

## Screening of children with high familiar risk of arteriosclerosis

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Serum total cholesterol (TC), high density lipoprotein cholesterol (HDL-C), very low density lipoprotein cholesterol (VLDL-C) and total triglyceride levels were determined in children with high risk arteriosclerotic family history.

Significantly higher TC and lower HDL-C levels were found in children whose parents' first arteriosclerotic sign had appeared before 40 years of age. There were no similar significant alterations observed in children whose parents' first arteriosclerotic symptom appeared after the forties. Screening therefore seems to be necessary in the offsprings of patients if the first sign of arteriosclerosis has been detected before 40 years of age.

Numerous papers were published during the last 15 years about efforts to prevent the development of arteriosclerosis by the screening of children with enhanced familiar risk [2, 9, 15, 16]. It has been shown by retrospective studies that results of cord blood lipid measurements have no prognostic importance [6, 8, 12, 18]; screening of older children with high risk family history seemed to be a more useful programme [6, 13, 14, 20].

One of the risk factors is the arteriosclerosis of the parents. A stronger effect of genetic predisposition than that of both environmental and nutritional factors was found in families of patients whose first arteriosclerotic symptom appeared in early age [4]. Early appearance of the first sign of arteriosclerosis may fall between 40

to 60 years [3, 10, 13, 14, 20, 22]. The serum total cholesterol level (TC) was higher in children of these families than in the control ones [11, 13] but it was the consequence of the increased serum high density lipoprotein cholesterol (HDL-C) level in some cases [11, 13]. The high risk of the latter children seemed to be doubtful according to the negative correlation observed between the serum HDL-C content and the development of coronary heart disease (CHD) [5, 7, 17, 19].

The estimation of serum TC and HDL-C levels seems to be a useful method of screening. With searching for the age when the appearance of the first arteriosclerotic symptom of parents occurs early enough for a reliable study of genetic effects. The 40 years

of age of the parents seemed to be a useful limit in the present study.

## MATERIAL AND METHOD

The study population consisted of 78 children 2–18 years of age whose parents had CHD proven by coronary arteriography or by acute transmural myocardial infarction. Group 1 consisted of 22 children whose parents' illness was observed before their 40th year. Group 2 consisted of 56 children whose parents' first arteriosclerotic symptoms appeared after 40 years of age. The age-matched control group consisted of 23 (2–18 year old) healthy children without any high risk family history.

After an overnight fast, the blood of children was sampled from the cubital vein. Serum TC and total triglyceride (TT) levels were measured by Boehringer tests. After precipitation of the serum by polyethyleneglycol 6000, the cholesterol content of the supernatant was measured by the Boehringer CHOD-PAP test according to the serum HDL-C measurement method described by Allen et al [1]. Other aliquots of serum were precipitated by sodium duodecylsulphate, centrifuged and the cholesterol content of the lower phase was determined by the Boehringer CHOD-PAP

test according to the method described by Wilson and Spiger [21] who calculated the serum very low density lipoprotein cholesterol values (VLDL-C) from the difference between the serum TC level and the cholesterol content of this lower phase.

Statistical analysis was performed by Student's *t* test and the  $\chi^2$  test.

## RESULTS

The mean TC level of children whose parents' CHD was first observed before their forties (Group 1) was significantly higher than that of controls. The increase of the mean TC level of children whose parents' CHD appeared later was not significant. There was no difference in the mean serum TT levels (Fig. 1).

The mean serum HDL-C level in Group 1 was significantly lower than that in the control group. The serum HDL-C level of children in Group 2 was also lower, but the difference was not significant. There was no difference in the VLDL-C values (Fig. 2).

The significant difference observed in the serum HDL-C level of children

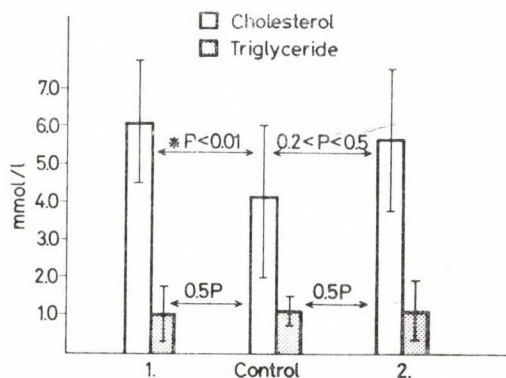


FIG. 1. Serum TC and TT levels of children in the different groups

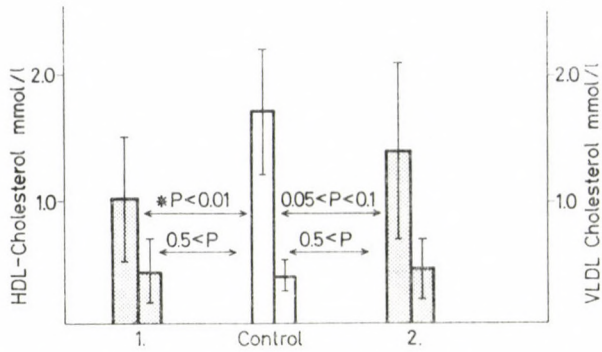


FIG. 2. Serum HDL-C (column 1)- and VLDL-C (column 2) levels of children in the different groups. Test groups are represented by dotted columns

TABLE I  
Serum TC and HDL-C content of control population

	Unit	n	Mean	S.D.	Min.	Max.	Percentiles				
							10%	25%	50%	75%	90%
TC	mmol/l	23	4.2	2.1	1.7	7.6	2.1	3.2	4.0	4.8	6.5
HDL-C	mmol/l	23	1.6	0.4	0.6	2.8	0.75	1.3	1.65	2.05	2.4

in Group 1 was remarkable in the age group under ten years. The standard deviation was very high in the group over ten years (Fig. 3).

The incidence of extremely high serum TC (above 90 centiles) and the extremely low serum HDL-C

(below 10 centiles) values showed that the frequency of extremely high TC or low HDL values was significantly higher in Group 1 than in the control group. Similar significant differences were not observed in children of Group 2 (Fig. 4).

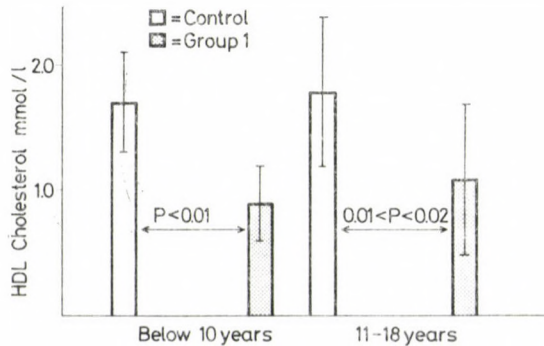


FIG. 3. Serum HDL-C values in group 1 according to the age of children

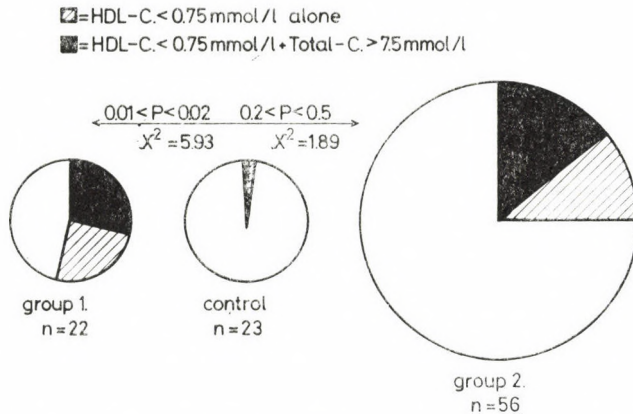


FIG. 4. Frequency of extremely low HDL-C values and/or the very high TC values in the serum of children in the different groups

## DISCUSSION

Significant alterations were observed in the serum TC and HDL-C levels of children whose parents' CHD had appeared under 40 years of age. More than half of these children had extremely low serum HDL-C levels with or without an extremely high serum TC level. There were no similar significant alterations in children whose parents' CHD appeared after their forties. The genetic effect on the serum HDL-C level observed by other authors [4] may explain these phenomena.

According to the results, the appearance of CHD under 40 years of age very often shows the high risk of arteriosclerosis in the offspring. The very low serum HDL-C values observed together with normal serum TC values suggest the great importance of estimating the serum HDL-C level in these cases.

The results suggest that screening and intervention are necessary in the offspring of patients if the first sign of CHD is detected under 40 years of age.

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