I. Functions of Fat

A. Dietary Fat

1. Fat is a concentrated source of calories, thereby serving to reduce the bulk of food needed to supply caloric requirements. This becomes of greater significance as caloric requirement increases.

2. Fat increases the palatability and acceptability of food.

3. Fat is a carrier and/or source of fat-soluble nutrients, including vitamins A, D, and E, linoleic acid.

4. Fat reduces the emptying time of the stomach with certain attendant advantages, e.g., satiety, improved digestion, mucosal protection.

B. Metabolic Functions

1. Fat increases the efficiency of food utilization, including the conservation of thiamine.

2. Fat is needed for growth and for maintenance of tissues and in certain lipid secretions.

3. Fat serves as specific fuel for the metabolism of many tissues.

II. Animal Fat in Today's Diet

A. Consumers demand leaner meats with no change in quality.

   1. More a reflection of calorie consciousness than of concern over cardiovascular disease.

B. There is considerable research interest in the metabolism of animal fats related to cardiovascular disease.

   1. Metabolism of individual fatty acids.

   2. Metabolism of short, medium, and long chain triglycerides in presence and absence of cholesterol.


5. Effect of dietary cholesterol on blood lipids.


There are a number of carefully conducted studies underway to assess the effect of controlled diets on blood fats and on cardiovascular disease incidence. Relatively large numbers of people are involved. The purpose of these studies is to determine whether adherence to diets designed to provide less saturated fat (animal fats) and more polyunsaturated fat (vegetable fats) than usually consumed in this country will bring about sufficient reduction of cholesterol and possibly reduce the risk of heart disease. In the more sophisticated studies blood lipids in addition to cholesterol are measured, but the largest studies still use cholesterol as the biochemical parameter of dietary success. The studies are designed to test the hypothesis that "normal" or low cholesterol levels will prevent a delay, lessen the severity of, or hasten the recovery from heart disease.

The group studies have not been underway for sufficient time to constitute a true test of the hypothesis; however, some important experience has been gained. Statistically significant lowering of cholesterol has been achieved in most cases, and the diets have been found to be practical from a gourmet viewpoint. In some cases, there is a suggestion that subjects in the studies have had less cardiovascular disease development than would have been predicted. However, the question of appropriate group comparisons and controls casts doubt on the significance of these early reports.

There are a number of recent developments that would justify a somewhat detailed discussion of the diets currently in use or proposed. The group studies are underway in New York City and in Boston, Chicago, Minneapolis, Oakland, and Baltimore. Dr. Irvine Page is directing a team of experts carrying out a very large cooperative study. In addition, the American Heart Association recently released a fat-controlled diet booklet for patient use, and the American Medical Association published a report to the physician on the regulation of dietary fat.

The diets used in the group studies have a great deal in common. Saturated fat is reduced from a usual daily intake of about 58 gm. to 20 - 30 gm. Sources of polyunsaturated fatty acids are provided to yield from 20 - 45 grams of linoleic acid depending upon the total number of calories. Although the total amount and the kind of fat in the diets are important, a qualitative evaluation can be obtained by a consideration of the ratio of linoleic acid or polyunsaturated fatty acids to saturated fatty acids. In the usual American diet the ratio is about 0.3, i.e., only 1/3 of the fat is from linoleic acid. All of the experimental diets strive for at least a 1 to 1 ratio and some go as high as 2 to 1. It should be noted in passing that some investigators suggest that at least 50 gm. of linoleic acid should be provided in the special diets.

Another feature common to all of the diets is the rather complete elimination of dairy fats. No whole milk, cream, butter, or ice cream is allowed; only a few cheeses are permitted. Non-fat milk may be used,
however. The kind, the cut, and the amount of meat allowed in the diets are also strictly controlled. These restrictions are necessary in order to reduce the total amount of saturated fats. Dairy fats now provide 28\% of the fat consumed in the United States (40 gm./day); meats, poultry, fish, and eggs provide 27\% (39 gm./day). Obviously, if the total amount of saturated fats is to be reduced, the visible sources of fat must go. Only the leanest meats in restricted quantities are allowed. Poultry, fish, seafoods, and low-fat cheeses are depended upon as the major sources for about 50\% of the protein each week.

The total fat in these special diets ranges from 30\% - 40\% -- quite a reduction from the 42.5\% in the usual American diet.

Rather significant changes have already occurred in the dietary habits in our country; more may be on the way. Because the products you distribute are drastically curtailed in the special diets, I will give you some of the details of the diets designed to reduce cholesterol. I will discuss the New York Prudent Diet, the American Heart Association diet, and the American Medical Association diets. Most of the diets in use are modifications of the Prudent Diet. It, therefore, can be used as a basis for consideration of what is involved.

The so-called prudent diet of the "anti-coronary club" is the one used in a study conducted by the New York City Department of Health. Actually, two diets are involved, one for weight reduction and one for weight maintenance. The latter is called the prudent diet; it is the one I will discuss. The 2,000 calorie maintenance diet provides 30\% of the calories as fat. The 66 grams of fat per day are, in part, composed of 19 grams of saturated fat and 20 grams of polyunsaturated fat. The P/S ratio is 1.05. The sources of protein permitted in the diet include cottage-type cheese, fat-free milk, chicken, turkey, veal, leaner cuts of beef, mutton, lamb, lean portions of pork, fish, seafood, and egg white. Meat must be baked, broiled, or boiled, and special attention must be given to remove all visible fat. Beef, lamb, mutton, and veal when used must be medium to well done. The size of the serving depends upon the total amount of calories permitted.

In the prudent diet, of the 21 meals each week, beef, lamb, mutton, or pork may be used not more often than four times. Veal or fowl may be used four times, fish or seafood five times, and cottage-type cheese or egg whites the remaining eight meals of the week. Four eggs may be eaten each week. One ounce of corn oil is to be used each day, and only the special high linoleic acid margarines are permitted. Participants are given detailed instructions on food selection and preparation and quite a list of foods that are not permitted. Most of your products are found in the forbidden list.

The American Heart Association has released a booklet intended to be used for patient instruction in planning fat-controlled meals. The following is an excerpt from the introduction:

"This booklet contains a diet that your doctor has prescribed for you. It is called a fat-controlled diet, because both the amount and the type of fat are carefully regulated."
"Your new diet will differ from this 'average' diet in two ways: 1) You will have somewhat less fat—about 35 per cent of the day's calories, instead of 40 to 45 per cent, and 2) of the fat you eat, more will come from vegetable oils and less will come from meat and dairy products."

"The purpose of this diet is to reduce the amount of cholesterol and other fatty substances in the blood. It is hoped that this will help prevent or retard the condition called atherosclerosis."

"Although there is no definite proof that changing the fat content of the diet will prevent atherosclerosis, a number of studies have pointed in this direction. Until more information is available, many physicians agree that the wise course for selected patients is a simple diet designed to lower the amount of cholesterol and other fats in the blood."

The booklet is available to patients on a physician's prescription only.

In this diet, as in others, only skim milk, non-fat dry milk powder, or buttermilk made from skim milk is permitted.

The section on meat, fish, and poultry contains specific instructions. Six ounces per day are permitted. In the 1800 calorie diet, three of the 14 main meals each week may be chosen from:

- beef (eye of round, top and bottom round, lean ground round, lean rump and tenderloin)
- lamb (leg only)
- pork (lean only)
- ham (lean and well trimmed)

For the other 11 meals of the week, choices may be made from among skinless chicken and turkey, fish, seafood, veal, or meat substitutes.

The booklet contains specific instructions for the patient to avoid "choice" or "prime" beef, lamb, except leg, pork, except lean loin, bacon, salt pork, spareribs, frankfurters, sausage, cold cuts, canned meats or organ meats.

In order to provide the increased amount of linoleic acid required in these diets, three level tablespoons of certain fats are included each day. The diet emphasizes vegetables, fruits, and cereals. Four eggs may be used each week and need not be substituted for some of the meat.

The Council on Foods and Nutrition has prepared a report for the physician on the regulation of dietary fat. The report contains six chapters
with the following titles: Chemistry of the Lipids, Physiology of the Lipids, Amount and Kind of Fat in the American Diet, Regulation of Dietary Fat, Methods for Reducing Fat Intake, and Methods for Substituting Polyunsaturated for Saturated Fat in the Diet. It is the last chapter with which we will be concerned.

The Council concluded in the report that: "Indications for restricting the total fat content of the diet may include gall bladder disease, certain types of malabsorption and hypertriglyceridemia. The indication for increasing the degree of polyunsaturation of the fat is hypercholesterolemia. Both hypercholesterolemia and hypertriglyceridemia have been associated with atherosclerosis. A direct casual relationship between diet or serum lipid concentrations and atherosclerosis has not been proved. In the light of present knowledge, it appears logical to attempt to reduce high concentrations of cholesterol and other serum lipids as an experimental therapeutic procedure."

The diets designed to bring about a reduction in cholesterol are given for three calorie levels. The 1800 and 2400 calorie diets are intended as weight maintenance. Both provide fat in an amount to equal 35% - 40% of total calories. The 1800 calorie diet calls for 70 grams of fat, of which 20 grams are saturated fatty acids and 26 grams are linoleic acid. The L/S ratio is, therefore, 1.3 to 1. The 2400 calorie diet calls for 116 grams of fat, of which 30 grams are saturated fatty acids and 45 grams are linoleic acid. The L/S ratio is 1.5 to 1. The diets are essentially similar to those proposed by the A.M.A. reported earlier and need not be reported in detail.

The only real difference between the diet plans of the A.M.A. and the A.M.A. is in the calorie level chosen for the maintenance of weight in men. The A.M.A. diet is given at 2400 calories, the A.H.A. at 2800 calories. It is simply a diet unrestricted in calories. The physician would prescribe the total number of calories in any event.

Now, with this information before us, what does it mean to you? First, you must bear in mind that these diets are experimental and are used by physicians in attempts to remove a degree of risk from their patients. Certainly the Nutrition Committee of the A.H.A. and the Council on Foods and Nutrition do not propose that their diets be used by the general public. Quite the contrary; both reports make it clear that the material is addressed to the physician.

Next, the diets call for only very moderate amounts of the products you provide to the market. No milk fat is permitted and only as little other animal fat as necessary to assure an adequate protein intake is permitted. In fact, it would be safe to say that meat is permitted primarily to avoid too drastic a deviation from the usual way of eating.

It seems clear to me that, if the trend continues, we will need to know more about the fatty acid composition of animal fats and of their effect on body chemistry. One important requirement of the meat industry may be to learn how to produce high protein-low fat (or modified fat) meat that is tender and acceptable. Only time and continued research will determine whether the general public will have to modify its dietary habits if cardiovascular disease is to be avoided.
MR. DOTY: I am sure there may be some questions and discussion about this later, but let us move along to the last paper of the session.

In trying to get someone to discuss this matter of proteins, particularly meat proteins, in human nutrition, the committee could find no one who they considered as well qualified as one of its own members. All of you know Joe Kastelic, and without further ado he will talk to us this morning on Meat Proteins in Human Nutrition.

MR. JOE KASTELIC: (Illinois) Mr. Chairman, and Del, and Members of the Reciprocal Meat Conference, and Friends;

I would like to say that I am very happy to be given the privilege to appear before you today because I consider it an honor, and I hope that my thoughts will not disappoint you.