

AD-A182 676

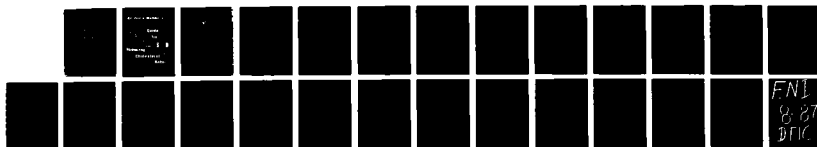
AIR FORCE MEMBERS' GUIDE FOR REDUCING CHOLESTEROL RATIO  
(U) AIR COMMAND AND STAFF COLL MAXWELL AFB AL M H HALL  
APR 87 ACSC-87-1050

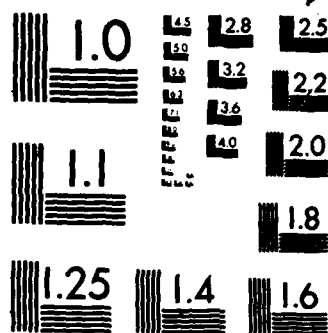
1/1

UNCLASSIFIED

F/G 6/8

NL





MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS-1963-A

DTIC FILE COPY

2

# Air Force Members'

AD-A182 676

## Guide for

DTIC  
ELECTE  
JUL 09 1987

S D

D

## Reducing

## Cholesterol

## Ratio

DISTRIBUTION STATEMENT A

Approved for public release  
Distribution Unlimited



|                    |                                            |
|--------------------|--------------------------------------------|
| Accession For      |                                            |
| NTIS CRA&I         | <input checked="checked" type="checkbox"/> |
| DTIC TAB           | <input type="checkbox"/>                   |
| Unannounced        | <input type="checkbox"/>                   |
| Justification      |                                            |
| By                 |                                            |
| Distribution /     |                                            |
| Availability Codes |                                            |
| Dist               | Avail and/or Special                       |
| 9-1                |                                            |

**REPORT NUMBER** 87-1050  
**TITLE** AIR FORCE MEMBERS' GUIDE FOR REDUCING  
CHOLESTEROL RATIO

**AUTHOR(S)** MAJOR MELISSA M. HALL, USAF

**FACULTY ADVISOR** Maj Stephen P. Boyer, ACSC/EDM



**SPONSOR** Lt Col Hank A. Staley, ACSC/EDC

Submitted to the faculty in partial fulfillment of  
requirements for graduation.

AIR COMMAND AND STAFF COLLEGE  
AIR UNIVERSITY  
MAXWELL AFB, AL 36112

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE

## REPORT DOCUMENTATION PAGE

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |                                          |                                                                                                                           |                                                                |                  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|------------------|
| 1a. REPORT SECURITY CLASSIFICATION<br>UNCLASSIFIED                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |       |                                          | 1b. RESTRICTIVE MARKINGS                                                                                                  |                                                                |                  |
| 2a. SECURITY CLASSIFICATION AUTHORITY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |       |                                          | 3. DISTRIBUTION/AVAILABILITY OF REPORT<br><br>STATEMENT "A"<br>Approved for public release;<br>Distribution is unlimited. |                                                                |                  |
| 2b. DECLASSIFICATION/DOWNGRADING SCHEDULE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |       |                                          |                                                                                                                           |                                                                |                  |
| 4. PERFORMING ORGANIZATION REPORT NUMBER(S)<br><br>87-1050                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       |                                          | 5. MONITORING ORGANIZATION REPORT NUMBER(S)                                                                               |                                                                |                  |
| 6a. NAME OF PERFORMING ORGANIZATION<br><br>ACSC/EDCC                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       | 6b. OFFICE SYMBOL<br>(If applicable)     |                                                                                                                           | 7a. NAME OF MONITORING ORGANIZATION                            |                  |
| 6c. ADDRESS (City, State and ZIP Code)<br><br>Maxwell AFB AL 36112-5542                                                                                                                                                                                                                                                                                                                                                                                                                                                            |       |                                          |                                                                                                                           | 7b. ADDRESS (City, State and ZIP Code)                         |                  |
| 8a. NAME OF FUNDING/SPONSORING ORGANIZATION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |       | 8b. OFFICE SYMBOL<br>(If applicable)     |                                                                                                                           | 9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER                |                  |
| 8c. ADDRESS (City, State and ZIP Code)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |                                          |                                                                                                                           | 10. SOURCE OF FUNDING NOS.                                     |                  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |                                          |                                                                                                                           | PROGRAM<br>ELEMENT NO.                                         | PROJECT<br>NO.   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |                                          |                                                                                                                           | TASK<br>NO.                                                    | WORK UNIT<br>NO. |
| 11. TITLE (Include Security Classification)<br>Air Force Members' Guide for Reducing Cholesterol                                                                                                                                                                                                                                                                                                                                                                                                                                   |       |                                          |                                                                                                                           |                                                                |                  |
| 12. PERSONAL AUTHOR(S)<br>Hall, Melissa M. Major                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       |                                          |                                                                                                                           |                                                                |                  |
| 13a. TYPE OF REPORT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       | 13b. TIME COVERED<br>FROM _____ TO _____ |                                                                                                                           | 14. DATE OF REPORT (Yr., Mo., Day)<br>1987 April               |                  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |                                          |                                                                                                                           | 15. PAGE COUNT<br>22                                           |                  |
| 16. SUPPLEMENTARY NOTATION<br><br>Item 11: Ratio                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       |                                          |                                                                                                                           |                                                                |                  |
| 17. COSATI CODES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       |                                          | 18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)                                         |                                                                |                  |
| FIELD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | GROUP | SUB. GR.                                 |                                                                                                                           |                                                                |                  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |                                          |                                                                                                                           |                                                                |                  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |                                          |                                                                                                                           |                                                                |                  |
| 19. ABSTRACT (Continue on reverse if necessary and identify by block number)<br><br>This guide was prepared to educate Air Force personnel on the danger of a high cholesterol ratio, and how to reduce the ratio. It explains cholesterol ratio and shows how the ratio is an indicator of the development of heart disease, and outlines measures for reducing the cholesterol ratio. Information in this guide is applicable to all Air Force personnel. <i>Key words: Diet, exercise, weight, diabetes.</i><br><br>Diabetes. ← |       |                                          |                                                                                                                           |                                                                |                  |
| 20. DISTRIBUTION/AVAILABILITY OF ABSTRACT<br><br>UNCLASSIFIED/UNLIMITED <input type="checkbox"/> SAME AS RPT. <input checked="" type="checkbox"/> DTIC USERS <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                              |       |                                          |                                                                                                                           | 21. ABSTRACT SECURITY CLASSIFICATION<br><br>UNCLASSIFIED       |                  |
| 22a. NAME OF RESPONSIBLE INDIVIDUAL<br><br>ACSC/EDCC Maxwell AFB AL 36112-5542                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       |                                          |                                                                                                                           | 22b. TELEPHONE NUMBER<br>(Include Area Code)<br>(205) 293-2483 |                  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |                                          |                                                                                                                           | 22c. OFFICE SYMBOL                                             |                  |

---

## PREFACE

---

My interest in health and nutrition started in the early 1970's shortly after I graduated from college. Perhaps it was because I was really on my own and felt "older". Whatever my motivation I devoured tons of information regarding health and nutrition. (I am a 10 year subscriber of Prevention Magazine.) I even visited a health clinic to learn about food allergies and nutrition. In the first month of Air Command and Staff College, all students were given an opportunity to have a blood test to find out their cholesterol ratio. I was intrigued and delighted to learn that I could satisfy my "project" requirement by creating this pamphlet on cholesterol ratio. The research was fun, the writing laborious, and the learning experience invaluable. If you want to learn how to control and improve your cholesterol ratio, and reduce your risk of heart disease, please read on.

---

## ABOUT THE AUTHOR

---

Major Melissa M. Hall is a native of Alabama. After receiving a bachelor of science degree from the University of Alabama she attended Officers Training School and was commissioned as a Second Lieutenant in 1974. Her first assignment took her to Offutt AFB, Nebraska where she worked as a Computer Systems Analyst. After that she had several assignments as a protocol officer working at the 1st Strategic Aerospace Division, Vandenberg AFB, California; a joint assignment with United States Forces Japan, Yokota AFB; United States Air Force in Europe, Ramstein AB, Germany; and at the 7350 ABG in the occupied city of West Berlin. Major Hall's next assignment brought her back to Gunter AFS, Alabama, where she worked as an Automated Data Processing Acquisition Plans Officer and as the Executive Officer for the Standard Information Systems Center. Major Hall received her master's degree from Troy State University in 1984, and attended Air Command and Staff College in 1987.

---

## TABLE OF CONTENTS

---

|                            |    |
|----------------------------|----|
| Preface.....               | i  |
| About the Author.....      | ii |
| List of Illustrations..... | iv |
| INTRODUCTION.....          | 1  |
| ATHEROSCLEROSIS.....       | 2  |
| CHOLESTEROL RATIO.....     | 2  |
| CHANGING YOUR RATIO.....   | 3  |
| DIET.....                  | 4  |
| EMPHASIZING NUTRITION..... | 7  |
| ALCOHOL.....               | 9  |
| EXERCISE.....              | 10 |
| SUPPLEMENTS.....           | 10 |
| SMOKING.....               | 11 |
| WEIGHT CONTROL.....        | 12 |
| DIABETES.....              | 12 |
| HEREDITY.....              | 13 |
| BIBLIOGRAPHY.....          | 15 |
| INDEX.....                 | 17 |

---

---

## LIST OF ILLUSTRATIONS

---

---

### TABLES

|                                                      |   |
|------------------------------------------------------|---|
| TABLE 1--Fatty Acid Content of Oils and Spreads..... | 5 |
| TABLE 2--Omega-3 Grams per 3 1/2 oz. Serving.....    | 6 |
| TABLE 3--Sources of Pectin Fiber.....                | 7 |
| TABLE 4--Fat Content of Milk.....                    | 7 |
| TABLE 5--Fat Content of Meats.....                   | 8 |
| TABLE 6--Restaurant Menu.....                        | 8 |
| TABLE 7--Tips on Changing Your Diet.....             | 9 |

## INTRODUCTION

If you are a 35-year-old male and have been eating a typical American diet most of your life, chances are all of your coronary arteries are blocked by 50 percent. If you are a 30-year-old female, your arteries are probably blocked by 20 percent. You will show no indication of heart disease until one of your coronary arteries is 90-100 percent blocked; and, by then you may be one of 540,000 Americans who will die each year of heart disease. The most effective way to determine your risk of heart disease is through a measurement called cholesterol ratio. This handbook explains cholesterol ratio and shows how you can lower your risk of blockage by improving your cholesterol ratio.

In 1953 Dr. William Enos compiled information about coronary artery blockage obtained from autopsies of 300 American soldiers killed during the Korean War. He reported that in 77 percent of the men, "...gross evidence of coronary disease was demonstrated..." The "evidence" ranged from partial to complete blockage of one or more of the main arteries. Although the average age of the soldiers was only 22, ten of the men already had blockage of 90-100 percent. So how and why does this blockage of arteries take place?

Blockage of the arteries is caused by the formation of plaque on the interior of the artery walls. The plaque builds up, restricts blood flow to the heart, and causes a heart attack. When an artery leading to the brain is blocked, the restricted blood flow could result in a stroke. To understand the buildup of plaque in your arteries think about it in terms of minerals building up in the water pipes of your home. A little amount doesn't stop the flow of water, but over the years it can add layers of minerals until the water can no longer flow. In the same way, plaque builds up until blood can no longer flow to all the parts of your "home." The pipes in your body can be replaced with a coronary artery bypass operation; but, unless you do something to correct the buildup of plaque the new pipes will also become clogged. With proper diet, nutrition, and exercise you can stop the plaque buildup and possibly reduce the buildup already present. This pamphlet tells you how to do it.

## Atherosclerosis

Plaque buildup in your arteries is a disease called atherosclerosis, which causes most heart attacks and strokes. The buildup is caused by fatty deposits on the inside of the artery walls. These blood fats, or lipids, cannot dissolve in the blood, so they are transported through the blood in protein containers called lipoproteins. When there is an excess of lipoproteins in the blood, they are occasionally trapped in the walls of the arteries. This causes the lipoproteins to release their cholesterol. The cells in the arteries react to this intrusion of cholesterol by producing smooth-muscle cells and connecting tissues. The combination of the cholesterol, new cells, and tissues creates a buildup on the interior of the arterial wall. This buildup restricts the flow of blood and is the major cause of heart disease.

## Cholesterol Ratio

A simple blood test will indicate your cholesterol ratio. To understand what this means you need to know something about lipoproteins. Remember, lipoproteins are the containers that transport your blood fat. They are subdivided into three main types: low-density lipoproteins (LDL), very low-density lipoproteins (VLDL), and high-density lipoproteins (HDL). LDL carries 75% of your blood cholesterol and is the lipoprotein that drops off cholesterol deposits in your arteries. High levels of LDL are associated with increased risk of heart disease. VLDL is composed mainly of triglycerides. A large increase of triglycerides causes your red blood cells to stick together. When this happens in a narrow, plaque-filled artery, the flow of blood is greatly reduced. Our bodies were created with many forms of checks and balances; and, HDL helps to keep our body fats in balance. The LDL and VLDL are considered the bad guys and HDL is the good guy.

High levels of HDL are good for you. HDL travels through your arteries picking up cholesterol and dropping it off in the liver where it is eliminated from your body. The higher your level of HDL the lower your risk of coronary heart disease. A blood test showing your level of total cholesterol in ratio to your level of HDL cholesterol is your best indicator of your risk of heart disease.

Results from your blood test will show percentages of milligrams of lipids per deciliter of blood (mg/dl). These measurements are then put in ratio form showing total blood cholesterol-to-HDL cholesterol. For example if your blood cholesterol is measured at 250 mg/dl and your HDL is 50 mg/dl,

the ratio would be 250 divided by 50 = 5.0, or a ratio of 5 to 1. Scientists from the Framingham Heart Study established national averages to predict your risk of heart disease. A ratio of 5 to 1 is considered to be the national average. If you have a ratio of 3 to 1 you have half the national average risk. But if you have a ratio of 11 to 1 you have twice the national average risk. The lower your ratio, the lower your risk of heart disease.

The most desirable ratio would be less than 4.0. Any ratio above 4.5 is considered to be an indicator of increasing coronary heart disease. The measurements that are included in your blood test are the levels of blood cholesterol, HDL cholesterol and triglycerides. The National Institute of Health reported that adults over 30 years old should maintain blood cholesterol levels of 200 mg/dl or less and those under 30 should have levels of 180 mg/dl or less. The good cholesterol, or HDL, should be maintained at the highest level possible. The Framingham Study reported that an HDL level below 35 mg/dl was associated with a high risk for heart disease and levels above 55 were associated with low risk. The third measurement of your blood test is the level of triglycerides.

Not as much research has been done on triglycerides as on cholesterol, but the Framingham Study reported that high levels of triglycerides correlate with high risk in coronary heart disease. Optimum level for your triglycerides is 125 or less. Research shows that the measurement of triglycerides in women over 50 is a better indicator of heart disease than blood cholesterol. Remember, it is important to maintain a low ratio, low levels of the bad cholesterol and triglycerides, and a high level of good cholesterol.

Now that you understand something about how to measure your risk of heart disease, let's see exactly how you can lower your cholesterol ratio and lower your risk of heart disease.

#### Changing your ratio

There are many factors which can lower or raise your cholesterol ratio, most of which you have the power to control. The factors you can control include diet, nutrition, alcohol, exercise, supplements, smoking, and obesity. The two factors you cannot control, but should be aware of, are diabetes and heredity. The following guide tells you how to positively affect the controllable factors without drastic changes in your lifestyle.

## Diet

You have been hearing for years that you should reduce the cholesterol in your diet. You thought that by not eating eggs, butter, and shellfish you would be able to control your cholesterol. In fact, reducing only foods that contain cholesterol will have little affect on your cholesterol ratio. You need to understand that there is a difference between diet cholesterol (that which you eat) and blood cholesterol (that which is in your blood). Most of your blood cholesterol comes from your liver which produces it mainly from the saturated fat in your diet. A large consumption of saturated fat, as in a typical American diet, is the greatest cause of increased levels of cholesterol.

The American Heart Association (AHA) recommends your diet contain no more than 10% saturated fats, 10% polyunsaturated fats, and 10% monosaturated fats for a total of 30%. Most American diets contain 40% to 50% fat, which is obviously much higher than the AHA recommendation. Saturated fats come mainly from animal products. Fat you can see on your meat or the fat in dairy products, like butter, is the visible fat that is solid at room temperature or in the refrigerator. But you must be careful of the hidden saturated fats that you can't see--hidden in foods such as biscuits, cakes, cheese, fried foods, and luncheon meat. There are also two types of vegetable oils that contain saturated fat--coconut oil and palm oil. These oils are often the principal fat in commercially baked goods and in nondairy products such as whipped toppings and coffee creamers. Saturated fats raise your LDL cholesterol, thus raising your cholesterol ratio and your risk of heart disease.

Not all fats are saturated. Two "good" kinds of fat are polyunsaturated and monounsaturated. They both lower your LDL cholesterol, but the polyunsaturated fat has the most positive effect. Polyunsaturated fats usually are found in vegetables. Oils from these vegetables include safflower, corn, cottonseed, soybean, sunflower, and sesame seed. As long as these oils are in liquid form they contain high polyunsaturated fat and low saturated fat; however, many of these oils are put through a process called hydrogenation, which hardens the oil to make products like margarine. As the product becomes harder the saturated fat amount increases. Therefore, soft tub margarines are higher in polyunsaturated fat than stick margarines. Read labels when shopping. The first ingredient listed on labels of margarine should not be partially hydrogenated or partially hardened oil. Also, watch out for the words "vegetable oil" when it is listed as an ingredient on labels. This is often used to avoid showing saturated fats like coconut or palm oil.

Monounsaturated fats are not as effective as polyunsaturated fats, but they can help to lower your blood cholesterol level. This fat is found in olive and peanut oils, and most nuts. While both polyunsaturated and monounsaturated fats are good for you in helping to reduce your cholesterol, remember that they are both high in calories and therefore should be used sparingly. It is obvious that polyunsaturated and monounsaturated fats are much better for your health than saturated fats, but you can't entirely eliminate saturated fats. So, you need to try and have a balance of the fats in your diet.

| Fatty Acid Content of Oils and Spreads (%)*                                     |                 |                 |           |
|---------------------------------------------------------------------------------|-----------------|-----------------|-----------|
|                                                                                 | Polyunsaturated | Monounsaturated | Saturated |
| Safflower oil                                                                   | 74              | 13              | 10        |
| Corn oil                                                                        | 55              | 26              | 13        |
| Cottonseed oil                                                                  | 54              | 17              | 23        |
| Soybean oil                                                                     | 50              | 25              | 14        |
| Margarine with safflower oil                                                    | 46              | 18              | 11        |
| Sesame oil                                                                      | 42              | 38              | 14        |
| Peanut oil                                                                      | 29              | 47              | 18        |
| Margarine with hydrogenated cotton-seed oil                                     | 13              | 52              | 16        |
| Palm oil                                                                        | 9               | 38              | 53        |
| Olive oil                                                                       | 7               | 76              | 11        |
| Lard                                                                            | 4               | 44              | 45        |
| Butter                                                                          | 2               | 27              | 46        |
| Coconut oil                                                                     | 1               | 5               | 80        |
| * Totals don't equal 100 percent because of other fatty acids that are present. |                 |                 |           |

Table 1

Another fat you should be aware of and add to your diet is an unsaturated fat called omega-3, which is found in fish. Omega-3 can help to lower your cholesterol ratio and lower your risk of heart disease by producing positive changes to your levels of LDL, HDL, and triglycerides. Omega-3 blocks the making of the bad cholesterol, LDL, thus preventing the buildup of plaque on the walls of your arteries. It raises your good cholesterol, HDL, which helps to carry cholesterol out of your blood. Omega-3 also lowers your triglycerides which will prevent your red blood cells from sticking together and reduce the risk of blood clots. Large amounts of omega-3 are found in cold-saltwater fish like sardines, salmon, and mackerel; however, all fish contain some of this unsaturated fat. Omega-3 is even found in shellfish. The benefits of omega-3 were

discovered through studies of the Eskimos. The Eskimos have diets of extremely high amounts of animal fat, but they have almost no record of heart disease. The connection was found in their diet, which consisted of large amounts of cold-saltwater fish containing omega-3. You don't have to take on an Eskimo diet and eat sardines and mackerel every day to lower your risk of heart disease. Start by trying to add fish to your diet three to four times a week. Vary the kind of fish and how you prepare it. For example, there are many types of fish that are especially good prepared over a barbecue grill.

| Omega-3 Grams per 3 1/2 oz. Serving  |      |                      |     |
|--------------------------------------|------|----------------------|-----|
| Sardines, Norway                     | 5.1  | Striped bass         | .64 |
| Salmon, chinook                      | 3.04 | Channel catfish      | .61 |
| Mackerel, Atlantic                   | 2.18 | Alaska king crab     | .57 |
| Pink salmon                          | 1.87 | Ocean perch          | .51 |
| *Albacore tuna                       | 1.69 | **Blue crab          | .46 |
| Sablefish                            | 1.39 | Halibut, Pacific     | .45 |
| Herring, Atlantic                    | 1.09 | Shrimp               | .39 |
| Rainbow trout (U.S.)                 | 1.08 | Flounder, yellowtail | .30 |
| Pacific oyster                       | .84  | Haddock              | .16 |
| * Canned, light    ** Cooked, canned |      |                      |     |

Table 2

While the high intake of saturated fats is a major cause of high blood cholesterol, you should also be aware of your intake of diet cholesterol. This type of cholesterol is found in meat, poultry, dairy products, eggs, fish, and shellfish. Diet cholesterol will only slightly raise your blood cholesterol; so, you need to be conservative of your intake of it, but do not totally deprive yourself of foods you enjoy. These foods also have important nutritional value.

Adding fiber to your diet will also help to lower your cholesterol. But it must be a water-soluble fiber, like pectin and gums, which is found in apples, citrus fruits, bananas, carrots, oats, and beans or peas. The insoluble fiber that is found in most breakfast cereals such as corn, wheat, rice, and bran has little effect on your cholesterol. Having a bowl of hot oatmeal or oat bran cereal and some fresh fruit will get your day off to a good start and help lower your cholesterol along the way.

| Sources of Pectin Fiber |          |          |               |
|-------------------------|----------|----------|---------------|
| Apples                  | Apricots | Bananas  | Citrus fruits |
| Pears                   | Beets    | Carrots  | Okra          |
| Grapes                  | Berries  | Potatoes | Peaches       |
| Plums                   | Prunes   | Raisins  | Onions        |

Table 3

### Emphasizing Nutrition

Remember, you do not have to make drastic changes to your lifestyle. Begin by making changes slowly. Reduce your intake of saturated fats, increase your polyunsaturated fats, eat more fish and poultry, and add fiber to your meals. The easiest way to start is to become more aware of what you are eating and how it is prepared. Cut down on your consumption of red meat. Buy lean cuts of meat and trim off the fat before cooking. Meats such as hot dogs, luncheon meat, bacon, and ham are considered to be "fatty" cuts of meat and should be avoided or limited to occasional eating. You should buy hamburger that does not have more than 10% fat. Again, read the labels. Stores now offer a wide choice in meats containing less fat or substitutes that taste like the real thing. The classification of beef is graded by its fat content with prime beef containing the largest amount of fat, followed by choice, good, standard, and utility. The meat of young animals such as veal and calf have less fat than that of older animals. Animal fat is also in foods like egg yolks and whole milk products such as butter, sour cream, cheese, ice-cream, and yogurt. Switch to skim milk, soft margarine, and lowfat cheese, ice-cream, and yogurt.

| Fat Content of Milk              |                      |
|----------------------------------|----------------------|
| Type of milk                     | Grams of fat per cup |
| Whole (3.3% fat)                 | 8.2                  |
| Low fat (2% fat)                 | 4.7                  |
| Skim (less than .2%)             | 0.4                  |
| Buttermilk (1% fat)              | 2.2                  |
| Nonfat dry milk powder (1/4 cup) | 0.2                  |
| Condensed, sweetened             | 26.6                 |
| Evaporated milk, whole           | 19.1                 |
| Evaporated milk, skim            | 0.5                  |

Table 4

Poultry and fish should be substituted for beef and pork, since they have much lower levels of saturated fats. Steak has

ten times more saturated fat than chicken without the skin, and 60 times more than fish. Of course the way you prepare the food also determines its fat content. If you fry breaded chicken with the skin on, you have increased its fat to that of a lean hamburger. Try "breading" your skinless chicken in oats and then baking it instead of frying. Have a meatless meal such as chili and substitute different kinds of beans for the meat. Cook with vegetable oils instead of shortening or lard.

| Fat Content of Meats              |                        |                      |
|-----------------------------------|------------------------|----------------------|
| <u>Lean Meat</u>                  | <u>Medium-fat Meat</u> | <u>High-fat Meat</u> |
| Beef, tenderloin,<br>chuck, round | Corned beef            | Hamburger            |
| Chicken, skinless                 | Ground round steak     | Steaks, club, rib    |
| Turkey, skinless                  | Pork roast             | Breast of lamb       |
| Leg of lamb                       | Liver, heart, kidney   | Duck, goose          |
| Fish                              |                        | Cold cuts            |
|                                   |                        | Hot dogs             |

Table 5

Maybe you don't think you eat foods that have a lot of saturated fat. Lets look at a typical meal you might order in a restaurant: eight ounce rib steak, baked potato with butter and sour cream, green salad with french dressing, rolls with butter, and coffee with cream and sugar. The following table shows the large number of calories for that meal, and that 67 percent of the calories, 1,116 out of 1,660, comes from fat.

| Restaurant Menu |              |              |                |
|-----------------|--------------|--------------|----------------|
| Food            | Serving size | Fat calories | Total Calories |
| Rib steak       | 8 oz         | 576          | 800            |
| Potato          | 1 large      | 0            | 140            |
| Butter          | 1 tbsp       | 135          | 135            |
| Sour cream      | 2 tbsp       | 45           | 45             |
| Salad           | 1 cup        | 0            | 0              |
| Dressing        | 3 tbsp       | 135          | 135            |
| rolls           | 2            | 90           | 230            |
| butter          | 2 tsp        | 90           | 90             |
| coffee          | 2 cups       | 0            | 0              |
| cream, light    | 2 tbsp       | 45           | 45             |
| sugar           | 2 tsp        | 0            | 40             |
| Total           |              | 1,116        | 1,660          |

Table 6

Saturated fats make up 90 percent of the fat in this typical meal. Most restaurants have many alternatives to this high-fat menu. Order smaller cuts and fill up on vegetables. Have margarine instead of butter and leave off the sour cream. Ask for whole wheat bread instead of the dinner roll. If you feel you must splurge occasionally, make sure your other meals of the day are extremely low in saturated fats. Have oatmeal with skim milk for breakfast and perhaps a salad for lunch. But don't make a habit of trying to make up for your frequent splurges.

#### Tips on Changing Your Diet

1. Reduce the amount of red meat and substitute poultry, fish, and veal which are low in fat.
2. Choose lean cuts of meat and trim off visible fat before cooking.
3. Remove excess fat and skin from poultry before cooking.
4. Avoid fatty meats--ham, bacon, cold cuts, hot dogs and sausages.
5. Avoid whole milk products--whole milk, cheese, sour cream, yogurt, butter, ice-cream, cottage cheese.
6. Bake, boil or broil food instead of frying.
7. Eat fewer bakery goods to avoid saturated fats including coconut and palm oil.
8. Avoid nondairy creamers in your coffee--use skim milk.
9. Substitute soft tub margarine for butter.
10. Substitute polyunsaturated and monounsaturated fat for saturated fat.
11. Get your protein by substituting beans and peas for meat.
12. Increase your fiber intake with fruits and vegetables.

Table 7

Americans are becoming more conscious of what they eat, but fast-foods are still extremely popular. Any drive-through window will give you a choice of high-fat items such as hamburgers, fried chicken, fried fish, french fries, and milk shakes. Many of the fast-food restaurants now have the "healthy" salad bars where you pile on cheese, bacon bits, ham, and thick dressings. Watch what you eat and don't let convenient fast-foods become a convenient road to heart disease.

#### Alcohol

Would you like a little something to go along with your meal, perhaps a glass or two of wine? Alcohol will slightly

raise your HDL levels. Only light drinking, one to two drinks, is considered beneficial to your heart. But there are two sides to this story. Alcohol produces an increase in your blood triglycerides. If you drink the alcohol along with a high fat meal you can increase your triglycerides to three and a half times the normal level. Alcohol is high in calories, has no nutritional value, can stimulate your appetite causing overeating, and it can be harmful to your liver. You must decide if you want to use alcohol to help raise you HDL or use a safer means such as exercise.

### Exercise

One of the best ways to help lower your cholesterol ratio is through exercise. Exercise is the only way in which you can substantially increase your HDL level. You don't have to be a marathon runner. You only need to do some type of aerobic exercise for 20 to 30 minutes every other day to produce benefits to reduce your risk of heart disease. Find something you enjoy doing such as jogging, walking, swimming, bicycling, or aerobic dancing. If you don't enjoy doing the exercise you probably won't stick with it. You must do the exercise on a regular basis. Weekend spurts won't lower your ratio and could possibly hurt you if you are not used to the activity. Listen to your body for any signs that you might be overdoing it--chest pains, dizziness, or trouble with breathing. If you are not used to exercise consult your doctor and start out slowly.

One word of caution about exercising. Exercise alone will not lower you cholesterol ratio and prevent heart disease. If you have a high count of blood cholesterol you must also change you diet. Don't think that as long as you exercise you don't have to watch what you eat. A good example of this was Jim Shetteler. He had trained as a marathon runner for over 25 years, was 6' 1" and 150 pounds, and did not smoke. One day after a long run he died of a heart attack at the age of 42. An autopsy indicated his left main artery was almost entirely blocked with cholesterol deposits. He had always believed that his running kept him in top physical condition. While exercise and diet are the two most important ways to keep a healthy cholesterol ratio, you can also enhance your efforts with supplements.

### Supplements

Supplements of certain vitamins, minerals, and fish oils can help to lower your cholesterol ratio. Vitamin C helps to lower cholesterol and triglycerides. One study done in Czechoslovakia showed that a supplement of 500 mg of vitamin C

a day reduced the cholesterol ratio. The greatest reduction occurred in people with a high blood cholesterol level above 300 mg. People with lower levels of cholesterol had smaller reductions, thus vitamin C helped those who most needed to reduce their ratio. Vitamin E works in the same manner, by lowering cholesterol ratio more in those with the highest ratios. Vitamin E lowers the ratio by raising the good type of cholesterol, HDL. It has little effect on people who already have high levels of HDL (such as joggers). In the studies that showed vitamin E could raise HDL, 800 I.U. (International Units) of vitamin E were taken daily. Niacin, one of the B vitamins, can lower your cholesterol ratio, but to have any effect it must be taken in large amounts. This should only be done under the care of a doctor, because large amounts of niacin can cause dilation of the blood vessels and the skin to flush.

The mineral chromium reduces the buildup of plaque in the arteries, lowers blood cholesterol, and raises the levels of HDL. In a study conducted in Israel, supplements of chromium were given to rabbits who had atherosclerosis. After only 60 days the rabbits were found to have 50 percent regression in their plaque formation. Another study used chromium supplements on people for eight weeks. The average cholesterol ratio was lowered from 5.0 to 3.9. Chromium supplements can be taken in 100 microgram tablets or by taking 1 to 2 tablespoons of brewer's yeast (which is considered the most reliable source of chromium). Calcium is another mineral that has been shown to help lower LDL, but it has no effect on HDL. To lower LDL levels, calcium can be taken in one gram supplements.

As mentioned earlier omega-3, which is found in fish oil, will help lower your cholesterol ratio. If you find it hard to increase your intake of fish, you might consider taking fish oil supplements. Cod liver oil is one type of fish oil available in supplements, but it is high in vitamins A and D. Vitamins A and D can be toxic at high levels; therefore, this would limit the amount of cod liver oil you could take safely. You should take fish oil supplements that are high in EPA (eicosapentaenoic acid), which is an active ingredient in omega-3, and low in vitamins A and D.

### Smoking

Smoking has a direct effect on your increased risk of heart disease. Cigarette smoking lowers your good cholesterol (HDL) levels and increases blood clotting in your arteries. Smoking also causes the muscles in the arteries to contract and restricts the oxygen flow needed in the cells of the arterial wall, thus damaging the walls. You can easily see how these

factors combine to increase your risk of heart disease. The damaged walls of the artery catch the cholesterol deposits, causing plaque; and, a reduction of HDL prevents the cholesterol from being carried away. Add plaque buildup to constricted arteries, and any increase in blood clotting could stop the flow of blood to the heart, causing a heart attack. Women usually have lower cholesterol ratios than men, but women who smoke have ratios which compare to male nonsmokers. Smoking also reduces the amount of vitamin C, which your blood needs to reduce cholesterol. If you are exercising to raise HDL levels, smoking will reduce the raising benefits. In other words, smoking is bad for your arteries. Even people who smoke the low-tar, low nicotine brands have up to a 75 percent higher death rate than nonsmokers. If you want to lower your risk of heart attack you must stop smoking now!

### Weight Control

Controlling your weight is important in controlling your cholesterol ratio. Overweight people have high levels of blood cholesterol and low levels of HDL. Studies show that losing weight helps to lower cholesterol ratio by reducing LDL levels and raising HDL levels. Weight gain also increases levels of triglycerides. When you eat more calories than your body can use as energy, the excess calories are made into triglycerides. Increased weight is an indicator of increased risk of heart disease. So if you are overweight you must go on a program to reduce.

One way of losing weight is to reduce the amount of calorically dense foods that you eat. These are foods that have a large number of calories in a small portion of food. These include foods containing both saturated and polyunsaturated fats such as butter, margarine, shortening, vegetable oils, desserts, beef, pork, cheese and nuts. As mentioned earlier, although polyunsaturated fats help to lower your cholesterol, they are still high in calories. Foods that are low in caloric density include fruits, vegetables, beans, fish, chicken, and whole grain products. You can eat more of these foods and take in less calories. For example, three ounces of bacon has about the same number of calories as 22 ounces of sea bass. Three ounces of cheddar cheese is equal in calories to 16 ounces of potatoes. Reducing your intake of foods, especially fats, and starting an aerobic exercise program will help to lower your weight and reduce your cholesterol ratio.

### Diabetes

Diabetes can increase the risk of heart disease. A diabetic tends to have above normal levels of blood cholesterol

and triglycerides, and low levels of HDL. It is important to control diabetes because a rise in blood sugar will increase LDL and triglycerides, and lower HDL levels. The same suggestions for controlling your cholesterol ratio can help to control diabetes; low fat, high fiber diet, weight loss, and exercise.

### Hereditiy

Genetics can play a factor in determining your cholesterol ratio. Some people are more susceptible to the formation of cholesterol buildup in their arteries than others. A history of heart disease in your family doesn't mean that you have the same risk, but you should have your blood cholesterol levels checked periodically. If you are prone to higher levels of cholesterol due to hereditiy, you can still reduce your risk of heart disease through diet and exercise.

Gender also plays a part in determining risk of heart disease. Women start developing plaque buildup about 10 years later than men. This gap is closed after women reach menopause. This might be explained by the fact that the male hormone, testosterone, raises blood cholesterol and lowers HDL, while the female hormone, estrogen, helps to lower blood cholesterol and increase HDL. After menopause, estrogen levels drop in women and their rate of heart attacks increases. Estrogen therapy for women can help lower their cholesterol ratio and their risk of heart disease. Even if you inherited your risk of heart disease you can still have an influence in whether or not the risk actually develops into heart disease.

### Summary

Americans enjoy more of the "finer" things in life than any other nationality. But our high-fat diets and sedentary jobs can shorten our lives if we do not understand what is happening to our bodies and do something about it. The first step is to find out where you stand. Get your doctor to order a blood test that will give your cholesterol ratio. Odds are that you will need to improve that ratio.

Dietary changes can vastly lower your ratio. Learn to read and understand labels on food products. Reduce fatty foods, and try different "less fat-intensive" methods of food preparation. Add fiber to your meals and watch your intake of diet cholesterol. Start and continue some type of exercise program. Remember, only 20-30 minutes of aerobic exercise three or four times each week will increase your HDL and

improve your cholesterol ratio. You may wish to add vitamin and mineral supplements to your new diet and exercise program. If you are overweight, or if you smoke, you are compounding your cholesterol problem.

This may all sound drastic at first, but if you try a small change here and there, your cholesterol ratio will improve and you will lower your risk of heart disease. Try it... your heart and arteries will like it!

---

## BIBLIOGRAPHY

---

### A. REFERENCES CITED

#### Books

1. Barnard, Dr. Christiaan, and Peter Evans. Your Healthy Heart. New York: McGraw-Hill Book Co., 1985.
2. Bland, Jeffrey, PH.D. Your Health Under Siege: Using Nutrition To Fight Back. Brattleboro, Vermont: Stephen Greene Press, 1981.
3. Bricklin, Mark. The Practical Encyclopedia of Natural Healing, Emmaus, PA: Rodale Press, 1983.
4. DeBakey, Michael E., and et al. The Living Heart Diet. New York: Raven Press, 1984.
5. Fisher, Hans, Ph.D., and Eugene Boe. The Rutgers Guide to Lowering Your Cholesterol. New York: Warner Books, 1985.
6. Hamilton, Eva May Nunnelley, et al. Nutrition: Concepts and Controversies. St Paul: West Publishing Co., 1985.
7. Lesser, Michael, M.D. Nutrition and Vitamin Therapy. New York: Bantam Books, 1980.
8. Mannerberg, Don, M.D. and June Roth. Aerobic Nutrition. New York: Hawthorn/Dutton, 1981.
9. Pritikin, Nathan. The Pritikin Promise: 28 Days to A Longer, Healthier Life. New York: Simon and Schuster, 1983.
10. Zugibe, Frederick T. 14 Days to a Healthy Heart. New York: Macmillan, 1986.

#### Articles and Periodicals

11. "Cholesterol: Still Risky at Low Levels." Newsweek (December 8, 1986), pp. 86).

---

## CONTINUED

---

12. Foley, Denise. "Clean Out Your Cholesterol." Prevention (July 1985), pp. 33-46.
13. Maleskey, Gale. "All About Triglycerides." Prevention (March 1986), pp. 80-86.
14. Maleskey, Gale. "Your Heart, Your Health and a Drink or Two." Prevention (December 1984), pp. 138-147.
15. Meade, Jeff. "Nutritional Breakthrough of the 80's: Omega-3." Prevention (July 1986), pp. 85-90.
16. Thompson, Paul D., and Amby Burfoot. "Eat to Live." Runner's World (September 1986), pp. 36-41.

### Pamphlets

17. American Heart Association. Eating for a Healthy Heart.
18. Donsbach, Kurt W., Ph.D. A Report on EPA (Eicosapentanoic Acid). Huntington Beach, CA: The International Institute of Natural Health Sciences, Inc., 1985
19. Passwater, Richard A., Ph.D. EPA-Marine Lipids. New Canaan, Connecticut: Keats Publishing, Inc., 1982.
20. Passwater, Richard A., Ph.D. GTF Chromium. New Canaan, Connecticut: Keats Publishing, Inc., 1982.
21. Rodale Press. How to Fight 10 Common Diseases. Emmaus, PA: Rodale Press, 1986.
22. Whitney, Major Edwin J., M.D. Patient Education Manual for "Help Your Heart". San Antonio: Matson Multi-Media, 1986.

---

## INDEX

---

### A

alcohol 3, 9, 10  
American Heart  
Association 4  
atherosclerosis 2, 11

### B

bacon 6, 9, 12  
beef 7, 8, 12  
blood cholesterol 2,  
3, 4, 5, 6, 10, 11, 12  
blood test 2  
butter 4, 5, 7, 8, 9, 12

### C

calf 7  
cheese 4, 7, 9, 12  
chicken 8, 9, 12  
cholesterol ratio 1,  
2, 3, 4, 5, 10, 11, 12,  
13, 14  
chromium 11

### D

diabetes 3, 12, 13  
diet cholesterol 4, 6

### E

estrogen 13  
exercise 1, 3, 10,  
13, 14

### F

fast-food 9  
fiber 6, 7, 9, 13  
fish 4, 5, 6, 7, 8,  
9, 11

### H

ham 7, 9  
hamburger 8, 9  
HDL 2, 3, 5, 10, 11, 12, 13  
heart disease 1, 2, 3, 4, 5, 6,  
heredity 3, 13  
hot dog 7, 8, 9  
hydrogenation 4

### I

ice-cream 7

### L

LDL 2, 4, 5, 11, 12, 13  
lipids 2  
lipoproteins 2  
low-density (LDL) 2, 4, 5,  
11, 12, 13  
high-density (HDL) 9, 10, 11,  
12, 13  
very low-density (VLDL) 2

### M

margarine 4, 5, 7, 9, 12  
menopause 13  
milk 7, 9  
monosaturated fat 4, 5

### N

niacin 11

### O

oils  
coconut 4, 5, 9  
corn 4, 5  
cottonseed 4, 5  
olive 5

---

## CONTINUED

---

oils con't

- palm 4, 5, 9
- peanut 5
- safflower 4, 5
- sesame seed 4, 5
- soybean 4, 5
- sunflower 4
- omega-3 5, 6, 11, 12, 13

P

- plaque 1, 2, 5, 11
- polyunsaturated fat 4, 5, 7, 9, 12

S

- saturated fat 4, 5, 6, 7, 8, 9, 11
- smoking 3, 11, 12
- supplements 3, 10, 11, 14

T

- testosterone 13
- triglycerides 2, 3, 5, 10, 12, 13

V

- veal 7, 9
- vegetable oil 4, 8, 12
- vitamins
  - B 11
  - C 10, 11
  - E 11
- VLDL 2

W

- weight 12, 13, 14

Y

- yogurt 7, 9

END

8-87

DTIC