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**Part 2**

INSTITUTO DE NUTRICION  
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PANAMA  
GUATEMALA, C. A.

**MEASURING the RISK  
of  
CORONARY HEART DISEASE  
in  
ADULT POPULATION GROUPS**

**A Symposium**

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## Discussion

### Implications to the Nutritionist

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✻ I appreciate the opportunity to comment specifically on the nutritional implications of the epidemiological studies of coronary heart disease conducted in four areas of the United States and presented at this symposium.

Dr. Paul White in his opening remarks stressed the importance of the epidemiological approach to coronary heart disease and gave some examples of the way in which epidemiological comparisons can furnish evidence for the role of a number of potential factors. You will note that he stressed the importance of world-wide studies of the frequency of this type of heart disease in populations with widely different ways of life, including varied dietary habits.

Our United States population in diet and even in activity, stress, and certain other factors of possible importance is remarkably homogeneous in comparison with the total range of human living conditions in our contemporary world. Dr. White also pointed out the major service which Dr. Ancel Keys has done in emphasizing for a number of years that the real clues to the solution of the coronary heart disease problems are likely to come from studying the different frequency of the disease and its manifestations in populations that differ in their modes of life. Obesity is perhaps an exception in that it can be studied within the United States samples, but it can be shown statistically that eliminating all obesity would effect only a relatively small proportion of the total problem of coronary heart disease in the United States.

From the point of view of the nutritionist, therefore, much of the value of the epidemiological studies that have been described this afternoon will come when they are compared with similar studies elsewhere.

Perhaps I am particularly conscious of this because I am working in an area, Central America, in which the majority of the people are essentially free of coronary heart disease (an immunity unfortunately not shared by either United States consultants or the more privileged local groups—physicians, lawyers, and other business and professional persons). For some time I, too, suspected that inadequate statistics might explain much of the reported lower incidence of coronary heart disease in many so-called “under-developed areas.” However, as Dr. Francisco Grande reviewed this morning, there is now sufficient proof that many of the differences are real.

A convincing example is the recent work of Dr. Carlos Tejada, pathologist of the Institute of Nutrition of Central America and Panama, together with Dr. Ira Gore, pathologist of the Department of Nutrition of the Harvard School of Public Health.<sup>1</sup> They were able to examine within a single month, approximately 600 aortas accumulated from persons dying in New Orleans Charity Hospital, 300 dying in the General Hospital in Guatemala and, therefore, belonging to the low income group.

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The differences between the Central Americans and North Americans were spectacular.

Every type of aortic atherosclerotic lesion began earlier and subsequently involved a more extensive area at each decade of age in the New Orleans material. Hemorrhagic, ulcerated, necrotic and calcified lesions began to be present to a significant degree after age 30 and increased rapidly after age 40 in the New Orleans aortas. In the Guatemalan ones, they did not begin until age 50 and increased moderately after age 60. In other words, the people of New Orleans acquired a given degree of surface involvement with severe aortic lesions at least 20 years of age earlier than the Guatemalans.

While these data refer only to aortic lesions, it is striking that there were 51 cases of myocardial infarction in the New Orleans study group and only one in the Guatemalans included in the study.

I should add that racial differences do not serve to explain the findings since they appear grossly similar in more than 200 Costa Rican aortas that are now under study. Although the Guatemalan population is partially Mayan Indian in origin, the Costa Rican people by history, appearance and major blood group distribution are of European ancestry.

When one sees results like these, the conclusion is inescapable that environmental factors are responsible for differences, such as these between lower income Central Americans and the general population in the United States, and almost certainly the factor or factors when identified fully will prove to be largely within our control.

The major dietary differences lie in the amount and kinds of fat and protein. The Central Americans were receiving an average of not more than 15 per cent in their diets; the persons in New Orleans were probably consuming closer to 40 per cent of their calories from this source. The Central Americans also

consumed much more vegetable and less animal protein and were more active physically. Their caloric intake may in some cases have been slightly higher but they were decidedly leaner. (Whether they were under any less psychological stress is highly debatable.) The point which I wish to emphasize is that a careful comparison of both the epidemiology of coronary heart disease and the prevalent environmental influences in two such different populations should be most fruitful.

A study appeared recently in the *Journal of Nutrition* which illustrates the fallacy of drawing sweeping negative conclusions from the study of a single group with small internal variations in the factors analyzed.<sup>2</sup> The variable happened to be serum cholesterol and not coronary heart disease, but the principle demonstrated would be the same in either case. The authors concluded that neither fat nor protein in the diet had any influence on serum cholesterol in women. However, the cholesterol groups began at 160 mg per cent; the percentage of calories from fat within these groups ranged only from 37.5 to 43 per cent and the variation in protein was even less. With a standard deviation for percentage of calories from fat of 5 per cent, it is unlikely that a single person in their study group even approached the mean percentage of calories from fat of 8 per cent encountered in rural Guatemala or for that matter had serum cholesterol values approximating the mean value of 130 mg per cent for rural Guatemalan males age 20 to 29.<sup>3</sup> How much more useful their data are for comparison with groups in other areas with the 8 per cent or even 15 or 20 per cent of calories from fat, for there are many such groups in the world. Certainly their conclusions, while statistically valid within their sample, have no meaning in terms of the basic question—does serum cholesterol vary with dietary fat within

the range of the common human diet?

When we examine the nutritional implications of epidemiological studies of coronary heart disease in widely differing areas, there are reasonable grounds for believing dietary factors to be of major importance. To go further than this is to enter into controversy. Certainly there is increasing evidence to suggest that fat is involved, but as a recent editorial in *Lancet*<sup>4</sup> warns: "Noxious processes must persist for long periods before overt disease is manifest. In this type of research the unit of time is the decade." Moreover, there are a number of apparent exceptions to the fat hypothesis. It is true that ones such as the often maligned Eskimos and the relatively low incidence in the populations of Scandinavia are being explained by better epidemiological data or by the increasing attention given to the kind as well as the amount of fat. Not all of the apparent exceptions, however, have as yet been satisfactorily explained.

The work on the relative influence of unsaturated dietary fat, or at least fat relatively rich in essential fatty acids, was ably reviewed and discussed in the Food and Nutrition Section session this morning. Certainly, the work in Canada so impressively presented by Dr. J. M. R. Beveridge this morning together with that of Ahrens in New York, Kinsell in California, and Bronte-Stewart in South Africa shows that the kind of fat does influence serum cholesterol in relatively short-term experiments. But there is no positive assurance as yet as to the long-term results which would be obtained from such studies. Obviously, there are few direct nutritional implications in the studies presented this afternoon unless they are interpreted in the light of the world picture.

In general, because of the great interest which has been aroused in the problem of diet in relation to atherosclerosis and the far-reaching repercus-

sions which premature pronouncements might engender, the public health profession must use great care in evaluating the available data. A year ago, the World Health Organization convened in Geneva a study group on atherosclerosis composed of nearly two dozen experienced workers in various aspects of the problem from a number of countries. I believe that the conclusion of this group must still guide us today—namely, that there is not yet sufficient information or agreement on its interpretation on which to base public health programs aimed at the prevention of ischemic heart disease. The group, of course, agreed that obesity per se was undesirable, whether or not it influenced coronary heart disease, and there are other recommendations which we may wish to follow as individuals or even prescribe to patients, but we certainly cannot at this time embark with confidence on an attempt to bring about mass changes in food habits.

There is, however, every reason to believe that epidemiological studies of the type presented this afternoon, especially when carried out in many parts of the world will make possible definitive answers in a few years. It is then probable that we will have a double problem of application, one of bringing about desirable changes in the habits of more privileged groups and protecting those less privileged from changes which will increase their risk of coronary heart disease.

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## Summary

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✿ I would like first to present a reverse twist to Dr. White's presentation and say that the epidemiologist needs to turn to the cardiologist. I say this because the major problems in the study of the epidemiology of coronary disease today are numerator problems, as was amply demonstrated by the other four papers on this panel. It is now impossible to get a definition of coronary artery disease which permits a clear separation between those with the disease and those without. Here the epidemiologist clearly needs the help of the clinical and laboratory cardiologists.

However, the four papers did show that application of the methodology we now have to population groups in Los Angeles, Calif., Albany, N. Y., and Framingham, Mass., has come up with fairly consistent and uniform prevalence and incidence rates of overt coronary disease in those age groups which can be compared. It may be that this methodology which, in its present state, does not clearly separate all the diseased from the well is reproducible enough that it can be used as a tool to produce an index of coronary disease in populations. Such an index could be used to study populations which differ by those characteristics thought to influence the occurrence of this disease.

These studies reported today undoubtedly will show and verify that certain characteristics of a population are associated with an increased incidence of coronary heart disease. Analysis of multiple characteristics, along the lines that were reported from the Framingham study, will, I think, eventually make it possible to accurately characterize a population in which susceptibility to coronary disease is very high. By the same token, highly resistant populations may be delineated.

Finally, I would like to draw your attention to the fact that three of the four studies reported on today were carried out by state and local health departments. This was expected since health departments, by their very nature, collect, analyze, and put to use information on health and disease. They are the logical sites for building population studies. I think we will see many other health departments embarking upon epidemiological studies of coronary disease, or for that matter all the chronic diseases, in the near future. I hope that this program has encouraged such an embarkation.

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