There is no question that keeping our strength up and are weight down is much more difficult at 60 than it was at 16!

Are you really willing to turn down that second glass of Chardonnay? Are you willing to dedicate a few minutes a day to exercise? We all know intellectually what is best. But we are generally "psychological" rather than "logical." The comfort of being inactive and having our bellies full often precludes us doing what is good for us.

In this book we will look at much of the science behind our health. We will include chapters that not everyone needs to read. If you don't use psychoactive drugs, you probably don't need to read about them-- unless you want some knowledge so that you can talk intelligently to your children or your grandchildren about drugs.

We will look a bit at the economics of our health-- where do we get the "most bang from our buck?" What dietary supplements make sense to use, what exercise equipment might be wise to buy, etc.

We hope that we will answer the "whys" and the "hows" of looking good and living well and long. It makes sense to start with the things we are likely to die from—then we will have a good starting point for discussing just how important positive health habits are!

CHAPTER 1

DO YOU HONESTLY WANT TO FEEL BETTER AND LIVE LONGER?

Anyone in his or her right mind wants to feel better and most of us would like to live longer—then why do so many of us continue our bad habits and make our lives shorter and less enjoyable? As has been said, "He who has no time for his health today will have no health for his tomorrow."

Scientists know that developing the right fitness and exercise habits can reduce our pot bellies, eliminate depression, make us proud of our bodies, give us more energy, and reduce our chances of developing the

diseases of aging-- such as diabetes, heart problems and high blood pressure, and even cancers. (1) We are all aware that a healthier regimen will enhance our lives. Then why don't we take the steps to do some or all of the things which science recognizes are healthy?

We get in ruts—and you know a rut is a long grave! If mother fed us fruits for dessert we probably continue to eat fruits for dessert. If she fed us pastries and chocolate, we probably continue in that habit. If we exercised when we were young, and enjoyed it, we are more likely to exercise today. But the ease of our 20th century lives makes it so easy to settle into the couch, turn on the tube, and take the easy path to killing time—and killing ourselves. If the only exercise you get is changing channels with the remote control, your thumb may be getting adequate exercise, but your heart is wasting away.

WHAT SHOULD BE OUR CONCERNS AS WE AGE?

Our quality of life must be considered both in health and in illness. That quality can be seen as both our objective functioning, how healthy or ill we really are, and by our subjective feelings about how and who we are. We may feel joy or pain, apprehension or certainty, depression or elation. (2) These feelings go a long way towards our determining that we are healthy. We must be positive about our chances for joy and longevity. More and more people are living to be 100, and the number of centenarians is expected to quadruple within 20 years. Life seems to get better each year and more of us are interested in holding on to this good life. I am reminded of Groucho Marx's lament when he said "If I knew I was going to live so long I'd have taken better care of myself."

If I want to live longer and better I should be aware of what is happening as I age. We're not 20 anymore. At 20 our energy was generally high even without taking proper care of our bodies. As we age we lose muscle tissue. We lose brain cells. Our bodies, at the level of our cells and tissues, do not function as efficiently as they once did. In fact it seems that at about age 50 our degeneration begins to speed up. (3) So as we age it becomes imperative that we exercise and eat effectively in order to both slow our aging and to reverse it.

If we are to be intelligent about changing our lives in a positive direction we should be aware of what is happening to us as we age. When we understand the aging process we can avail ourselves of the programs and products which science tells us will slow or reverse the processes of aging. For this reason, in the next chapter we will look at some of the theories of how we age. In the following chapter we will survey some of the diseases of aging. After we have grasped the realities of what is, or may be, happening to us we can more effectively plan on a fitness program.

We would hope that as you see the potentials for living a longer and more fruitful life you will be more motivated to change your diet and exercise habits—if they need changing. We hope that we can also give you some ideas which may help to improve your mental health and the happiness which results from such a positive change.

HOW CAN I CHANGE MY LIFE POSITIVELY?

You must decide that you want to make a permanent change. So many people start with good intentions. They give up smoking for a few weeks then go back to the weed. They start on a healthy diet then return to their deeply ingrained habits. They start to jog, get some muscle soreness, then retire to the sofa—watching other people exercise.

Don't even start unless you want the change to be permanent. And if you choose to die earlier than necessary just consider that you are doing your bit to control the overpopulation in the world!

Next, you will want to make your life changes as enjoyable as possible. You can watch the television while you ride your exercise bike, jump rope, or walk on a home treadmill. If you don't want to change your diet to include all of the vitamins and minerals you need, you can pop some pills which will give you these nutrients.

If you want to go to a gym, make it a social time—go with your friends every day or two. If you would rather garden or walk—no problem. Just make it enjoyable. Obviously a habit that makes you happy will be a great deal easier to learn than one that is drudgery or otherwise unpleasant.

Dr. William Castelli, the director of the Framingham Heart Study--the longest ongoing study in the world, became the first man in his family to live past age 50. He did it by heeding his own advice of not smoking, restricting fat in his diet, and exercising. At 60 he was fit as a fiddle. And he's going strong in his 70s. My own longevity parallels his. My father died at 48 with an aorta (the main artery from the heart) as hard as a clay pipe and his heart twice the normal size because of the work it had to do to push his blood through that artery. He had done everything wrong: 50 pounds overweight, a 2 pack a day smoker, a heavy fat eating-non-exerciser who lost all the money he had in the Depression. I have just done everything the opposite of my father's habits. So far I have outlived him by more than 30 years. Of course now we have so much more information than was available in my father's day. It's up to you. You can't change your heredity—but you are in control of your environment. You can add years to your life and life to your years—if you want to.

WHAT AND WHY DO YOU WANT TO CHANGE?

We will give you a number of reasons to make positive changes in your life. We will discuss diseases which can be avoided, or at least reduced, with proper health habits. We will give you a greater insight into why you should be more attentive to your diet, your exercise program and your tobacco addiction. You choose which you want to change and how much.

Do you want to exercise just enough to live a bit longer or do you want to exercise to the point where your activity makes positive mental changes in your life? Do you want to lose weight for looking and feeling better or to increase your longevity? Do you want to stop smoking for your own sake or for the sake of your family? We will lay out the facts—you decide if and what you want to do. It's your life!

We will start with the negatives—the diseases and negative health practices. Next we will look improving your fitness by eating a more efficient diet, then we will look at various kinds of exercise programs. We'll try to make it as pleasant a change in your behavior as possible. The rest is up to you!

MENTAL HEALTH

Our mental health is also often negatively affected as we age. We can be more negatively affected by the stresses of business, by changes in our family status, and by the obvious physical affectations of the process of our getting older.

A book on fitness would not be complete without looking at our mental health and the opportunities to make it better—particularly through exercise.

A FINAL THOUGHT

My favorite social scientist and philosopher, Ashley Montagu told us—“that the goal of life is to die young, as late as possible.”

END NOTES

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CHAPTER 2 THEORIES OF HOW WE AGE

- To slow aging;
 - *Consume high anti-oxidant foods and supplements*
 - *Reduce smoke inhalation*
 - *Keep your weight controlled*
 - *Choose your parents wisely*
- Here's why*

We know it's happening but we don't know exactly why or how. If we knew better we would be more able to slow our aging process and live longer and better. Actually we do know some things and these things that we know have helped many people to live longer and more effective lives. Better nutrition, especially eating less fat, and more exercise have allowed many of us to successfully live longer than our parents and grandparents.

If we understand some of the theories of aging that are being researched we can change our health behavior to take advantage of what is known today. But we must remember that aging research doesn't have all of the answers. Our extremely complicated bodies with our own genetic predispositions and our varying environments give us trillions of variables for the researchers to investigate. We may never know all of the answers but we have some ideas.

If we ever completely understand how and why aging occurs the reasons will undoubtedly be a combination of the following theories plus some theories not yet postulated. The theories of aging generally can be classified as “built in” or “genetic” theories of the cells breaking down or they can be seen as “damage” theories in which the genetic material (DNA and RNA) are damaged so that they cannot function properly or reproduce healthy cells. Additionally, when we look at the following theories we can't be certain if aging is a result or a cause of the factors that we observe.

While some wild optimists suggest, based on animal studies, that we might be able to live to be 200, we are a long way from such potential. But scientists around the world, such as those at the Department of Geriatric Medicine at the University of Manchester, are working to unlock the keys to living longer and better. And they are finding that we can each play a part in extending our own lives.

GENETIC THEORIES

Cells of a species tend to multiply and reproduce themselves for a predetermined number of doublings. Once they have completed their predetermined number of doublings the cell stops reproducing so the organism dies. It is assumed that we human beings should be able to live between 110 and 120 years based on the number of doublings expected by human cells.

Studies with some non-human cells indicate that perhaps vitamin E can prolong the number of doublings. Other experiments have indicated that by lowering the body temperature the cells will double slower. If there were temperature lowering drugs, life might be lengthened.

The genetic switching theory holds that the genes have a built-in switch that begins aging at a certain period of one's life. It is therefore similar to the "cell doubling" theory

The error catastrophe theory. Deoxyribonucleic acid (DNA) and ribonucleic acid (RNA) are the basic genetic materials. DNA is the basic structure of the genes. It can reproduce itself with the help of the RNA. When either is changed the gene cannot reproduce itself or cannot reproduce itself correctly.

This theory holds that the correct genetic information held in the DNA is changed by enzymes or the environment. This "bad" information is then transmitted to other cells by the RNA. Damage could also have occurred to the RNA which would have resulted in its transmitting erroneous information.

Epigenetics

Epigenetics is the name of the branch of science that studies this. Epigenetics (meaning 'above' genetics) is a relatively recent area of study. It looks at how environmental influences can affect the DNA in a gene--by turning it on or off. (It doesn't change the DNA, one's basic genetic structure, only how much it will be activated in the next generation or the next few generations) It then looks at whether such epigenetic changes can be transmitted to offspring as well as how many generations might be affected by that environmentally changed gene. This whole process is called "trans-generational epigenetic inheritance." It has been studied in plants, bacteria, lower animals and mammals—including humans.

There are a number of factors that can affect the DNA in a gene by turning it on or off. One of the more common epigenetic chemical actions, and the one most extensively studied, is methylation. In methylation a methyl radical (CH₃) attaches to the DNA and affects its ability to control an action.

Scientists are a long way from being able to predict what kinds of external stimuli will produce major or minor affects on which genes. For example there are about 50 genes known to be related to breast cancer that can be affected by the methylation of DNA. It is impossible to predict whether an external stimulus, such as a job stress, would affect any or all of these genes and for how long any changes might be active.

When the DNA is affected, a number of positive or negative outcomes have been observed. Both the attentive grooming of mice or an enriched environment for them can cause positive changes in the animal that can then be transferred to the next generation. But many more negative effects have been found. Stress (which increases various stress hormones), toxins, such as tobacco or marijuana smoke or air pollution, and the effects of both legal and illegal drugs are possible culprits. Depending on which genes are affected,

and how they are affected, the resulting combination can affect both the mental and physical health of the newborn.

While the action in the gene is chemical, it can be caused by such things as stress, drugs, smoking, over- or under-eating, or even a happy environment. Depending on the type of gene and whether the switch is on or off, the traits can be transferred in the sperm or ovum and can affect the next-generation of life. It had been thought that changes in the DNA would be reset when pregnancy occurred and that any damage done to one's body would not be transferred to offspring. Now it is found that it is not true and that the changes may be passed on for several generations. In fact we don't know when it might end. One study of corn showed that the changes were extinguished by the seventh generation. But a study of mice found an epigenetic problem that lasted through only five generations.

An example of positive changes can be shown in a mouse study. 15-day-old female mice were provided with a very positive environment, things to play with and wheels to exercise on. When they became pregnant and gave birth, their pups showed very positive personality traits even though they had never lived in such an enriched environment. This was true even when the pups were not raised by their biological mothers. An enriched environment during adolescence, including exercise, resulted in the mice pups having better memories. More social contacts and more exercise change the brain structures somewhat—increasing the number of dendrites at the end of the nerves and develop other positive physical and chemical responses that increase the learning ability and the memory of the mice pups. The changes in this study seemed to last only one generation.

It is much easier to evaluate multiple generational transference in plants and mice than in humans because their life spans are so much shorter. However a study in a rather isolated area in northern Sweden has been able to chart some changes going back 200 years. In studying the effects on males and females during years of slim and bountiful harvests some definite changes in the offspring of the paternal grandfathers were revealed. When prepubescent children had less food, their grandchildren lived much longer. When they had a great deal of food, due to a bountiful harvest, the grandchildren were four times as likely to have diabetes. When the mother had inadequate food there was a positive effect on longevity and on the incidence of cardiovascular problems. This was just the opposite of what occurred with fathers, when their food needs were more than adequately met. Also the children of poorly fed fathers had a lower than normal fertility rate.

Another illustration of the effect of diet on grandchildren was in Holland. In 1944 there was a very harsh winter in the land. The children of mothers who were undernourished had smaller than normal babies. This was expected. What was not expected was that their grandchildren were smaller than normal also, even though their mothers were well-nourished. This probably indicates epigenetic effects passed through the ovum.

A study in London compared sons and grandsons of males who started smoking before age 11. The sons, but not their daughters, had a higher than average body mass index (evidence of overweight) by age 9-- when compared with fathers who had started smoking after age 11.

Metabolic disease syndrome includes a number of negative factors for longevity. It may include: the accumulation of fat around the waist, an increase in the harmful blood fats and a decrease in the good blood fats, higher blood pressure, insulin resistance which may lead to diabetes, and the tendency for inflammation of the blood vessels.

Another epigenetic study found similar metabolic disease symptoms. Chewing betel nut, from the betel palm, is a commonly used stimulant in the world. Between 200 million and 600million people are said to use it. Its stimulant effects are much stronger than nicotine, and it is known to cause a number of negative effects on the person who chews it, including cancers of the mouth and esophagus. But studies in Taiwan indicate that the non-chewing children of the betel nut using fathers have a high rate of metabolic disease syndrome--overweight and obesity.

With this new knowledge we might wonder whether the huge rise of conditions such as autism, ADHD (attention deficit hyperactivity disorder), ADD (attention deficit disorder), anorexia nervosa, overweight and obesity, schizophrenia and other conditions might be, at least partially, explained by epigenetic conditions experienced by the parents and passed on to their children and grandchildren.

If we look back at the last 50 years we can see that one major experience of many youths has been in the use of illegal drugs. Uppers, downers, hallucinogenics, cannabis in a wide range of natural and synthetic chemical makeups. But there is more. Is it possible that microwaves from televisions, computers and ovens might have some effect on future parents of this world. Then there are pesticides, hormonal feeding of cattle and chickens, chemicals and plastics that we're all exposed to and many other possible culprits in the epigenetic list of possible disease causing elements. There is also the overeating by some and the under eating by others. We have already seen how this could affect one's descendants.

It is even possible that the type of food we eat may have some epigenetic effects. A study conducted at the University of Kuopio, Finland, assessed the effect of carbohydrate modification on gene expression with the features of the metabolic syndrome. Eating wheat, oats or potato turned up 62 genes related to stress and had negative effects on biological functioning, such as immunity. On the other hand eating rye products down-regulated 71 genes and up-regulated none.

At Washington State University study with rats showed that two agricultural chemicals, a fungicide and a pesticide, administered to pregnant rats decreased sperm count of their pups and that epigenetic trait was passed down to at least four generations.

There are already studies looking for links between drugs, both legal and illegal, and toxins. We know that high doses of morphine given to mice damage their nervous system. This damage was also seen in their descendants. There are already studies looking at possible epigenetic causes of the autism. While the science of epigenetics is quite new, based on what we have seen so far it might be wise for those who plan to be parents sometime in the future minimize their risks for carrying negative transgenerational DNA. With this in mind it might be wise to consider eliminating any unneeded drug intake and to consider the potential values of organic foods.

Another theory hypothesizes that the immune system, that fights diseases, reduces in efficiency as we age. Problems such as cancers or illnesses therefore progress farther and faster as we age. Appropriate exercise can keep the immune system more efficient, as can proper diet.

CELLULAR DAMAGE THEORIES

--**Free radical aging theory.** In chemical reactions, both inside and outside of the body, non-stable atoms or molecules can be produced. Commonly oxygen, without one of its electrons (a free oxygen radical), attacks body cells in search of an electron that will make it stable. The action of the

oxygen radical damages cells. When it attacks the collagen and elastin of the skin, wrinkles form. When it attacks the arteries in the heart a lesion is formed which may then attract the cholesterol which narrows the arteries and sets up a heart attack. When it affects the tissues of the joints arthritis can occur. When it attacks other areas of the body cancers can begin. When it attacks brain tissues dementia and Alzheimer's disease can be the result.

Free oxygen radicals are formed as part of the body's normal functioning, particularly when fats are oxidized in the body for energy. Their production is increased during exercise. Illness and stress also increase their production in the body. They are also present in, or are caused by, air pollution, water pollution, tobacco and other smoke, and sunlight.

A proper diet that is low in fats and high in anti-oxidants can reduce the risk of cell destruction. Reducing or controlling one's life stresses can also have a favorable effect on longevity. Obviously smoke from tobacco, marijuana, or any other source is also a negative environmental factor.

Toxic waste accumulation theory. As we grow older the reproduction of our cells and their ability to repair damage is reduced. This is caused by an accumulation of toxic wastes in the cells. These wastes often become free oxygen radicals which damage the cells. The sources of the wastes are both internal and external. The external sources include environmental pollutants such as pesticides, heavy metals, and radiation. The internal sources are caused by oxidized fats such as over heated or rancid margarine, shortening, butter, or liquid oils.

The cross-linkage aging theory. Free radicals are again involved here. In this theory they combine with proteins in such a way that the cells can no longer absorb nutrients, such as oxygen or water, from the blood. The connective tissues of the body, including collagen (the supporting protein of ligaments, skin, and other tissues becomes hardened leading to stiffness in the tendons, wrinkled skin, and cataracts in the lenses of the eyes. Along with the free oxygen radicals, sunlight, nitrous oxide, heavy metals and stress can also cause cross-linking.

CHRONOLOGICAL AGE AND BIOLOGICAL AGE

The number of years you have lived (chronological age) and the relative age of your body (biological age) are not the same. If your heredity has speeded up your aging or if your environment has created more cell damage you will have a biological age which is older than your chronological age. If you have been stressed, have had excessive free oxygen radical damage because you have eaten too many fats, or if you have been exposed to smoke or other air pollution it is likely that your body is older than it should be.

A lack of exercise can also increase your biological age because that exercise would have increased your immunity to diseases and would have kept your muscles and other organs healthier. It would have also reduced the chances of blood vessel damage through a build up of cholesterol in the heart and brain. Similarly, if you have eaten wisely, had minimized your fat intake and had adequate anti-oxidant vitamins your cells would have suffered less damage because of the lesser amount of free oxygen radicals you would have had.

Biological aging is, to a large degree, dependent on your cells ability to repair themselves as quickly as they are damaged. When the damage occurs at a greater rate than your ability to repair the damage your biological age is increasing.

PHYSICAL CHANGES OF AGING

From the time we are 20 until the age of 75 we will lose:

- about 3 inches in height;
- 10% of our brain weight (primarily water),
- 30% of our ability to pump blood from the heart (cardiac output);
- 65% of our taste buds;
- 60% of our ability to use oxygen (maximum oxygen uptake); and
- 20% of our body's water content.

Additionally we may:

- become more sensitive to heat and cold;
- lose some bone (osteoporosis);
- develop kidney and bladder problems;
- become constipated more often due to the changes in the musculature of the large intestine;
- become more susceptible to medicines because the liver shrinks and the kidneys become less effective in eliminating wastes;
- lose some mental functioning due to the loss of brain neurons and the lessened ability of the neurotransmitters to work effectively.

SLOWING OR REVERSING THE EFFECTS OF AGING

It is estimated, based on studies with twins, that about 20% of our aging and death potential is set in our genes. That means that about 80% of our aging and death factors are set by our environment—by where we live, and how we live. We therefore have some power over our destinies.

When you understand the theories of aging and the environmental contributions you make to your aging through not exercising effectively, poor eating habits, smoking or drinking, and living a stressful life, you may decide to make some changes. If you will bear with us for one more chapter, on disease, we will begin our expose' of which of our habits may be contributing to our aging and how we can change.

But as we look at each risk factor realize that no one is exactly average. While the average one pack a day smoker cuts his life span by seven years, there are those who smoke and live to be over 100. Of course if we are looking at the averages, there must be a number of people shortening their lives by over seven years if one lives to be over 100.

The importance of the risk factors is also something we may look at. While either not exercising or being obese is the number one factor, the third most important factor of risk is either cholesterol levels or smoking. For the person who has hereditarily high cholesterol, such as a 400 (ideal being under 160 and normal nearer 200), that person will probably not live to be 40—even if he didn't smoke or exercise and was not obese. The high cholesterol level for him became the primary risk factor. Your heredity is very important in determining just how negative each risk factor is for you. However we must remember that the most important risk factors (exercising effectively, being trim, having a low cholesterol, and not smoking) can generally be controlled by us if we merely know where we stand in regard to each one.

For a person with very high cholesterol only medication or an operation can help. Obesity may also need medical help—if it is hereditary. But smoking and exercise levels are definitely behaviors we can control without the help of others. If aging is due to us taking poor care of our bodies, and there is growing evidence that it is, there is hope that solutions can be

developed to slow the onset of the diseases of aging. This will be a very difficult job.

The value of a genetic understanding of aging is clear, but interventions need not be genetic. For example, regular athletic exercise is associated with a slowing of the accumulation of mutant mitochondria seen in muscle cells with advancing age. Exercise also reduces blood pressure and overweight and changes the more dangerous cholesterol to the protective ones.

In ancient Rome the average lifespan was about 22 years, now it is approaching 80. In 1850 only one of 6 Englishmen lived to be 75, today it is 4 of 6. (1) We must be doing some things right. The picture we now need to define is of how genes, environments, and lifestyles work together to influence longevity and health in old age. This will not come easily, but come it will if we go at it hard enough. Increasing human life spans to 200 years may take a little longer.

At this point it should be said, loudly and clearly, that the primary goal of research on the biological basis of aging must be to increase the quality of later years of life. If quality is not improved, any increase in longevity would not be a victory. Now let us first take a look at the diseases which are most likely to "get us" then we can understand better what we need to do to live longer and better. Later we will look at the mental side of our lives and suggest some ways to make our lives more fulfilling as we are living longer.

AND MORE:

In a large study of older with younger people in China it was concluded that there is a physiological basis for living longer. The major factors included:

a better blood flow to the cells,
a stronger, more efficient heart, lung and circulatory system,

a more effective immune system,
better adrenocortical, liver and kidney functions, and,
a higher level of high density lipoprotein cholesterol.

It was suggested that Chinese traditional medicine, along with Western medicine, might be used to improve the micro-blood-flow, nature killer cell activity, high density lipoprotein cholesterol and vital organ function. (2)

[There are a number of signs of aging](#) that become evident after age 25 or 30:

At age 40

--You use about 120 calories per day less than you did at 30 so weight control is more difficult.

--You will be about 5/16th of an inch shorter than at age 30 and you will continue to shrink about an inch every 15 years. This is due to bone loss, the compression of the spinal disks and changes in posture.

--A hearing loss will develop particularly at the higher frequencies. Men have more problems with this than women.

--As the lenses of the eyes become harder there will be more difficulty in focusing on close things, such as newspaper print.

By the 50's

--Muscle cells atrophy and strength is lost.

--Immunity system continues to become less effective increasing one's chances for infections and cancers. This is due in part to the reduction in size of the thymus gland.

--The eye becomes less sensitive to recognizing objects in dim light.

By the 60's

--The joints become stiffer due to less lubrication and the effects of 60 years of use.

--Men's sexual daydreams have pretty well stopped by the mid 60's. The reason is unknown.

--Hearing continues to diminish.

--Diabetes increases as the functioning of the pancreas becomes less efficient.

By the 70's

--The harder artery walls make the heart pump harder so blood pressure increases, usually by 20 to 25%.

--Coordination is reduced probably because of a diminished brain function—often in the cerebellum.

--Short term memory is reduced.

--Half of men show signs of coronary artery disease.

--Sweat glands become less efficient.

By the 80's

--Osteoporosis (loss of calcium in the bones) increases the risk of hip fracture and falling.

--Mental function continues to diminish with about 50% of people showing signs of senility or Alzheimers.

END NOTES

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2. Department of Aging and Antiaging, Shanghai Institute of Gerontology and Geriatrics, Huadong Hospital, People's Republic of China.

CHAPTER 3 BLOOD VESSEL DISEASES

*We should be aware that:
The persistent problems in our age of affluence are aging
and killing us.*

*More than half of our disease problems are caused by
us—They are not hereditary.*

*New medical knowledge can reverse aging
and keep us physiologically young.*

*Heart attacks, stroke and most cancers have the same
causative factors.*

*If we want to be younger—we had better stay alive—by
reducing our risk of dying!*

*You already know most of the negative behaviors you do
and most of the positive things you should do—but maybe not all.*

So here is some food for thought!

Most of the diseases that kill us are diseases to which we have contributed. We may neglect to have a physical examination that might have detected an abnormality. We eat too much or exercise too little. Perhaps by understanding a bit more about how these diseases develop, we may decide

to change our habits so that we can minimize our chances of developing the problem.

Most people die of diseases which are labeled as chronic or degenerative rather than those which are communicable. Seven of the top ten causes of death are of the chronic-degenerative type which attack us as we age.

The ten top killers are:

Diseases of the heart

Cancer

Stroke (cerebral vascular accidents)

Bronchitis, emphysema, asthma

Accidents

Influenza and Pneumonia

Diabetes

AIDS

Suicide

Homicide

The top four and the seventh are in the chronic and degenerative category. Other degenerative diseases are hardened arteries (atherosclerosis), arthritis, headaches, emphysema, multiple sclerosis, Alzheimer's disease, and low back pain.. These diseases can be inherited or developed by the way we live. A recent 21 year study in Scotland indicated that even our social class affects our chances of developing diseases and dying earlier. The men in the manual trades, and presumably lower social class, died at a higher rate than those who worked in the non-manual areas. (1)

CARDIOVASCULAR DISEASES

The major killer in the Western world is the combination of cardiovascular problems, which affects the heart and the blood vessels of the body. Coronary artery disease, a hardening of the blood vessels which supply blood to the heart, is the most frequent killer of the cardiovascular ailments. Stroke (cerebral vascular accident or CVA), a deadening of brain tissue, is also a blood vessel problem.

In a recent study of male mortality in a number of European countries during the decade of 1980 to 1990 it was found that heart disease was related to manual laboring people in England, Wales, Ireland and the Scandinavian countries but not in Switzerland, France or the other Mediterranean countries—where a number of cancers were a primary cause of death. (2)

The causes of heart attack and stroke are similar because in both cases the blood flow to the organ is slowed or stopped. This lack of blood results in the lack of oxygen and nutrients, deadening the heart muscle or brain tissue. The causes of blood blockage can be a thrombus, a hemorrhage, or compression.

The blood flow may be slowed or stopped by a thrombus, a clot which clogs the blood vessel. It may be slowed by an embolism. This moving clot can slow the blood flow so that the necessary oxygen does not reach the tissues ahead of the embolism. Blood flow can be slowed if the artery is constricted. This can happen if a growing tumor pushes down on the blood vessel. Or blood flow can be slowed if the artery ruptures and the blood hemorrhages.

Heart attack is the most common type of heart ailment. It occurs when an artery of the heart is blocked. The coronary artery or the "crowning" artery of the heart is the major artery of the heart It brings blood to the heart muscle. Without that blood, the heart muscle will not have the oxygen

that is needed and will cramp. * This cramping is called a heart attack. The cramping of the muscle occurs in the area forward of the blockage. The area damaged during a heart attack can be so small that the individual doesn't even know that a heart attack has occurred, or it can be so massive that the individual dies immediately.

When the heart attack occurs, there is a scarring of the heart muscle, causing the muscle's death. This is called a myocardial infarction, Latin for "the death of the heart muscle." Once it was thought that the scarring was complete as soon as the heart attack was completed, but now we find that there tends to be a continual scarring and it can spread. This is another reason for immediate expert attention, because effective doctors can minimize the damage that may continue after the first part of the heart attack.

Each year, millions of people die from heart disease. Of these, 65 per cent of the people with severe coronary attacks die before reaching the hospital. But in three out of five cases people survive their first heart attack. Men are more likely to experience these than women, but after menopause a woman's chances greatly increase and her risk is 4 times what it was before menopause.

Strokes are the third leading cause of death accounting for nearly 7 per cent of all deaths. But in people over seventy at least two out of every three deaths are from stroke. Men are more commonly afflicted than women.

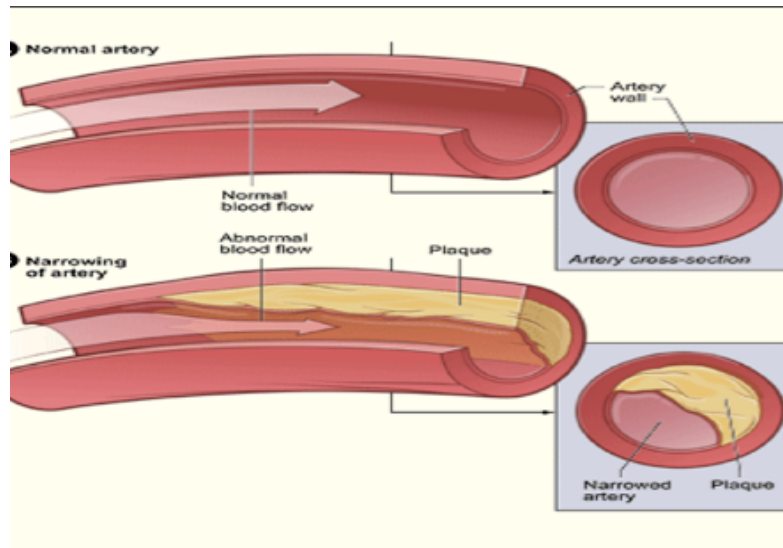
A stroke occurs when a blood vessel in the brain is blocked or bursts and the oxygen supply to the brain is cut off. Since the brain requires about 20 per cent of all the blood and the oxygen output of the body, even a small blockage of a blood vessel can do a great deal of harm.

Both exercise and an effective diet can reduce the risks of blood vessel diseases. This is true even with such a serious problem as congestive heart failure, in which the weakened heart cannot pump sufficient blood, exercise can improve the sufferer's endurance and heart strength. Studies at the Free University of Berlin have shown a 65% increase in fitness after only 3 weeks of exercise. (3)

HARDENED ARTERIES AND HIGH BLOOD PRESSURE

Hardened arteries (atherosclerosis) and high blood pressure (hypertension) go hand-in-hand as the major contributors to both heart disease and stroke. Arteries become less efficient when their inner linings thicken and are roughened by these deposits of fat, fibrin, cellular debris, and calcium. The resulting reduction in the diameter of the blood vessels slows the blood flow, making it easier for clots to form and further restrict the blood flow of the arteries. Atherosclerosis is responsible for about 95 per cent of all heart attacks.

Fatty deposits on the artery walls (atherosclerosis) may begin as tumors which accumulate fat. These tumors may result from a genetic defect in the cell. The defect may then be stimulated into growth by outside influences such as high blood pressure (hypertension), cigarette smoking, free oxygen radicals, items in the diet, or possibly viruses.



Hypertension (high blood pressure) is the primary indi-



cator of heart attack, stroke, and kidney disease. Many millions of people have it. More than half of them are not aware of their condition because there are usually no symptoms. Blacks are particularly prone to this condition, being afflicted three times more often than whites.

Hypertension is of concern because of the harm it can do to the heart, kidneys, brain, and blood vessels if it remains uncontrolled for long periods of time. The heart is the organ most commonly damaged by high blood pressure. The increased force required during each beat makes the heart muscle thicken and become abnormally enlarged. It also speeds the hardening of the arteries of the heart.

High blood pressure occurs when the blood vessels in the body are constricted, either by nervous impulse or a build-up of plaque in the arteries. The heart is then required to beat more forcefully than normal. This forceful beat increases the pressure of the blood flowing from the heart.

Among the causes for hypertension are: a narrowing of the arteries; a tumor on the adrenal gland; kidney disease; or obstructions in the arteries to the kidneys, and diabetes. These can usually be surgically or medically corrected. Approximately 90 per cent of all high blood pressure cannot be attributed to any one cause. Heredity, obesity, diet (particularly excess salt or inadequate potassium), smoking, and nervousness may each play a part, as can alcohol consumption. Some drugs can also raise blood pressure. Steroids, caffeine, drugs with stimulants (such as some cold remedies, nasal decongestants, and appetite suppressants), cocaine and methamphetamine, and some depressants--because of the rebound effects.

The effects of the disease include: kidney damage, artery wall damage, artery wall aneurysms (bulges) or hemorrhage which is often a cause of strokes, and the development of atherosclerotic plaques in the arteries of the heart and brain.

Your blood pressure is easily checked. You can easily check your blood pressure. Sphygmomanometers (Greek for pulse pressure measurer) and stethoscopes can be bought at any medical supply house. They are quite inexpensive. Some have the stethoscope built into the sphygmomanometer, making it very easy to take one's own blood pressure. Electronic sphygmomanometers are the simplest to use. You can also buy wrist and finger manometers.

The pressure in the arteries fluctuates somewhat. It is



higher at the instant that the heart beats. It is lower when the heart is resting between beats.



Wrist manometer

Finger manometer

When taking one's blood pressure the blood flow is first stopped by inflating the air pressure above the measuring device. In a doctor's office it is done in the upper arm and the measuring device is below this area. The air pressure is slowly reduced until the heart is able to force blood past the air cuff. When the force of the heart beat is first able to move blood past the inflated air cuff would have the first measurement of blood pressure -- the systolic pressure. The air pressure is continually reduced until blood can flow past the cuff during the heart's resting phase. This measure is the diastolic phase.

The various pressures are measured by determining how much mercury in a tube is elevated in the sphygmomanometer. A mercury sphygmomanometer is often used in doctors' offices. However gauges are so accurate now that they are commonly used in both doctors' offices and in the home.

Your blood pressure is measured by two numbers. Every beat of your heart pushes a wave of blood through your blood vessels, which raises the pressure in the arteries. This is called systolic blood pressure and is represented by the first number. The blood pressure between heartbeats, when

the heart is recovering, is called the diastolic pressure and is the second and lower number.

So called ‘normal’ blood pressure is about 110/70 to 120/80. The numbers represent the number of millimeters of mercury that are being lifted in the sphygmomanometer by the pressure of the blood. (This assumes the older type of machine that actually used mercury in a glass tube. Today most machines work with a gauge that gives an equivalent measurement.

110/70 is ideal and is normal for many women, a number of experts would like to have this measure considered to be normal for all. 120/80 is generally considered to be normal and is common for many men. 140/90 is borderline high. Generally lower is better--unless it gets so low that you faint. This may happen when it reaches 90/60 or lower. Some research is questioning the "lower is better" concept because there is some evidence that heart attack risk may elevate when the diastolic level is below 74. (4) Research to determine the validity of this theory and its possible causes is currently being conducted.

Blood pressure may vary greatly during any one day, so a high reading is not conclusive. If it remains high, it may be dangerous--and a doctor should be consulted. Having a sphygmomanometer at home makes it easy to get an accurate picture of your blood pressure. One in six homes already have them.

The danger of high blood pressure can be seen if we understand that a person whose systolic pressure is over 150 has twice the risk of a heart attack and four times the risk of a stroke as a person with a systolic pressure under 120. Insurance companies' studies show that a 35-year-old with a blood pressure of 145/95 lives 12 years less than someone with normal blood pressure.

HOW AND WHERE BLOOD VESSEL PROBLEMS OCCUR

Blood vessel problems occur most commonly in the heart muscle and in the brain. These give us the heart attack and stroke. When there are problems with high blood pressure or blood with an excess of HDL fats, they are more likely to harden the arteries in the heart muscle, because that is where the blood pressure is the highest-- because the blood that nourishes the heart muscle comes directly from the aorta which comes directly from the heart. So the blood pressure here is very high. In the brain the huge number of blood vessels in the brain make it a prime area for blood vessel problems.

A stroke or heart attack happens when the blood flow is slowed or stopped. A clot can stick in the blood vessel and stop the flow. An embolism is a small clot that is moving through the vessel but slowing the blood flow. A hemorrhage occurs when a blood vessel ruptures and allows blood to escape. This reduces the amount of blood in the vessel past the rupture. All of these can cause heart attacks or strokes. An additional problem that is much more likely to happen in the brain than in the heart is compression—where a tumor may grow and compress the blood vessel.

A heart attack is not caused by blood flowing through the heart, but rather the coronary arteries that nourish the heart muscle.

THE CAUSES OF VASCULAR PROBLEMS

It seems that the same factors are related in the development of both atherosclerosis and hypertension. It is likely that either one may cause the other. Thus their possible causes will be discussed together.

Heredity is often responsible for the tendency to high blood pressure and being over-weight. In studies comparing children of both natural and adoptive parents, the parents with abnormal body weight or blood pressure gave birth to children who manifested the same symptoms. Adopted children in the same household tended to have normal readings despite identical diets.

Inherited racial characteristics may also play a part. Among blacks, one in four have hypertension (only one in 500 have the much publicized sickle cell anemia). Among whites, one person in eight is hypertensive. Whether inherited or environmentally induced, our blood pressures seem to be determined, to a large degree, early in our lives.

Environment is a major cause of cardiovascular disease.

Being overweight, eating certain types of foods, reactions to stress, cigarette smoking, and inadequate exercise are all possible contributors to cardiovascular diseases.

Exercise that requires that the heart work hard for a reasonably long period of time is a positive factor in keeping the circulatory system functioning efficiently. There are various theories as to why it works, but the

results of effective exercise are well established. Exercise aids in reducing the

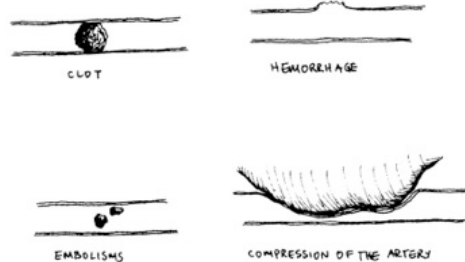
effects of stress, lowers harmful blood fats while raising the protective blood fats, and may increase the number of open blood vessels in the heart. These combined effects not only lessen the possibility of a heart attack, they also increase one's chances of survival should a heart attack occur.

Moderate exercise can improve your heart health significantly. Walking is the activity of choice for many heart patients. The recommended "dosage" is 12 to 15 miles per week, but start at whatever distance is comfortable for you, and gradually increase your mileage over weeks and months. Such exercise can reduce your body weight and blood pressure and can make your heart more efficient by slowing the pulse rate and increasing the amount of blood pumped during each heart beat. (5.)

A recent Dutch study that used 20 sedentary men and 14 sedentary women then trained them by walking and running them 3 or 4 times a week for nine months, culminating with them running a half marathon (13 miles, 21 kilometers) found significant changes in their bodies which resulted from their training. The men lost an average of 5 pounds and the women 2.5 pounds. The men had significant reductions in their total cholesterol, their low density lipoproteins (LDL—the most dangerous of the cholesterols) and their triglycerides. All are greatly associated with heart attack risk. (6) 7) 7. The reduction in risk factors was much greater in the men than in the women but this is partially accounted for by the females hormones which reduce the female risk until menopause.

A British study of nearly 10,000 male civil servants with no history of heart disease followed them for nearly ten years. During that time

These four problems lead to most cardiovascular accidents. Obstructed blood vessels add more complications.



474 experienced a heart attack. Of those who had reported that they exercised vigorously (cycling, running or fast walking at over 4 miles per hour) only half had the rate of heart problems occurred. Those who exercised less but still somewhat vigorously, had a 2/3 risk compared to the non-exercisers. The exercise had to be vigorous and aerobic. (7)

Smoking has many negative effects which make the circulatory system less efficient. The smoker raises both blood pressure and blood fats. The carbon monoxide in the blood makes the blood less efficient. This makes the heart work much harder to circulate the required oxygen to the body. Smoking is directly responsible for between 100,000 and 200,000 heart attack deaths each year in the United States and even more in Europe. But five to ten years after quitting brings the risk back to the level of those who have never smoked. (8) In one major study, people who had had heart problems then stopped smoking enjoyed a 62% reduction in deaths over the next 6 years compared with those who continued to smoke. (9)

Excess body fat also increases the work of the heart. Every pound of fat adds about 200 miles of capillaries which must be filled with blood so that the fat can be nourished. Overweight increases the risk of high blood pressure, high blood cholesterol, and diabetes risk.

Stress may be a factor in cardiovascular diseases. The classic study in this area was done by Drs. Meyer Friedman and Ray Rosenman. They brought great insight into the evaluation of stress when they coined the terms Type A and Type B personalities. (10) They cited several characteristics that show up in high-risk heart patients. They found that these high risk people have a chronic and severe sense of time urgency--they want to get things done. There's a constant involvement in multiple projects subject to deadlines. They have a desire for recognition and advancement and an excessive competitive drive. They neglect all aspects of life except work. They have a tendency to take on excessive responsibilities feeling that, "Only I can handle it." Their speech patterns showed explosiveness and a tendency to hasten the pace of their normal conversation.

The Type A people are excessively ambitious types who show overwhelming aggression, impatience, and are slaves to the clock. They are the competitive types who may even compete with themselves--such as pushing themselves to improve their time while running, jogging, or swimming. They are usually the early-to-bed and early-to-rise types. They drive themselves excessively, skip vacations, walk fast, talk fast, and are compulsive. They're concerned with making money, and they compete in just about everything they do.

The Type B personalities may be just as serious about where they are going but they are easy going, seldom impatient, and they take time out for leisure. They don't feel driven by the clock to get things done. They are not preoccupied with social achievement and are less competitive. This personality type may be easily sidetracked because they are not as intense in their drives to accomplish. Studies have shown that the Type A personality is two to three times as likely to have a heart attack as did the Type B personality.

More recently theorists have looked at the Type A people and concluded that it may not be their hard driving natures as much as their hostility which increases their heart attack risk. The type A's without hostility seemed to live as long as Type B's. But the hostile people seemed to have more heart attacks.

The physiological effects of the negative stress situations are reflected in higher blood pressures and more adrenaline secreted. Both of

these are known risk factors for heart problems. Negative stress has also been shown to increase the stickiness of the blood platelets and make them more likely to clot. (11) In the Framingham study, anxiety levels for middle aged men, but not women, was predictive of hypertension. (12) In another study high stress men "out-died" their low stress counterparts by a 3 to 1 ratio over a five year period.

On the other hand, studies at the Institute of Gerontology in Kiev, U. S. S. R., indicate that the easy life may shorten life spans. The studies done there with animals at the molecular level, the cell level, and the systemic level have shown that animals subjected to certain stresses lived longer than those that lived in ideal conditions. Russian researchers believe that the key to long life may be in the hypothalamus. They found that cell nuclei of this gland age at different rates for different people.

Dr. Hans Selye, director of the Institute of Experimental Medicine and Surgery at the University of Montreal, and perhaps the world's authority on stress, said that, "It is not the stress that is the problem, but how one reacts to stress. The trick is not to avoid stress, but to enjoy and master it. "

Stress is often related to not having control of one's situation. Those in the lower social classes are also at the bottom of their job classifications. Those in the bottom 10% of job classifications have four to five times the number of heart attacks than those in the top 10% of the job ladder. (13)

Finally, when faced with stressful situations, learn to respond with thought-out solutions and avoid anger and hostility rather than resort to knee-jerk reactions. Recognize that overreacting to things you can't control can be harmful to your heart health.

Hypertension is the price one
pays for being a racehorse
instead of a cow.



Diet is an area that has been studied at great lengths. In addition to the positive effects of low fat diets and diets low in sodium and high in potassium, the addition of anti-oxidants* is being recognized more often as an important step in reducing both heart disease and many cancers. Vitamins C and E and beta carotene, which is converted into vitamin A, as well as the mineral selenium all have anti-oxidant properties which are thought to reduce the damage in the artery walls which precede the development of the atherosclerotic plaques in the arteries.

People who live in parts of the world which are rich in selenium, a trace mineral found in soil, plants, and water, are much less likely to die of heart attacks, strokes, aneurysms, and other high blood pressure related causes. This mineral is sometimes included among the anti-oxidants. However it has been found toxic in higher doses. European soil is low in selenium so it should be supplemented.(14) American soil is generally relatively high in the mineral.

Moderate alcohol consumption, particularly some red wines, also seems to be preventative for heart disease. It raises the HDL lipids which carry cholesterol away from the tissues and back to the liver. Of course

there are some negatives associated with alcohol, the calorie intake is raised which may add body weight and in increased amounts there can be toxic effects to other organs. (15)

Fats in the blood are considered to be prime contributors to hardened arteries. The most studied blood fats are the lipoproteins, cholesterol, and the triglycerides.

The major types of lipoproteins are:

--heavy density lipoproteins (HDL) which transport cholesterol from the body's tissues to the liver where it can be eliminated;

--low density lipoproteins (LDL) which take cholesterol from the liver to the tissues, they contain few triglycerides. 60 to 80% of the body's cholesterol is carried by the LDL; and

--very low density lipoproteins (VLDL) which contain primarily triglycerides with a little cholesterol. They carry triglycerides to the tissues and fat of the body--where they can be used for energy.

Cholesterol is a waxy substance used in many of the body's chemical processes. It is required in everyone in certain amounts. When there is too much cholesterol being carried by the LDLs some can be deposited in the artery walls. This is the buildup which we call atherosclerosis (artery "fat scarring" or hardened arteries).

Cholesterols are derived primarily from saturated fats that are eaten in the diet and from cholesterol which is ingested. About 70 to 80 per cent of cholesterol is made in the body, primarily by the liver, from saturated fats that are eaten; the remaining 20 to 30 per cent of the blood's cholesterol is eaten in the form of cholesterol in animal products.

The amount of cholesterol in your blood is measured as millimoles per liter (mmol/l) in Europe and as milligrams per deciliter (mg/dl) in the United States. To change the Continental measure to the American measure multiply by 38.46. To change the American to the Continental, divide the American number by 38.46.

It is highly recommended that all people have a total blood evaluation when they are young. This can give a "base line" level against which future examinations can be measured. It can also reveal any dangerously high levels of one of the blood fats. The recommended total blood cholesterol level is below 5.19 mmol/l (200 mg/dl) with 3.9 mmol/l (150 mg/dl) being considered to be ideal. Lower is better. In the Framingham study in Massachusetts, which is the classic study in the field of heart disease, there have been 5, 209 adults involved in the program since 1948. In correlating all the factors that relate to heart disease, it was found that the cholesterol levels of the blood are a primary determinant in predicting heart attack risk.

People with blood cholesterol levels over 6.63 mmol/l (255 mg/dl) of blood have five times the heart attack risk as those with the level of 5.72 Europe (220 USA). Men, whose cholesterol level was 5.98 Europe (230 USA), suffered three times as many heart attacks as men with cholesterol levels under 5.46 Europe (210 USA). It is generally considered that for every 0.026 mmol/l (1 point mg/cu. cm³ in U.S.) you drop in your cholesterol level that you reduce your chances of dying by 2%.

High-saturated fat foods, from which cholesterol is made, are found primarily in animal fats such as beef, lamb, pork, ham, whole milk, egg yolks, cream, butter, and whole milk cheeses (the hard cheeses). But they are also found in vegetable fats which are solid or which have been hydrogenated* (trans fatty acids) such as shortenings, coconut oil, cocoa butter,

and palm oil (which is used in commercially prepared cookies and pie fillings). They are also found in non-dairy milk and cream substitutes and in chocolate.

While people commonly talk about "good" and "bad" cholesterol it is really the carrier of the cholesterol which is good or bad depending on whether they are taking the cholesterol to the liver or away from the liver and into the tissues--including the arteries.

The HDLs (the good lipoproteins) are associated with lower cardiovascular risk because they are able to get rid of the cholesterol which, if allowed to stay in the blood, can develop plaques in the arteries of the heart, neck and brain. These then increase the risk of heart attack and stroke. Women tend to have more HDL than men. This is caused by the estrogen which they produce. Estrogen replacement after menopause can continue this protection, otherwise women's heart attack rates will rise as they grow older.

While polyunsaturated oils had previously been advocated to reduce blood cholesterol we now know that while decreasing total cholesterol in the blood they lower the HDL. For this reason the monounsaturated fats, such as found in olive oil and canola (rapeseed) oil, are more often recommended as a source for fat.(17) Stopping smoking, maintaining a proper weight, and exercising effectively are all ways in which HDLs may be raised.

The HDL levels should be higher than 0.91 Europe (35 mg/dl USA) for men and over 1.69 Europe (65 mg/dl USA) for women. Higher is better. A level below 0.91 (35) is a very negative risk factor. Another important measure is the ratio of total cholesterol to HDL. It is derived by dividing the HDL level into the total cholesterol level. It should be less than 3 for women and less than 4 for men..

The LDLs (the bad lipoproteins) carry cholesterol to the tissues. Some of this may be implanted in the arteries, hardening and narrowing them. This process seems to need oxygenation in order to occur. It is the free oxygen radicals that change the fat in the LDL. Once it is changed it can be deposited into the artery walls. Both HDL and the anti-oxidant vitamins (A, C, and E) reduce the rate of this oxygenation. (Margolis, Simeon, *ibid.* p. 5) Vitamin E supplementation of 100 I.U. per day reduced women's risk of heart attack by 33% and men's by 25%. [*Ibid*] Dr. Ken Cooper, of Aerobics fame, suggests 400 I.U. per day of vitamin E. The previously mentioned polyunsaturated fats increase the likelihood of oxygenation. The top normal level for LDL is 140 mg/dl, and it is desirable to have it under 130. Lower is better. (See Chapter 9) for more on free oxygen radicals and anti-oxidants.

A Swedish study, sponsored by Volvo, showed that generally women have less LDL than men, but as they move up the occupational scale their levels approach that of men. However while the more competitive type A men had a much higher level than type B men, the type A and B women had similar levels in each job category. The HDL levels for women remained higher than men at every level. (18)

Tri-glycerides are the most common type of blood fat. While they are found in some foods, such as luncheon meats and shellfish, they are generally constructed in the liver from carbohydrates, such as sugars, in the diet. Although we hear much more about cholesterol in the blood, some experts think that the tri-glycerides may be even more harmful than the cholesterol. (19)

Blood tests for tri-glycerides and blood cholesterol should be part of everyone's physical exam from the age of three. The normal level for tri-glycerides it is 1.3 to 3.9 Europe (50-150 USA), but the lower the better. Endurance (aerobic) exercise has been found to reduce triglycerides (because

they are used for energy during the exercise). It also increases the amount of HDL.

Heredity can also play a part in the body's ability to produce too much cholesterol or triglycerides. When heredity is the problem either drug therapy or surgery may be required to eliminate the problem. Even when diet and the lack of exercise are the primary problems, drug therapy can often be used to reduce the blood levels of these fats.

The combination of risk factors increases one's chance of developing a cardiovascular disease, especially coronary artery disease. To the degree that coronary artery disease is increased, the risk of heart attack is increased.

Two members of the Harvard University School of Public Health have reported a study of the health records of 50,000 former students at Harvard and at the University of Pennsylvania in respect to fatal heart attacks and heart attack risks. The study revealed that 1,146 of the former students died between the ages of thirty and sixty-nine years from fatal heart attacks. When these students were compared with classmates who had not suffered heart attacks, the scientists found six clues or relationships that increase the risk of death from heart attack. These relationships were as follows:

1. Cigarette smoking. Smoking in college was found to be associated with 50 per cent increased risk of a coronary death

2. Non-participation in sports. The college student who engaged in no sports while in college was found to have a 50 per cent increase in his risk of a fatal heart attack.

3. An elevated blood pressure. A systolic blood pressure in excess of 130 mm. Hg. while in college. was found to be associated with a 40 per cent increase in the risk of death from heart attack.

4. Heavier than average body weight. Excessive body weight for height was found to increase the risk of an eventual fatal heart attack by 30 per cent.

5. A height of less than 5 feet 6 inches. Short stature was found by investigators to be associated with an increase of 30 per cent in the risk of death from heart disease.

6. Early death of a parent. The early death of a parent (based on deaths from all causes) was associated with a 30 per cent greater chance of dying from a heart attack.

From this we might infer that the person who smokes cigarettes, is inactive physically, has a slightly elevated blood pressure, is short and overweight, and who has the heredity for a shorter life, as indicated by the early death of a parent, is the person of today who is most apt to have a fatal heart attack in the future.

Other risk factors which have been shown to be related to heart attack and to death from the attack are: depression, anger, and living alone. These factors also multiplied the effects of other risk factors. For example, for smokers who were also depressed, the amount of artery hardening was nearly three and a half times greater than non-depressed smokers. And LDL was twice as high for depressives as for non-depressed people. (20)

You can aid in preventing or slowing of the progress of cardiovascular disease. To slow the hardening of the arteries and to minimize the chances of developing heart disease and strokes, it is wise to keep your blood pressure low and your blood fats in the proper proportions.

In order to begin to do this, it is suggested that you have a physical examination. This will assist in spotting high blood pressure and high cholesterol or high tri-glyceride levels in the blood. It will also find heart

irregularities through the use of the stethoscope and the electrocardiogram. For every 1% you reduce your blood pressure or your cholesterol you reduce your heart attack risk by 2 to 3%.

Your eating habits can assist in controlling general body weight, and the lower your body weight, the less your chances are of developing heart disease. You can lower your fat intake. Our average diet is about 35 to 45 per cent in fat. It is suggested that the fat intake be between 10 and 20 per cent of the total calories. Cholesterol intake should be below 300 milligrams per day.

Salt should also be cut down in the diet. There seems to be a direct relationship to the amount of salt in the diet and the amount of high blood pressure. In the northern islands of Japan, the diet is twice as high in salt as in southern Japan. The frequency of high blood pressure is also twice as high. In Western societies we consume about ten times as much sodium than is necessary, it would be a good idea to take the salt shaker off the table and to avoid highly salted, processed foods.

Vitamin supplementation, while once frowned upon, is now often being recommended. Higher levels of the anti-oxidants, vitamins C, E, and beta carotene and a little selenium are common recommendations. (21)

Taking a half an aspirin daily is also recommended by those who suffer no ill effects from the aspirin. The aspirin reduces the blood's ability to clot so it reduces the risk of a thrombus or embolism forming. A recent study found that after suffering a heart attack or stroke aspirin reduced the chances of a recurrence by 20% and 19% respectively.(22) Omega 3 oil from some fish is also recommended because it reduces the blood's ability to clot and seems to reduce the LDLs.

For normal people one or two glasses of alcohol per day may be beneficial in reducing heart attack risk. But it must be weighed against the possible detrimental effects of increased calories and the possible increase of hypertension. For people who have had heart problems, the drinking of alcohol may be hazardous. Patients with heart disease may be extraordinarily susceptible to myocardial depression (a weakening of the heart muscle action) which is a result of alcohol. Patients with severe cardiac damage and chronic congestive heart failure should probably not drink at all.

Exercise increases the cardiovascular efficiency by increasing the amount of oxygen carrying red cells in each unit of blood. It often lowers blood cholesterol and may widen the blood vessels of the heart. It also seems to decrease the effects of stress.

Stopping smoking is extremely important in the prevention of heart disease. When you stop smoking, your blood pressure will generally lower, the amount of oxygen in each unit of blood will be increased, the artery hardening process will slow, and the amount of cholesterol in the blood will be reduced.

Taking quiet times during the day, which can reduce one's stress, may also be beneficial. Dr. Herbert Benson, Associate Professor of Medicine at Harvard University, studied transcendental meditation. He found that prayer or meditation may promote peace of mind which can reduce stress.

CHECKING YOURSELF

SELF TESTS

Your systolic pressure (pressure at the time your heart is contracting) is the higher number. Your diastolic pressure (the continuous pressure at the time your heart is recovering from its contraction) is the lower number.

Up to 130/ up to 85 is in the normal range—but lower is better.

130-139/85-89 is high normal blood pressure

140-159/90-99 is considered mild hypertension (stage 1)

160-179/100-109 is moderate hypertension (stage 2)

180-209/110-119 is severe hypertension (stage 3)

210 and higher/120 and higher is very severe hypertension

(stage 4)

(If your systolic pressure and your diastolic pressures are in different categories, consider yourself in the higher (worse) category.)

(Source: Report of the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure, Bethesda, MD, National Heart, Lung, and Blood Institute, National High Blood Pressure Program, 1993)

WHAT IS YOUR HEART ATTACK RISK?

American Heart Association's Heart Attack Risk Test for those who know their cholesterol and blood pressure levels. (Total your points.)

___ Age Men Younger than 35—0 points, 35 to 39—1 point, 40-48—2 points, 49-53—3 points, 54 or older—4 points

___ Age Women Less than 42—0 points, 42-44—1 point, 45-54—2 points,

55-73—3 points, 74 or older—4 points

___ Family History Someone in your family had heart disease or a heart attack before age 60—2 points

___ Inactive Lifestyle (Rarely exercise) 1 point

___ Weight More than 20 pounds over ideal weight 1 point

___ Smoking I am a smoker 1 point

___ Diabetic Male diabetic 1 point Female diabetic 2

points

___ Total cholesterol level Less than 240 mg/dL (6.23 mmol/L) 0 points,

240 to 315 mg/dL (6.23 to 8.18 mmol/L) 1 point, above 315 mg/dL (8.18 mmol/L) 2 points

___ HDL level (good cholesterol) Over 60 mg/dL (1.56 mmol/L) subtract 1 point,

39 to 59 mg/dL (1 to 1.53 mmol/L) 0 points, 0-38 mg/dL (0.78 to 1 mmol/L) 1 point, Under 30 mg/dL (0.78 mmol/L) 2 points

___ Blood Pressure If you take blood pressure medicine—1 point.

If you don't take blood pressure medicine and your systolic (the higher number) is:

Less than 140 -0 points, 140 to 170 -1 point, Over 170—2 points

___ TOTAL POINTS (4 points and over indicates a higher than normal risk for a first heart attack.

THINGS TO KNOW

Measuring blood fat levels.

Americans use a cholesterol measurement different from most other countries. The doctors in the United States use milligrams per deciliter (mg/dl). Most other countries use millimoles per liter. (mmol/L) A millimole is a thousandth of a mole.

To convert United States values (mg/dl) to other values (mmol/L) divide the U.S. value by 38.5.

To convert the other values to United States values multiply the other value by 38.5.

So: A desirable level would be under 200 (mg/dl) or 5.2 (mmol/L)

Borderline high would be 200 to 239 (mg/dl) or 5.2 to 6.19 (mmol/L)

High would be over 240 (mg/dl) or 6.2 (mmol)

SYMPTOMS OF HEART ATTACK

--An uncomfortable feeling of pressure, fullness or squeezing in the chest

--Possible pain in the shoulder, arm, neck, lower jaw

--Possible dizziness, fainting, nausea, shortness of breath

If any of these symptoms last for more than a few minutes call a doctor

TAKING YOUR BLOOD PRESSURE

To take your blood pressure:

1. Wrap the cuff around your upper arm, just above the elbow.

2. Tighten the screw on the rubber bulb so that you can pump up the cuff.

3. Place the stethoscope on the inside of the elbow, just below the biceps* muscle. (This is where the artery passes.)

4. While listening for a heartbeat with the stethoscope, pump up the cuff. When the gauge shows between 70 and 100 mm of mercury, you should hear your pulse.

5. Continue pumping the cuff until you cannot hear the pulse, perhaps to 140 to 160mm. of mercury. Then slowly let the air out of the cuff by twisting the valve on the air pump.

6. When you hear your heart beat through the stethoscope, note the number on the gauge. This is your systolic pressure (the pressure of your blood when the heart beats).

7. Continue to let the air out *of the cuff*. When you no longer hear your heart beat, note the number on the gauge. This is your diastolic pressure (the pressure while the heart is relaxing).

Blood pressure is recorded thus: systolic pressure/ diastolic pressure

Normal blood pressure is approximately. 110/70 to 120/ 80
The diastolic pressure is more important. It may be significant if it is continually higher

(Novel Products, Box 408, Rocton, IL 61072-0408, 800-323-5143 for catalogue. This company stocks sphygmomanometers and nearly every other kind of device for measuring fitness.)

End Notes

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