

DEATH DISCORDANT TWINS

A New Method to Evaluate Genetic Factors in Chronic Diseases

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At the international twin symposium in Puerto Rico in 1969, studies of mortality were considered of great importance and as valuable extensions; clinical examinations of the partners of deceased twins were suggested with a view to detecting any differences in disease prevalence between surviving MZ and DZ cotwins.

One important line of the research program for the Swedish Twin Registry is a continuous mortality follow-up of all the twins. From January 1971, information on deceased twins has been available every month, thereby permitting clinical examinations of the surviving cotwins reasonably soon after the death of the partners. This provided one of the prerequisites for a study on ischemic heart disease (IHD) in death discordant twins. The method used is presented for. It is concluded that this model can be applied not only to IHD but also to other chronic diseases.

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“EQUIVOCALNESS” AND OTHER EMPIRICAL METHODS IN ZYGOSITY ASSESSMENT

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Zygoty determination is generally carried out by different methods in small and respectively large twin samples.

The probability method of Penrose and Maynard-Smith, based on sex and biological markers, is limited to relatively small samples, as a consequence of its cost.

The empirical “two peas in a pod” questionnaire method, especially developed by Cederlöf, is applied in several large twin registers. Its margin of error is low enough for population studies, its cost is negligible,

but its accuracy is insufficient when zygosity of twin pairs included in definite samples must be individually assessed.

Efforts to bridge the distance between the two methods should be made, and they may take either direction: (1) find new, inexpensive biological markers with definite probabilities, or (2) increase the number and accuracy of empirical methods.

The accuracy of a number of empirical methods applied to a twin sample of established zygosity has been compared.

One modification of the “two peas in a pod” method, originally called “equivocality method” by Gedda, appears to warrant inclusion in questionnaire methodology. Also, compound probability as expressed by several empirical methods may reach an acceptable level of accuracy in zygosity assessment.

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BLOOD VESSELS OF THE TWIN PLACENTA IN RELATION TO ZYGOSITY

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In continuation of the earlier suggestion that anatomical characteristics of fetal blood vessels of the placenta are largely determined by functional demands, rather than genetic factors exclusively, 220 placentae (28 monochorial) from multiple pregnancies — including triplets, conjoined twins, and acardiac monsters — were injected with corrosion preparations. The anatomical characteristics of the arteries, veins, arterio-venous relationships, velamentous vessels, and vascular communications, were studied. The incidence of hydramnios and congenital defects, in relation to the placental component, was also recorded.

Practically all the anatomical characteristics of the blood vessels and their relationship in either component of the twin placenta showed discordance of varying degree, irrespective of zygosity, including that of the pattern in 44 dichorial placentae. Singular involvement of one component of the twin placenta by hydramnios or congenital anomalies; incidence of vascular communications and the anatomical characteristics of

the vessels in conjoined twins, acardiac monsters, and triplets; and presence of chromosomal discordance (21) in a pair of MZ twins, lends additional support to the initial surmise that the functional demands are largely responsible for the anatomical characteristics of fetal blood vessels of the placenta.

On the above basis, it is suggested that the inequalities of the prenatal environment be assessed by an examination of the fetal blood vessels of the placenta, as a prerequisite before drawing homologies in the twin concordance studies.

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THE NATIONAL HEART AND LUNG INSTITUTE TWIN STUDY OF CARDIOVASCULAR DISEASE RISK FACTORS: ORGANIZATION AND METHODOLOGY

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The National Heart and Lung Institute undertook a study of twins in 1969 to expand knowledge of the etiology of coronary heart disease and genetic relations that may cause

some individuals to have elevated levels of coronary risk factors while others do not. Between 1969 and 1974, 250 MZ and 264 DZ male twin pairs aged 42-56 were examined at study centers located in Massachusetts, Indiana, and California. The twin sets were identified from a roster of U.S. Armed Forces Veterans compiled by the NAS-NRC. Of the 1099 sets that were identified as living within 200 miles of any study center, both members of 514 sets volunteered to be examined.

The examination featured a medical and family history, a dietary interview, electrocardiogram, blood pressure measurements, weight and height measurement, a variety of blood chemistry tests, including complete lipoprotein analyses, and lung function tests. Zygosity was determined from analysis of 22 red cell antigens. A detailed interview dealing with the twins' relationships to each other was also obtained. Each of the centers also incorporated various ancillary substudies, including psychological inventories, vectorcardiograms, and red cell studies.

Each of the quantitative variables was tested for the presence of significant genetic variance using the method of Christian et al. which also tests for differential environmental effects. Variables found to have considerable nongenetic variability are examined by regression analyses to attempt to explain intrapair differences by differences in exposure to various environmental factors. The current report discusses the organization and methodology of the study while accompanying reports focus on the genetic variance in blood lipids, blood pressure, and coronary prone behavior patterns.

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