Effect of the Anti-Coronary Club Program on Coronary Heart Disease Risk-Factor Status

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A group of 814 men at large, 40 to 59 years old, have been placed in a diet relatively rich in polyunsaturated fatty acids. The study diet has significantly lowered the serum cholesterol levels and maintained these lower levels for periods as long as five years. The study protocol has also been effective in significantly reducing the incidence of obesity and hypertension during the first four years of study participation. Among a control group of 463 men of similar age, the prevalence of these conditions was stable. After the men had participated in the study for four years, the differences between the experimental and control groups in prevalence of these risk factors (obesity, hypertension, and hypercholesterolemia) were statistically significant. Accompanying these significant differences, a statistically significant difference was observed between the two groups in morbidity from new coronary heart disease.

The Anti-Coronary Club Study tests the hypothesis that adherence to a serum cholesterol-lowering diet will be associated with a decreased incidence of coronary heart disease. This project has been conducted by the Bureau of Nutrition of the New York City Department of Health since 1957. In previous reports the composition of the experimental diet (the “prudent diet”) has been described, and data have been presented which strongly suggest that adherence to this diet significantly lowers the level of serum cholesterol of both normal and overweight subjects with or without coronary disease.1-4

Concurrent with the long-term (five-year) maintenance of lowered serum cholesterol level, a progressive increase in the percent of linoleic acid in the depot fat of Anti-Coronary Club subjects has been observed.5 According to present knowledge, linoleic acid is an essential unsaturated fatty acid which can only be derived from dietary sources. This observed increase in depot fat linoleic acid therefore indicates that adherence to the study diet in relation to linoleic intake has been generally satisfactory.

Recent investigations of the effect of the experimental diet on serum vitamin E and A levels of study subjects have confirmed the nutritional adequacy of the diet with respect to these vitamins. Furthermore, it was found that long-term adherence to the study diet does not demonstrably increase serum triglyceride levels.6 Finally, data have been published indicating that our Anti-Coronary Club experimental subjects experienced a significant decrease in coronary heart disease incidence.7 In the light of this, it is of interest to investigate the changes occurring in the risk-factor status of the study experimental and control groups.

Method

Experimental Group.—Since the inception of the Anti-Coronary Club Study in June 1957, 1,091 male volunteers aged 40 to 59 years enlisted. The volunteers responded initially to a radio and press call for study participants. Subsequent volunteers were derived largely from referrals made by the original Anti-Coronary Club members. This report considers the 814 subjects of this total who were free of prior evidence of clinical coronary heart disease. The remaining 277 subjects have been excluded from this report because of a history of clinical or electrocardiographic evidence of coronary heart disease on entry to the study.

Table 1 shows that as of Dec 31, 1963, the end of the observation period regarding the occurrence of new coronary disease events for this report, 814 men had accumulated 2,857 person-years of experience while in an active status. Active status denotes regular attendance approximately every five weeks for venipuncture and serum cholesterol determinations and consultation with a nutritionist; every ten weeks for a clinical and nutrition review session by a panel of physicians; and a yearly medical history, with physical, laboratory, electrocardiographic, and roentgenographic examinations.
By the end of the observation period, 290 of the 814 subjects had lapsed into an inactive status in which they accumulated 1,482 additional person-years of experience. Subjects in inactive status were appraised annually as to health and nutritional status but did not return regularly to the Anti-Coronary Club for venipuncture, nutritionist, or physician panel sessions. For about two thirds of this inactive group this health status appraisal took the form of an annual physical and laboratory examination; in the remainder, communication was maintained by phone or by a mail questionnaire. It has been determined that in no case was the onset of a new coronary disease event the cause for the shift of a subject to inactive status.

Control Group.—The first objective of the Anti-Coronary Club was to determine whether the experimental or prudent diet was capable of lowering the serum cholesterol level and whether the experimental subjects would find the prudent diet palatable and be able to adhere to it. After sufficient time had passed and an affirmative answer to these questions had been obtained, a control group was enlisted for comparison with the experimental group regarding serum cholesterol changes and incidence of coronary heart disease.

Starting in 1959, the control group was recruited from men who had voluntarily appeared for examination at the cancer detection clinics of the New York City Department of Health. These subjects were considered similar to the experimental subjects in the specific sense that they showed health consciousness and were willing to participate in a department of health program. Potential control subjects were induced to participate in the study by the offer of an annual comprehensive cardiovascular examination as an additional routine service. This proposal was made to every male aged 40-59 attending the Cancer Detection Clinics; about one-third accepted. These were assigned to the study as controls. They were not told that they were part of a diet and heart disease study. The control group included in the analyses in this report consists of 463 subjects who showed no initial evidence of coronary heart disease, by the same criteria applied to the experimental group.

The validity of comparing coronary heart disease incidence in the experimental group consuming the study diet, and the control group maintaining its usual diet pattern, depends on the comparability of other factors such as demographic and risk factors associated with coronary heart disease as they exist in the two groups on entry. Accordingly, a detailed demographic analysis of the experimental and control groups was performed and described in a previous report. This analysis indicates that the significantly lower incidence observed in the experimental group compared with the total control group could not be ascribed to demographic differences between them.

The experimental and control groups were compared regarding entry levels of the three risk factors identified by the Framingham (Mass) study, i.e., hypercholesterolemia (serum cholesterol 260 mg/100 ml or more), hypertension (diastolic pressure of 95 mm Hg or more), and obesity (at least 15% more than optimum weight as presented in Metropolitan Life Insurance Co. tables of weight for height, build, and sex; further modified by subjective evaluation of panel of physicians on basis of skin-caliper measurements and appearance). The two groups were quite comparable regarding the proportion with initial hypercholesterolemia. However, the experimental group had higher proportions with initial obesity and hypertension than did the control group. In view of these findings, it would be expected that the experimental group might experience a higher frequency of coronary heart disease than the control group.

The Experimental Diet.—A basic principle of the study diet is to provide approximately equal quantities of the three types of fats: saturated, polyunsaturated, and monounsaturated. Beef, mutton, or pork is limited to four meals per week; poultry and veal consumed four or five times a week; and a minimum of four fish meals weekly are required. Butter and hydrogenated shortenings are replaced by a high P/S ratio margarine and a minimum of 1 oz of vegetable oil daily. (The P/S ratio, without consideration of technical qualifications, is substantially the amount of polyunsaturated fatty acids divided by the amount of saturated fatty acids present in a given diet pattern.) Ice cream, hard cheeses, and pastry are avoided. Skim milk is substituted for whole milk. The diet contains about 30% to 33% of total calories as fat with a ratio of polyunsaturated to saturated fatty acids of 1.25-1.50 compared to the P/S ratio of 0.3-0.4 for the American diet. The nutritionists emphasize inclusion of adequate amounts of citrus fruits, green vegetables, and grains and cereals in the diet. The overweight subjects were placed on a diet averaging 1,800 calories and containing 19% of the total calories as fat, and a P/S ratio of 0.6-0.7. When weight reduction was completed, this
was changed to the standard study diet by the addition of 1 oz of vegetable oil plus additional calories when needed from bread, nuts, fruits, and vegetables.

Food table analysis of the study diet pattern shows an upper limit of 400 mg of dietary cholesterol and 1.6 gm of dietary sodium.

Diagnostic Criteria.—The classification of new events representing myocardial infarction was that used by the Cooperative Study of the American Heart Association, which included the following categories: (1) myocardial infarction, definite; (2) myocardial infarction, definite by ECG alone; (3) coronary thrombosis, definite; (4) coronary sclerosis, definite by autopsy; (5) ECG abnormalities, definite, associated with coronary artery disease; (6) angina pectoris, definite with ECG changes; and (7) angina pectoris, definite, without ECG changes. The clinical and electrocardiographic criteria for new coronary events were based on those recommended by the New York Heart Association.10

The chief cardiologist of the project assigned a classification of "definite event" when in his judgment criteria for one of the above categories were met. He utilized data from the physical examination of subjects, mail and phone follow-up of inactive subjects, information reported by subjects and their associates, and records from the subjects' families, physicians, hospitalizations, and death certificates. The complete records on all such "definite" events were then submitted to another cardiologist whose sole function on the project was their critical review and evaluation. This cardiologist was not aware whether the record under review was that of an experimental or a control subject; however, submission of a record for his review inferred at least the suspicion of possible pathology.

Results

Serum Cholesterol.—The serum cholesterol level was determined by the Anderson-Keys modification of the method of Abell, Kendall, with a technical error of 2.5%.11,12

Figure 1 shows the trends in the average level of serum cholesterol of the 478 experimental subjects and 420 control subjects 40 to 59 years old still active in the experimental and control groups as of Dec 31, 1963. In the experimental group, a highly significant drop of about 30 mg/100 ml serum from an average initial level of 280 mg/100 ml was observed after one year in the study. Thereafter the concentration of serum cholesterol leveled off at about 225 mg/100 ml. In the control group the serum cholesterol level fell about 7 mg/100 ml during the first two years, but rose thereafter so that by the end of the fourth year, the latest for which data are available, the average level had returned to its initial concentration.

New Coronary Events, Incidence, and Mortality: Active Experimental Subjects Compared to Controls.—Table 1 shows data accrued by the experimental and control groups in terms of accumulated person-years of experience, number of confirmed new coronary events, and incidence rates per 100,000 person-years. During the 2,357 person-years of active experience accumulated by the 814 experimental subjects, eight new coronary events occurred. This represents an overall incidence rate of 339 per 100,000, comprised of the age-specific rates of 196 and 379 per 100,000 for the men 40 to 49 and 50 to 59 years old, respectively. Similarly, the 463 men of the control group in comparable age categories have accumulated 1,224 person-years of experience and 12 new coronary events, resulting in an overall incidence of 980 per 100,000, or 642 and 1,331 per 100,000 for the men 40 to 49 and 50 to 59 years old, respectively.

The incidence in the control group was thus more than three times as high as in the experimental group in each age category. The overall age-adjusted incidence rate in the experimental versus the control group was tested and found to be statistically significant at a level of 0.01 < P < 0.02.

Of the eight new coronary events among active experimental subjects, seven occurred during the 1,353 person-years of experience accumulated during the first two years of each individual's participation in the study. This is not significantly different from the expected number of nine based on the experience of the control group. Only one of these eight new events occurred among active experimental subjects during the 1,004 person-years of full participation accumulated subsequent to the first two years of an individual's participation when, presumably, the diet had a greater opportunity to exert its effect.

The number of new events available for this report is still too small for meaningful analysis by specific diagnostic criteria. However, we are re-
porting that eight new events in the experimental group involved six definite myocardial infarctions, one definite angina with ECG changes, and one definite angina without ECG changes, while the 12 new events in the control group involved six definite myocardial infarctions, four cases of definite angina with ECG changes, and two cases of definite angina without ECG changes. The relative incidence rate in the experimental group among those who were initially obese and then reduced may be compared with that for men who did not reduce as well as with the rate for those who entered at normal weight. Although the total number of new events is still small, the age-specific incidence rates among the initially obese and the initially normal weight in the experimental group are about the same.

Inactive Experimental Group.—As seen in Table 1, confirmed new coronary disease events have been detected among those in the experimental group who shifted to inactive status. The observed incidence rates by age group are 139 per 100,000 person-years of experience for the inactive 40-49 age group and 919 per 100,000 for the 50-59 group. The rate in the inactive 40-49 group is similar to the rate for fully participating experimental subjects in the same age group, while the rate in the inactive 50-59 group is between that for active experimental subjects and that for the control subjects, but closer to that for control subjects.

It is difficult to interpret precisely the findings in the inactive experimental group, since it is not known to what extent this group may have followed the study diet. Moreover, the detection of new coronary disease events which have occurred may not be as complete for this group as for the active experimental and control subjects. However, the incidence in this inactive experimental group is intermediate between that of the active experimental and control subjects. This suggests that the difference in incidence between the active experimental and control subjects may be due to the Anti-Coronary Club program.

Dropouts.—Of the 814 subjects who entered the experimental group, 478 remained active until the end of the observation period and 290 shifted to inactive status, as previously defined. The other 46 subjects are dropouts; that is, after a period of active status (averaging 15 months) they discontinued all contact with the study. The health status of these 46 dropouts was determined in June 1964 by mail questionnaire, telephone calls, and home visits. This process revealed that a death from coronary heart disease had occurred in one subject four years after he had dropped out of the study following less than a year's participation. A nonfatal coronary disease event was also reported for another subject, which occurred four years after he dropped out following four months' participation in the study. Of the remaining 44 dropouts, 42 were found to be alive and reportedly free of new coronary events; only two remain with unknown follow-up status.

Since only two new coronary events among dropouts from the experimental group were revealed by this process and these occurred in individuals with less than a year’s full participation in the study, the findings do not affect our interpretation of the significant difference in incidence between the active experimental and control subjects.

Among the 483 individuals who entered the control group, 43 subjects dropped out of the study. The health status of the control dropouts was determined by using the same procedures applied to the experimental group dropouts. Among the 43 dropouts, information was obtained on 26 subjects and no new events were reported. Although follow-up data in our controls are not as complete as in the experimental group, any additional new coronary events which may have occurred among control dropouts remaining with status unknown could only have accentuated the difference already observed in coronary heart disease incidence between the experimental and control groups.

Deaths From Coronary Heart Disease.—Of the eight subjects with new coronary disease events in the fully participating experimental group, three died of coronary heart disease, one died of other causes, and the other four were still alive at the end of the observation period. Of the seven detected cases with new events in the inactive experimental group, all of which were definite myocardial infarctions, five died of coronary heart disease and the other two were still alive at the end of the observation period. These are not unusual case fatality rates from this disease over the period of time involved, particularly in such small series with substantial chance variation in the rates.

Of the 12 cases with new coronary disease events in the control group, all were still alive at the end of the observation period. This does appear somewhat unusual, although again the series is small. It was previously mentioned that the control group had initially lower rates of obesity and hypertension than the experimental group. Perhaps these differences contributed to the higher survivorship of the subjects with new coronary disease in the control group. Further analysis of

<table>
<thead>
<tr>
<th>Risk Factors</th>
<th>Experimental</th>
<th>Control</th>
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<tbody>
<tr>
<td>None</td>
<td>Entry 2 yr 4 yr</td>
<td>Entry 2 yr 4 yr</td>
</tr>
<tr>
<td>Hypercholesterolemia</td>
<td>42.8 20.9 19.9</td>
<td>36.3 35.4 32.2</td>
</tr>
<tr>
<td>Obesity</td>
<td>56.3 17.8</td>
<td>45.3 46.8 44.3</td>
</tr>
<tr>
<td>Hypertension</td>
<td>25.9 9.9</td>
<td>10.9 11.1 13.1</td>
</tr>
<tr>
<td>Mino</td>
<td>16.6 9.9</td>
<td>34.0 35.4 32.3</td>
</tr>
<tr>
<td>Any one</td>
<td>46.4 31.6 34.6</td>
<td>40.1 33.2 32.5</td>
</tr>
<tr>
<td>Any two</td>
<td>52.6 5.5 6.9</td>
<td>22.5 18.2 17.9</td>
</tr>
<tr>
<td>All three</td>
<td>4.5 1.6 8.3</td>
<td>2.0 2.4 3.2</td>
</tr>
</tbody>
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*Serum cholesterol of 250 mg/100 ml serum or more.
**Body weight within 15% more than 190 lb. or within 15% less than the Metropolitan Life Insurance Co. table weight for height and sex.
***Systolic pressure of 140 mm Hg or more.

Table 2.—Percent of Risk Factors Among 332 Experimental and 329 Control Subjects at Entry and After Two and Four Years

JAMA, Nov 7, 1966 • Vol 196, No 6
In the experimental group, the prevalence of these risk factors decreased substantially after two years and remain depressed after four years. The prevalence of hypercholesterolemia declines from about 43% to about 20%, that of hypertension from about 26% to about 11%, while the proportion of obese subjects drops from 56% to 16%. It should be noted that the initial prevalence of these risk factors for the experimental group was higher in each instance. Figure 2 presents the distribution of the subjects in the experimental and control groups by the number of risk factors present for the same periods of observation. In the control group, the distributions of the number of risk factors present after two and four years of observation have remained substantially the same as that observed initially. By contrast, the proportion of the experimental group with one or more of the risk factors has been a significant reduction in the number of subjects exhibiting a single risk factor, the most impressive changes are the decreased numbers of subjects with multiple risk factors and the increased number with none. At the time of entry to the study, 32% of the experimental subjects exhibited at least two of the risk factors considered here, while only 17% had none; two and four years later, these proportions had changed to about 6% and 60%, respectively.

The factor of obesity is worthy of more detailed analysis since both hypercholesterolemia and hypertension may be related etiologically or pathologically with this condition. The prevalence of hypercholesterolemia and hypertension according to the presence of obesity on entry and after four years of observation is examined in Table 3.

On entry to the study, 187 of 332 experimental subjects were obese (56.3%); while of the 329 control subjects, 149 (45.3%) were initially obese. Of the obese experimental group subjects, 41.7% were hypercholesterolemic and 25.1% hypertensive compared to 45.8% and 16.1%, respectively, in obese subjects who entered the ranks of the control group. Among the normal-weight experimental subjects, 44.1% were hypercholesterolemic and 25.9% hypertensive, compared to 33.9% hypercholesterolemic and 6.7% hypertensive among the controls of similar weight status.

After four years of participation in the study, 57 men (17.2%) of the experimental group were obese; 53 belonged to the 187 men initially obese while the remaining four had been initially of normal weight.

coronary heart disease deaths will be made as follow-up of the group continues.

Deaths From Other Causes.—Among the 814 original experimental group subjects, there have been 18 known deaths from causes other than coronary heart disease during fully participating or inactive status among individuals who had not experienced a new coronary event, compared to 6 such deaths among the individuals in the control group. The rates for these deaths in the 50-59 age group were 689 per 100,000 person-years in the experimental group, and 666 per 100,000 in the control group. The difference between these two rates is slight and not statistically significant.

Changes in Risk-Factor Status Resulting From Study Participation.—Since the incidence of coronary heart disease of the experimental subjects was significantly lower than that of the control group during their period of participation in the study, it is of interest and importance to recognize the changes which took place in their status with respect to the three risk factors considered in this study. For the 332 subjects in the active experimental group and the 329 subjects in the control group who participated in the study for four years or more, risk factor status was compared at time of entry to the study, after two years, and after four years of participation.

Table 2 indicates that the prevalence of hypercholesterolemia, obesity, and hypertension initially observed in the control group remained at substantially the same level after two years and four years of observation. On entry to the study, approximately 46% of subjects were obese and 11% were hypertensive. The somewhat more variable proportions of subjects with hypercholesterolemia were 30% and 32% after two and four years, respectively, and may represent an additional manifestation of the slight downward trend observed initially, followed by rebound upward of the serum cholesterol level of the control group shown in Fig 1.
By contrast, 145 men in the control group were obese after four years; 129 were derived from the group of 149 initially obese while 16 of the initially normal weight had become obese.

Among the experimental subjects after four years, the prevalence of hypercholesterolemia and hypertension in the obese and normal-weight subjects were substantially the same. In the control group after four years, the proportion of normal-weight subjects with hypercholesterolemia was about the same as at the time of entry. However, among those obese after four years, the proportion hypercholesterolemic (32.4%) was significantly lower \( (P=0.06) \) than the proportion of obese men hypercholesterolemic at entry (43.6%). Despite this, the proportion of hypercholesterolemic men in the experimental group after four years was significantly lower \( (P<0.01) \) than that in the control group at the similar period of observation, thus suggesting that the dietary protocol of the study was effective in lowering serum cholesterol levels without regard to initial or final weight status or change in weight status.

| Table 5.—Percent of Experimental and Control Groups Hypercholesterolemic and Hypertensive, by Weight Status |
|-----------------------------------------------|---------------|---------------|
| Weight Status          | At Entry | After 4 Years |               |
|                        | Experimental| Control | Experimental| Control |
| Obese, number         | 187      | 149     | 57           | 145     |
| % Hypercholesterolemic| 41.7     | 43.6    | 21.4         | 32.4    |
| % Hypertensive         | 25.1     | 15.1    | 8.8          | 20.0    |
| Normal, number         | 145      | 180     | 278          | 164     |
| % Hypercholesterolemic| 44.3     | 33.9    | 19.6         | 32.1    |
| % Hypertensive         | 26.9     | 6.7     | 9.5          | 7.6     |
| Total, Number          | 332      | 329     | 332          | 329     |

With respect to hypertension, the total control group had significantly fewer hypertensive subjects at time of entry \( (P<0.001) \) than the comparable study subjects. However, after four years of observation, the proportion of hypertensive subjects in the total experimental group had decreased significantly \( (P<0.001) \) from entry levels and was even lower than the proportion with hypertension in the control group at the same time of observation although this latter difference was not statistically significant \( (P=0.13) \).

In addition to changes in the prevalence of obesity, hypercholesterolemia, and hypertension described above, a study was made of the cigarette smoking habits of all 478 active experimental and 480 active control subjects considered in this report. The distribution of the number of cigarettes smoked at time of entry to the study is shown in Table 4. Both groups contained a relatively large number of non-smokers and, although there was a slight tendency for the experimental group to smoke more, the differences between the experimental and control subjects could easily be explained by chance variations.

In order to make these estimates of cigarette smoking current, a survey was conducted of all comparable subjects with more than two years of participation in the study who appeared at the study facilities over a two-month period. This group consisted of 195 experimental and 180 control subjects and each was questioned concerning the number of cigarettes smoked at the time. This amount was then compared to that claimed at the time of entry to the study. Table 5 shows the proportion in each group smoking more, the same, or less than the initial amount. Again, although there are seeming differences, these are not statistically significant. The smoking habits of the two groups have apparently remained comparable during the period of participation in the study.

| Table 4.—Percent Distribution of Active Experimental and Control Subjects by Number of Cigarettes Smoked per Day |
|---------------------------------------------------------------|---------------|---------------|
| Number of Cigarettes per Day                                      | Experimental | Control |
| None                             | 51.9          | 49.1          |
| 1-9                              | 9.7           | 10.2          |
| 10-29                            | 22.4          | 26.7          |
| 30-49                            | 11.0          | 12.1          |
| 50-69                            | 4.1           | 1.3           |
| Mean                             | 12.1          | 11.5          |
| No. of subjects                  | 478           | 420           |

*At time of entry to study.

The data presented indicate that the incidence of new coronary events among the initially coronary-free active group in the Anti-Coronary Club program was significantly lower than that among the control group, and also lower than incidence rates reported in studies\(^\text{13,14}\) of comparable age groups. It seems reasonable to attribute this difference primarily to the effects of the Anti-Coronary Club program with its major feature of supervised adherence to the prudent diet. The reasons for this conclusion are as follows:

1. The group of entrants into the experimental group had no initial predilection for reduced coronary heart disease incidence in comparison with the control group.
2. Those remaining in the active experimental group appear to have adhered to the prudent diet, as judged by regular and frequent interviews with the Anti-Coronary Club nutritionists and by progressive increase in the linoleic acid component of their depot fat.
3. A substantial and statistically significant de-
crease in serum cholesterol levels occurred during the first year of active status in the experimental group, and remained essentially stabilized at this lower level throughout the next six years of follow-up. The numbers of the control group, by comparison, showed no significant change by the end of the study period.

4. There was a substantial and statistically significant decrease in the incidence rate of new coronary events in experimental group subjects between the first two years of participation and the period from their third through sixth years of full participation, despite their increasing age. By contrast, the rate increased with the passage of time in the control group.

5. The incidence rate in the control group is not high in comparison to the incidence rates of the other prominent prospective studies already cited, indicating that the difference between the control group rate and that of the experimental group is not due to an unusually high rate in the control group.

Many important questions relevant to the effects of the Anti-Coronary Club program have not yet been finally answered. The number of new coronary events through the end of the observation period of this report is admittedly small; the follow-up of the experimental and control groups will continue. As additional data accumulate, more meaningful analysis will be possible on a number of questions. Among such questions are whether the relatively low incidence rate is maintained in the experimental group as participation continues, and whether the new coronary events which occur among long-term full participants in the experimental program can be related to other characteristics.

The prospective Framingham study has confirmed the association between the incidence of coronary heart disease and the presence of specific risk factors. Among these have been hypercholesterolemia, obesity, and hypertension. The identification of such risk factors constitutes a major advance in the effort to control the public health problem posed by coronary heart disease. It would therefore appear reasonable to attempt to control coronary heart disease morbidity and mortality by attacking these associated conditions.

A previous report has shown that the study diet is effective in lowering the serum cholesterol levels of middle-aged men and in maintaining lowered levels for periods as long as five years.1 The present report indicates that the protocol of the study was also effective in significantly reducing the incidence of obesity and hypertension among the subjects in the experimental group over their first four years of participation in the study. The incidence of these conditions in the control group was stable. A statistically significant difference in morbidity from coronary heart disease accompanied the highly significant differences between the experimental and control group in the incidence of these risk factors achieved after four years in the study.

The hypocholesterolemic effect of the study diet is based on well-established epidemiologic and laboratory evidence linking the levels of serum cholesterol with the type of fatty acid intake. The ability of the study diet to decrease the incidence of hypertension may be related to its lowered sodium content. The investigations of Dahl et al2 suggest that the dietary sodium intake may be related to the incidence of hypertension; however, an epidemiologic study failed to demonstrate inordinate use of salt by hypertensive subjects.3

The unusual degree of success in reducing the weight of our obese subjects followed by maintenance of normal weight may be attributable to the intense nutritional guidance given the subjects by the study's public health nutritionists. Normal-weight subjects as well as those in the weight reduction program are seen every six weeks at a minimum upon entry to the study. During the phase of weight reduction they are seen every week. Despite such concentration of personnel and effort to achieve the objectives of the study with respect to the lowering of serum cholesterol concentration and the reduction of weight of obese subjects, the elements of such a program seem worthy of consideration as a preventive medical program servicing the community. The practicing physician can use the serum cholesterol determination to screen his high-risk patients. Armed with knowledge, skill, and time, he can practice preventive medicine in his own office in an effort to reverse the risk factors affecting his patients.

The decrease in morbidity experienced by the experimental group could not be ascribed to any change in cigarette-smoking habits since investigation of this parameter indicated similar smoking patterns in the experimental and control groups both upon entry to the study and at the time of observation. The Anti-Coronary Club study protocol was limited to the effect of diet on coronary heart disease morbidity; it is also recognized that efforts to reduce risk factors not studied by our group, such as the establishment of psychic stress and lack of physical activity, could well contribute to further avenues of coronary heart disease control.

The American Medical Association4 has recognized the importance of controlling the level of serum cholesterol in high risk groups and has also suggested the need to control the risk represented by high serum cholesterol levels in the young adult. The American Heart Association5 has repeatedly emphasized the preventive role of diets that lower serum cholesterol concentration and has recently indicated that appropriate dietary changes for the public in general should be instituted. If the results described presently are confirmed by other prospective studies of the relationship between diet and heart disease now in progress, there is reason to hope that progress can be made in deterring the nation's paramount public health problem.
EMPLOYMENT OF CARDIAC PATIENT.—Most forward looking businesses today recognize that good medical programs save waste and dissipation of assets just as surely as auditors and accountants. That is the principal reason for the growth of medical departments in industry—from emergency service first aid stations to the well-equipped, expertly staffed organizations to better serve the needs of all members of an organization.

Specifically in the area of heart and circulatory disease, good corporate medical departments and industrial medical units make a number of highly important contributions.

First: When new people are employed, careful physical examinations can help place those with health problems in jobs where they can function without jeopardizing their health.

Second: Medical counseling has stepped up programs for periodic physical examinations of key employees, to detect health problems at an early stage, an extremely important part of the control of heart disease. At the same time these programs contribute to better mental health by alleviating anxiety and fear.

Third: After an employee has recovered from a heart attack, it is a basic responsibility of the company medical program to match the man to the job. This means that there must be a medical evaluation of the job itself, as well as an evaluation of the employee’s physical capabilities.

Our own experience shows that the employee who has received proper medical treatment for his cardiovascular problems, who is placed in a job with requirements not inconsistent with his regimen, will be above average in performance of his duty.

I recognize that many employers shy away from hiring the recovered cardiac. The primary reasons are probably lack of understanding and the fear of the severe financial risks to the employer who does so without assurance that such employees have received adequate medical treatment and are following good medical advice in their daily lives. Here again a good industrial medical program can help solve these problems.

This is an area where business and industry and the medical and health professions need to cooperate so that employers can expand their employment of post-cardiac people without adding unreasonably to their risks of workers’ compensation claims in the process.

With the average age of our work force increasing, the need for working with post-cardiacs will continue to increase. Solving these problems in one of the great challenges of occupational health and industrial medical programs.—Wright, J.S.: Industr Med Surg, 35:684-686 (Aug) 1966.