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The Failure of the Fat Avoidance Diet

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## Introduction

The first formal study documenting an association between high fat diets and coronary artery disease was conducted in Java in 1907 (1). In his study, De Langen found much higher levels of atherosclerosis in the Dutch settlers of Java, who consumed a high fat diet, than in the native Javanese, who consumed a low fat diet. Since then, relationships have been established between high fat diets and obesity, non-insulin dependent diabetes, and certain forms of cancer (2). In the United States, these findings have resulted in changes in dietary recommendations, cultural definitions of ideal body shape, available food choices, and dietary behavior. The dominant dietary advice has been to replace foods high in fat with foods high in carbohydrates (3). The result has been the rise of the fat avoidance diet, succinctly represented by the dietary philosophy "I'll eat it as long as it doesn't have any fat," and symbolized by recent developments such as no fat ice cream, zero fat cheesecake, and non-fat potato chips. These dietary changes have caused a reduction in energy intake from fat from 40% to 33% from the 1960s to 1995 (1). Consequently, serum cholesterol levels, which are an important risk factor for coronary disease, and mortality due to coronary disease have both decreased during the same time period (1,4,5).

In itself, the decrease in dietary fat content and the associated decrease in coronary disease mortality since the 1960s represent the last stages of a process in which scientific findings inform policy and cause a positive behavioral change in a population. But the broader picture is less simple and less positive. Although coronary mortality has declined, obesity is now considered among the most important medical problems in the US today, with 1 in 4 children and 1 in 2 adults overweight, an increase of 50% since the 1960s (4,6). Morbidity and mortality from non-insulin dependent diabetes and asthma, two diseases that are closely associated with obesity, have also increased significantly in the past 40 years (7,8). In this paper, I will explain why the dietary strategy of fat avoidance has only had a moderate effect on the incidence of coronary heart disease and has failed to reverse the obesity epidemic and the health problems with which obesity is associated.

## Decrease in HDL cholesterol

The fat avoidance dietary strategy has resulted in a shift to increased consumption of carbohydrates (3). This shift is a cause of concern because diets low in fat and high in carbohydrates have lower levels of both LDL and HDL cholesterol. Although the reduction in LDL and overall cholesterol levels is laudable and has almost certainly contributed to the decrease in mortality due to coronary disease, the reduction in HDL is a problem because HDL cholesterol has a protective effect on the heart by reducing atherogenesis. Hence, lowering HDL usually increases coronary artery disease risk (3,9). Although the net effect of the decrease in dietary fat has been to decrease coronary heart disease (CHD) mortality, the benefits of dietary change would have been greater if, instead of reducing consumption of all types of fat, individuals consumed greater amounts of monounsaturated and polyunsaturated fat and less saturated fat. Given the evidence that HDL cholesterol protects the heart and given the availability of HDL cholesterol in such products as olive oil, a doctor who told her patient to reduce fat intake in order to reduce CHD risk without encouraging an increase in the consumption of monounsaturated and polyunsaturated fats would be doing her patient a disservice. This is the first of the disservices resulting from the fat avoidance dietary strategy.

### Increase in Dietary Glycemic Index

A second problem with the shift from fats to carbohydrates is that dietary fat has been replaced by refined grain products and concentrated sugars, both of which have a high glycemic index (10). Foods with a high glycemic index such as potatoes and white bread cause a greater insulin response when consumed. It is hypothesized that this increased insulin response directs nutrients away from oxidation in muscle and toward storage in fats. This hypothesis is supported by evidence that rats pretreated with insulin preferentially transfer glucose to adipose tissue. Additionally, Pima Indian children with elevated fasting insulin levels gain more weight than children with normal insulin levels (10). Ludwig conducted a study in order to test the effects of high and low glycemic index diets. He found that high glycemic index diets caused higher insulin release, greater reactive hypoglycemia, and greater energy consumption in the period following the high glycemic index meal than did low glycemic index diets. The conclusion drawn by Ludwig is that the rise in obesity is partly due to the rise in the consumption of high glycemic index foods. In this light, the shift from dietary fat to dietary carbohydrates may be partly responsible for the increase in obesity that has occurred in the US since the 1960s.

### Decrease in Satiation

A third question that needs to be addressed is whether fats or carbohydrates are more effective in satisfying hunger. Separate studies reported by Rolls and McCrory et al. found that the amount of food consumed is dependent primarily on the food's palatability and on its energy density, not on its fat content (11,12). Subjects provided with a high energy density diet consumed more calories than subjects provided with low energy diets. Stated another way, the weight of food consumed on a daily basis was the same amongst subjects regardless of the energy density or fat content of the food. As a result, high energy density diets led to higher caloric intake.

What does this research tell us about the effectiveness of the fat avoidance diet? Given that people tend to consume the same weight of food each day, foods with a high water and fiber content such as fruits and vegetables are the best way to reduce caloric intake. Although pure fat has a higher energy density than pure carbohydrates, many of the commercially available low fat foods have the same energy density as high fat foods because of their concentrated sugar, reduced fiber, and low water content. If these studies on satiation (the amount eaten in a meal) and satiety (the effect on subsequent intake) are reflective of the US population as whole, simply shifting from high energy density fatty foods to high energy density carbohydrates is not an effective way to prevent weight gain. Instead, an increase in the consumption of foods such as fruits and vegetables with a high fiber and water content would be expected to reduce caloric intake and reduce the prevalence of obesity.

### Decrease in Caloric Intake

As explained in the introduction, the push to reduce dietary fat began as an effort to reduce CHD risk factors and was successful in this regard. But as the prevalence of obesity and morbidity and mortality associated with obesity grew during the past 40 years, the need to reduce caloric intake became a central motive behind the push to decrease dietary fat. Reducing dietary fat is a logical means of preventing obesity because high fat foods tend to have a high energy density and are extremely palatable (13). Did this approach work? The answer is both yes and no. Yes, the

amount of dietary fat consumed by Americans has decreased, and yes, the average caloric intake has decreased (14). But no, these decreases have not prevented an increase in obesity and associated morbidity and mortality (14). This no, this rise in the prevalence of obesity despite a decrease in fat intake and caloric consumption is the most poignant indicator that the gospel of fat avoidance has failed to protect the health of the US population.

Because weight gain is proportional to energy intake minus energy consumed, for weight gain to occur while energy intake has declined requires an even greater decrease in energy consumption. This observation leads us to the conclusion that the explanation for the increase in obesity is the dramatic fall in the physical activity of the US population (14). Before considering the importance of exercise on health, I would like to remind the reader that the importance of exercise is not independent of the role of diet. Ludwig's observation that high glycemic index foods cause glucose transfer to adipose tissue and cause hypoglycemia, indicate that the over consumption of certain types of carbohydrates may significantly decrease physical activity rates by decreasing energy available to exercise. In describing the importance of exercise I am not saying that diet is unimportant.

### Failure to Emphasize Exercise

One of the most serious short falls in health policy during the past half century has been the failure to recognize exercise as a central component of human health. Exercise is important because it is a primary determinant of energy consumption and body weight. Not only does exercise tend to decrease body weight, exercise also causes an increase in HDL cholesterol, the form of cholesterol which protects against CHD (15). Similarly, a recent study by Votruba et al. found that exercise rates above 2,500 kcal/wk were an important determinant of maintaining weight loss (16).

The prevailing dietary philosophy of fat avoidance could have been coupled with an aggressive campaign to maintain physical activity levels; it wasn't. A study by Walsh et al. of 326 doctors working in the US found that only 14% of doctors prescribed exercise for more than half their patients (17). In the same study, physicians aged 35 and over asked about, counseled, and prescribed exercise at significantly higher rates than their younger peers. These latter results indicate that the trend towards decreased emphasis on exercise is likely to continue. Emphasis on fat avoidance is not the direct cause of the decrease in physical activity, but may have contributed to the decrease. As explained by Katan et al. in an article entitled Beyond Low Fat Diets, "the intense focus on total fat intake...distracts individuals from lifestyle changes that can have real benefits" (3).

### A New Dietary Philosophy

Dietary fat avoidance, born out of an interest in reducing total cholesterol in order to reduce CHD risk has become a central tenet of the American diet. Although reducing dietary fat was well intentioned, the increase in the prevalence of obesity and morbidity and mortality from obesity-related diseases that has occurred since the 1960s indicates that this approach is insufficient to protect the health of the US population. Although there is no reason to increase dietary fat consumption above current levels of 33% of energy intake, there is an urgent need to: 1) increase emphasis on consumption of mono and polyunsaturated fats as opposed to saturated fats; 2) increase consumption of fruits and vegetables which are high in fiber, have a low

glycemic index, and a low energy density; 3) increase levels of physical activity. Ludwig has suggested that rather than focus on restricting fat intake in order to reduce energy intake and balance overall energy consumption, an attempt should be made to maintain a pattern of diet and exercise reflective of our pre-historic life (11). Given the rise in the prevalence of obesity and associated diseases despite a decrease in energy intake that has occurred over the past 20 years in the US, an aggressive campaign to further modify the diet and to increase physical activity levels is warranted. Clearly, fat avoidance has not been sufficient to address the problem.

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