PREDICTIVE FACTORS FOR CORONARY HEART DISEASE IN THE YOUNG

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First some picture of acquired coronary disease in the young has been obtained by a review of published reports of autopsies performed on individuals who died from this condition under the age of 30 years. Unfortunately the data regarding risk factors was found to be too fragmentary to be useful. Fairly adequate descriptions of the pathological findings were available on only 26 cases. Seven of these were age 10 to 19 years including 5 males and 2 females, and 19 were age 20 to 29 years with 14 males and 5 females. Three in the age group 10-19 and seven of the 19 age 20-29 were stated to have been exercising at the onset of symptoms. The average heart weight was 361 grams for the five cases age 10-19 for whom heart weights were listed, and 344 grams for the ten cases age 20-29 on whom this information was available. The left anterior descending artery was described as showing major disease in four of those age 10-19 and ten of those age 20-29, the left circumflex artery was similarly involved in only two cases in each age group, and the right coronary artery showed major disease in four and eight cases respectively. No coronary arterial thrombi were observed in one of the seven cases age 10-19 and nine of those age 20-29. New infarcts were described in four of the seven cases age 10-19 with, surprisingly, old infarct in six of them. For the age group 20-29, seven were noted to have acute infarcts with two showing old areas of infarction. This relatively unsatisfactory material demonstrated a male dominance approximating 2.5 to 1, a possible association of the onset with exercise in slightly less than half the cases, a predilection for left anterior descending and right coronary artery involvement, an absence of thrombi in nearly half of the cases in the age group 20-29 and an absence of acute infarct in three of the seven youngest cases and 12 of the 19 older cases.

Second, we looked at cases of proven myocardial infarction seen in individuals under the age of 40 during the past two years, either at the U.S. Naval Hospital Great Lakes, Illinois, U.S.A., or at Northwestern Memorial Hospital, Chicago, Illinois, U.S.A. There were 19 such cases all males age 25-39 and as shown in Fig. 1 they have been compared with the findings in 1,548 males age 30-39 screened in the Chicago area by the Chicago Heart Association as part of a routine industrial screening examination. This latter material has been kindly supplied by Dr. Richard Shekelle. The striking finding was that 95% of the patients but 45% of the screened population were cigarette smokers. The serum cholesterol was higher in the coronary cases than the average for the screened population (which indeed showed a value lower than anticipated). The blood pressures were not very different although the diastolic pressures were higher in the coronary group. A family history positive prior to age 65 for cardiovascular disease or diabetes was found in approximately half of the coronary category. Thus this small but interesting population demonstrated a strong association with cigarette smoking some elevation of diastolic blood pressure and serum cholesterol as compared to a control population, and a positive family history in 47%.

Next we reviewed the prospective data pooled under the aegis of the American Heart Association for 10 year results coming from the Albany, Los Angeles, Minneapolis, Tecumseh and Chicago studies for coronary deaths and non-fatal myocardial infarct in white males age 30 to 39 on admission to the study. The data from 1,193 men indicated a 10 year rate of 106/10,000 for combined coronary deaths and non-fatal myocardial infarction for men with initial diastolic blood pressures of less than 85 mm of mercury compared with rates of 1,463 per/10,000 for those with initial pressures of 105 mm of mercury or more. If the initial serum cholesterol exceeded 254 mgm/dl, the 10 year rate for those with diastolic blood pressures less than 85 mm of mercury rose to 197 and for those with a diastolic blood pressure of 105 mm's of mercury rose to 2,000. For those who were cigarette smokers the 10 year rate for those with the lowest diastolic blood pressures were 131 and for those with the diastolic blood pressures of 105 mm of mercury or more were 1,538. Here too, in a prospective setting, it was clear that hypertension, hypercholesterolemia, and the cigarette habit were associated with the appearance of non-fatal and fatal coronary events, and that an increase in rates of tenfold or more was encountered with increases in the magnitude of the risk factor exposure.

	Findings in males (19) aged 25 - 39 at time of myocardial infarction	Findings in males (1548) aged 30 - 39 in urban screening program
Cardiovascular disease or diabetes in one or both parents prior to age 65 (%)	47	—
Average systolic pressure (mm Hg)	131	136
Average diastolic pressure (mm Hg)	88	82
Average cholesterol (mg/dl)	263	204
Average triglycerides (mg/dl)	181	—
Diagnosis of diabetes (%)	18	—
Cigarette smoker (%)	95	45

Fig. 1. Comparative findings in 19 young males aged 25-39 experiencing myocardial infarction and 1548 males aged 30-39 seen in routine urban screening program during same time period in the greater Chicago area.

Finally, it was indicated that because of the magnitude of the problem the Task Force on Arteriosclerosis of the National Heart and Lung Institute had recommended in 1971 the following: "The Task Force recommends a new concentration of effort to alert physicians concerning risk factors as they appear in childhood and young adulthood. A nationwide program of education should be developed to inculcate desirable habits of eating and physical activity. Motivational psychologists may be helpful in formulating simple programs for encouraging the avoidance of smoking and overweight". Other comments referred to the role of hypertension.

It has been asked if such a posture should indeed be taken at this time since there is still much to know regarding the natural history of coronary disease. There are still gaps in our knowledge concerning precursors of this condition especially in childhood and early adulthood life, and what should be done anyway if risk factors are encountered in the young and relatively young. The answers would seem to be that it is not essential to know the full evolution of coronary atherosclerosis to attempt to prevent it, and it indeed would seem to be dangerous merely to await such information before taking action. While there are major deficiencies in our knowledge of precursors to coronary disease in the young, the information now shows a remarkably

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consistent pattern indicating important associations with hyperlipidemia, hypertension, and cigarette smoking. A negative or neutral attitude towards intervention in the young adult shown to be at increased risk can only be justified if the proposed measures to modify such risk are unduly hazardous, show important detrimental effects on health or are excessively expensive. Since programs of education and counselling aimed at the cessation of cigarette smoking carry no such disadvantages they should surely be pursued. Since those with frank hyperlipidemia may have some amelioration of this process by a low saturated fat diet and optimal caloric diets similar to those consumed without identifiable harmful effects by countless thousands in many parts of the world, this approach also would appear above criticism. It is only in relation to the treatment of hypertension and hyperlipidemia in the young with pharmacological agents that valid objections may be raised. We do lack precise guide lines as to when to start treatment with drugs. We are conscious that the long term effect of pharmacological agents may not be visible for many years or even decades. We are conscious that certain agents (estrogens, lithium chloride, thalidomide, tolbutamide, and phenformin) have in recent years been shown to have quite unsuspected long term disadvantages. It is therefore in this area that the physician must exercise his best personal judgment and where continued long term investigation is sorely needed.