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Good health and well-being

My diet

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Editor's note

WN has not until now published any proposal for a diet regime. Here we do Fred Kummerow is a biochemist at the University of Illinois, an authority on coronary heart disease and on *trans*-fatty acids for more than half a century, and still a regular contributor to the scientific literature. He sent us his recommendations just after his 100th birthday. *WN* celebrated his life and work earlier this year. In response, Walter Willett wrote:

> Fred Kummerow had the understanding and vision to know that *trans* fat could be a problem. When I read his papers in the 1970s I realised that more data would be needed if a convincing case was to be made, and so we at the Harvard School of Public Health started to create a database on the *trans* fat content of foods so we could study the possible ill-effects. It took us 13 years to get enough follow-up results for our first paper in *The Lancet.* For better or worse, epidemiology takes a long time!

Fred Kummerow is the second centenarian that we know of to publish recommendations for a long-life and good-health diet. The first was Luigi Cornaro (1464-1566) whose *The Art of Living Long* recommends a regime including plenty of eggs and meat such as 'veal, kid and mutton' and 'fowls of all kinds' and also fish plus wine. Over half a millennium later, Fred Kummerow enjoys a more varied but otherwise similar diet minus wine.

Introduction

Population rates of coronary heart disease are higher in the US than in France and other Mediterranean Southern European countries. This short commentary, taken from a longer and more fully referenced paper, proposes three reasons why. It distils over 60 years of my own work as a laboratory scientist with a special interest in lipids, and sometime advisor to the American Heart Association.

There are three reasons why the rate of coronary heart disease remains high in the US. First, the national diet contains a lot of polyunsaturated fat and fried food. People in the US are told that cholesterol-containing foods cause heart disease, and they consume foods that contain manufactured *trans* fat. I found that the human diet should contain a balance of saturated fat and polyunsaturated fat. Second, foods that contain cholesterol should be consumed, because they contain the ten amino acids that are needed to make the 60 trillion cells in the human body. Third, partially hydrogenated oils, that cause the formation of 14 synthetic fats, should be avoided, because they cause the blood to clot. If people in the US ate more balanced diets based mostly on natural foods, similar to those still eaten in France, I believe that the rates of coronary heart disease in the US would decline.

What is wrong with the US diet

Coronary heart disease occurs around the world. (1) A common denominator in the countries that have low rates is that their people consume smaller portions of an overall high quality diet. Their diets are influenced by the availability of fresh foods in their country, allowing them to consume fresh fruits, vegetables, fish, meats, and dairy products. Thus, 'nutrition plays a role in the low coronary heart disease rates in France and Mediterranean Southern Europe'. Also, as Paul Rozin, Claude Fischler and colleagues state (3):

> Food is actually a critical contributor to physical well being and a major source of pleasure, concern and stress. Eating and drinking take up much of people's waking time around the world. Americans associate food most with health and least with pleasure. The French are the most pleasure-oriented and least health oriented.

The French diet is high in meat and cheese with vegetables taking a secondary role.(4) Protein, in these diets, is available from two sources, either from animals (meat, dairy, or fish) that contain cholesterol, or vegetables (grains and legumes) that do not contain cholesterol. I believe there are three inter-related reasons why people in the US have a higher rate of coronary heart disease.

Polyunsaturated fats and deep-fried products

The first reason is that people in the US eat more polyunsaturated fatty acids and deep fried food than people in continental Western and Southern European countries. People in the US are advised to replace saturated fat (from animal sources) with polyunsaturated fat (from plant sources) because of the cholesterol hypothesis (see below). But (5):

> [The hypothesis] relates to blood lipids, not dietary lipids, as the putative directly causative factor. Although diet, especially dietary lipid, is an important determinant of blood lipid levels, many other factors play important roles… It is essential to distinguish between the indirect 'diet-heart' connection and the direct 'blood lipid-heart' connection.

I believe that cholesterol plasma levels do not cause coronary heart disease. Harumi Okayama states that dietary cholesterol and saturated fats are not risk factors for coronary heart disease. He believes that the unbalance of the ratio of omega 6 and omega 3 fats is the problem (6). On average, people in the US have omega 6/ omega 3 ratios of plasma lipids ten times higher than the average Japanese (7).

Average consumption of fats in the US has increased six-fold since 1912 (8). Polyunsaturated fats are easily oxidised. Oxidation occurs when omega 6 and omega 3 fats take on oxygen that causes them to become oxidised and thus changes the composition of the fatty acid. Oxidation can also occur in fats that have been over-heated for prolonged periods of time. The over-use of these fats causes the formation of cyclic monomers which adhere to the food being cooked.(9) In animal studies, feeding cyclic monomers alters lipogenesis in the livers and adipose tissue of rats.(10) This suggests that increasing polyunsaturated fats in the diet will not prevent coronary heart disease, but may have the opposite effect.

Avoidance of dietary cholesterol

The second and related reason for the higher rates of coronary heart disease is the cholesterol hypothesis. The US public is told that cholesterol in the diet causes heart disease and should be minimised. But cholesterol in animal food products does not cause heart disease. The oxidation of cholesterol by oxidised fatty acids is the problem (11). People who eat too much oxidised fat will change the composition of their coronary arteries (12). The coronary arteries will be more susceptible to calcification and require bypass surgery. *The New York Times* (13) reported that

> Michael E. DeBakey, a heart surgeon, said that 30 years of observation of more than 15,000 patients had led him to conclude that cholesterol was not the cause of atherosclerosis, the artery-clogging condition that kills hundreds of thousands of Americans each year. He found that people fell into three groups, based on how fast the sticky substance that blocks the arteries builds up after patients are treated for the condition. He noted that one group experienced a 'rapid' build up of such plaque and

> redeveloped the disease within three years. Another group experienced a 'moderate' build up of the substance over a period of six to seven years.

While the process took more than nine years for a 'slow' group, I conjecture that the slow group had changed their diet and the others had not. *The New York Times* further reported (13)

> DeBakey found again that cholesterol levels did not predict which of these bypass patients would redevelop blockage and require further surgery.

I believe that the sticky substance that Michael DeBakey referred to was calcium imbedded in arterial cellular sphingomyelin, formed by the removal of choline from phosphatidylcholine in the arterial wall (14). The blood lipids are stable in the plasma until they are exposed to a diet that contains excessive oxidised fatty acid. This will gradually cause 30-40 per cent of the phosphatidylcholine in the arterial wall to lose its choline and become 30-40 per cent more sphingomyelin in the arterial wall. The natural salty composition of the plasma causes sphingomyelin to have a negative charge. This negative charge attracts the positive charged calcium to adhere to the sphingomyelin in the arterial wall, and thus gradually narrows the diameter of the coronary artery to the point that requires bypass surgery.

Industrial trans-fat

Manufactured *trans* fat is the third reason for higher rates of heart disease in the Various governments have put pressure on manufacturers and this has resulted in a reduction in the intake of industrial *trans* fat in their diet (15). This *trans* fat is formed during the partial hydrogenation of oils, which causes the formation of 14 synthetic fats (*trans* fats) that are not present in animal or vegetable fats. The presence of these synthetic fats causes the blood to clot (16). I believe that the gradual increase in the rates of death from coronary heart disease in the US beginning in 1910 was due to the presence of 44 per cent industrial *trans* fatty acids as then contained in margarine. The reformulation of margarines to 27 per cent *trans* fatty acid in 1968 caused the death rate to decline. In 2003 the death rate levelled out when the US Food and Drug Administration (FDA) required amounts of *trans* fat to be listed on nutrition labels.(17) Currently the FDA is considering making *trans* fat not 'generally recognised as safe' (non GRAS) (18). It is my hope that industrial *trans* fats will be eliminated from food supplies in the US and everywhere else in the world, by law.

The wrong diet

A massive consensus report of a panel chaired by Scott Grundy has stated that the US population should consume less cholesterol and less saturated fat (19). Dietary recommendations in the US remain based on the cholesterol/lipid hypothesis that states that dietary cholesterol causes heart disease. The US public is still being told to eat the wrong diet. In terms of macronutrients the average US diet is 50 per cent

carbohydrates, 15 per cent protein and 35 per cent fat. This is referred to as the Standard American Diet, or SAD for short (20).

The consensus recommendations include restricting protein consumption from animal products, keeping cholesterol intake below 200 mg a day, and maintaining fat intake at 35 per cent of total dietary energy with just 7 per cent from saturated fats. But protein is essential to preventing heart disease. Protein is needed to 'carry' fat and cholesterol as lipoprotein throughout the body and heart (21). Animal products provide the best biological value of protein, in the sense of the percentage of absorbed protein that the body can actually put to work building cells for growth and maintenance (22). The US public is being advised to get protein from grains (23), but grains are not complete proteins unless combined with legumes. Plant sources of protein do not contain adequate amounts of one essential amino acid. The diet must contain adequate amounts of all the essential amino acids to build human cells (24).

My diet

I believe the diet listed below (Box 1) is based on correct principles. It provides the vitamins, minerals and trace minerals for the liver to synthesise all the components for a healthy body. It contains sufficient amounts of protein to keep the body in a positive nitrogen balance. It also contains a balance of omega 6 and omega 3 fats. We all need to limit consumption of foods cooked in over-heated and over-used oils, keep omega 6/ omega 3 ratios in balance, and eat nourishing diets that include all the food groups

People in the US should eat more like the French. This is also a matter of how people eat. Slow down, make meals a time to relax, and enjoy smaller portion sizes. I am now over 100 years old and have followed these guidelines for over sixty years.

Box 1

My typical diet

For breakfast

An egg (cooked in butter). Ccoked whole wheat grains and oatmeal served with several kinds of fruit, including a banana and fruits with a coloured skin, topped with milk. A few walnuts, pecans or almonds. Yoghurt and milk.

For lunch

Meat or fish prepared under the broiler. A small piece of baked potato. Some fresh or frozen vegetables. Lettuce salad with olive oil and vinegar dressing. Fruit. Milk.

For dinner

Smaller portions of what I ate for lunch. Meat, vegetables, fruit. Milk.

I exercise every day. I weigh myself weekly and if I am gaining weight, I eat less for the next 3-4 days. (That is the best way to lose weight. If I am losing weight, I treat myself to a dessert of ice cream or cherry pie.

Conclusion

Current US dietary recommendations are maintaining a higher rate of death from coronary heart disease than France, Japan and the Mediterranean Southern European countries. A diet low in dietary cholesterol and in fats that raise blood cholesterol will not provide long-term prevention of coronary heart disease.

Protein from animal products normally needs to be in the diet because this contains all the essential amino acids and essential fatty acids, and has the best biological value. Reducing dietary cholesterol intake to a level at or below 200 mg a day will result in a less nutritious diet for most people. A diet low in dietary cholesterol and cholesterol-raising fats is likely to be deficient in protein, vitamins and minerals. Reducing saturated fats and increasing polyunsaturated fats will increase the level of omega 6 fatty acids, creating an unhealthy imbalance in omega 6/omega 3 ratios.

References

1 World Health Ranking. *Coronary Heart Disease*. http://www.worldlifeexpectancy .com/cause-of-death/coronary-heart-disease/by-country

2 de Logeril M *et al*.. Mediterranean diet and the French paradox: Two distinct biogeographic concepts for one consolidated scientific theory on the role of nutrition in coronary heart disease. *Cardiovascular Res*earch 2001;**54**:503-515.

3 Rozin P, Fischler C, Imada S, Sarubin A, Wrzesniewski A. Attitudes to food and the role of food in life in the USA, Japan, Flemish Belgium and France: possible implications for the Diet-Health debate. *Appetite* 1999; **33**:163-180.

4 Ferrieres J. The French paradox; lessons for other countries. *Heart* 2004; **90**:107-111.

5 Steinberg D. *Cholesterol Wars*. San Diego CA: Academic Press,.2007.

6 Okuyama H, Ichikawa Y, Sun Y, Hamazaki T, Lands WEM. *Prevention of Coronary Heart Disease*. Basel: Karger. 2007.

7 Okuyama H, Kobayashi T, Watanabe S. Dietary Fatty Acids - The n-6/n-3 balance and chronic elderly diseases. Excess linoleic acid and relative n-3 deficiency syndrome seen in Japan. *Progress in Lipid Research* 1997;**35**:409-457.

8 Economic Research Service, USDA, *Oil Crops Yearbook* and *U.S. Fats and Oils Statistics, 1909-65. Statistical Bulletin* #3.

9 Meltzer JB, Frankel EN, Bessler TR, Perkins EG. Analysis of thermally abused soybean oils for cyclic monomers. *Journal of the American Oil Chemists Society* 1981;**58**:779-784.

10 Iwaoka WT, Perkins EG. Metabolism and lipogenic effects of the cyclic monomers of methyl linolinate in the rat. *Journal of the American Oil Chemists Society* 1978;**55**:734-738.

11 Zhou Q, Smith TL, Kummerow FA. Cytotoxicity of oxysterols on cultured smooth muscle cells from umbilical arteries. *Proceedings of the Society of Experimental Biology* 1993; **202**:75-80.

12 Kummerow FA, Cook LS, Wasowicz E, Jelen H. Changes in the phospholipid composition of the arterial cell can result in severe atherosclerotic lesions. *Journal of Nutritional Biochemistry* 2001;**12**:602-607.

13 Blakeslee S. Surgeon questions cholesterol role. *New York Times,* 9 April 1987. http://www.nytimes.com/1987/04/09/us/surgeon-questions-cholesterol-role.html
14 Shah DO, Schullman JH. Interaction of calcium ions with lecithin and sphingomyelin monolayers. *Lipids*. 1967;**2**:21-27.
15 Stender S, Astrup A, Dyerberg J. Tracing artificial trans fat in popular foods in Europe: a market basket investigation. *BMJ Open* 2014;**4**;e0005218.doi:10.1136/bmjopen-2014-005218.
16 Kummerow FA, Mahfouz M, Zhou Q, Masterjohn C. The effects of *trans* fats on prostacyclin production. *Scandinavian Cardiovascular Journal* 2013;**47**:377-382.
17 US Food and Drug Administration. Food labeling: Trans fatty acids in nutrition labeling, nutrient content claims and health claims. *Federal Register* 2003;**68**: 41433-41506.
18 US Food and Drug Administration. Tentative determination on partially hydrogenated oils. *Federal Register*. http://www.federalregister.gov/articles/2013/11/08/2013-26854/
19 Grundy SM, Becker D, Clark LT, Cooper RS, Denke MA, Howard WJ, *et al. National Cholesterol Education Program Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults*. *Circulation* 2002;**160**:3145-3421.
20 Western pattern diet. en.wikipedia.org/wiki/Western pattern diet.
21 Lendgren FT, Nichols AV. *Plasma Proteins*. New York: Academic Press, 1960.
22 Kummerow FA, Kummerow JM. *Cholesterol is not the Culprit*. Charleston SC: Spacedoc Media, 2014.
23 Gillinov M, Nissen S. *Heart 411: The Only Guide to Heart Health You'll Ever Need*. NY: Three Rivers, 2012.
24 Lehninger AL. *Biochemistry: The Molecular Basis of Cell Structure and Function*. New York: Worth. 1970.

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