

The twin method

Twins

- Dizygotic - DZ = "two ovoid", fraternal;
 - they arise from the fertilization of **two** eggs , each with one sperm ;
 - from a genetic point of view, individuals created in this way are in the same relationship as normal siblings (relationship coefficient $r = 0.5$).
- **Monozygotic** - MZ = "single egg", identical
 - they arise from the **division of one zygote** in the early stages of ontogeny ;
 - from a genetic point of view, such individuals have the same genetic make-up (relative coefficient $r = 1$);
 - their epigenetic makeup (e.g. DNA methylation) is not completely identical and this difference continues to increase during life.

The Twin Method

- Also name *geminological method* ;
- is a special genetic method that is largely specific to human genetics;
- in the case of alternative signs, it is based on the determination of concordance (similarity) and discordance (difference) between members of a twin pair and on the ratio of the number of concordant and discordant pairs;
- the first step is determining the so-called zygosity of the twin pair;
 - divide the set of twins into a group of MZ pairs and DZ pairs;
 - if obstetrical data are available, it is possible to base them on them; in other cases, it is possible to assume that the members of the MZ couple must be concordant in all genetically determined traits, such as blood groups ;
 - with a sufficient number of characters of a similar type, we can fairly reliably divide a set of twins into a group of MZ and DZ;
- the so-called Weinberg method :
 - determines the so-called a priori probability of zygosity ;
 - the phenotypic character used here is sex ;
 - all MZ couples must be of the same sex ;
 - if we assume that the probability of a boy being born is the same as that of a girl, then gender-discordant pairs represent half the number of DZ pairs

(boy, boy: girl, girl; girl, boy: boy, girl);

- then twice the number of discordant pairs is the total number of DZ twins in the set; the remaining (concordant) pairs are MZ twins;
- after dividing the set of twins into DZ set and MZ set, it is possible to compare between these sets the representation of concordant or discordant pairs for a given character.

A number of statistical procedures have been proposed for the quantitative expression of heritability in twin studies, among the classics is the Holzinger heritability index:

$$H = \frac{Kmz - Kdz}{1 - Kdz}.$$

where Kmz is the relative representation of concordant pairs in the MZ twin group and Kdz is the relative representation of concordant pairs in the DZ twin group.

- The twin method is also widely used in the heredity of quantitative human traits - appropriate statistical procedures allow heritability estimates for multifactorial traits

Links

Related articles

- Genealogy
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ŠTEFÁNEK, Jiří. *Medicine, diseases, studies at the 1st Faculty of Medicine, UK* [online]. [feeling. 2/11/2010]. < <https://www.stefajir.cz/> >.

Reference

1. FRAGA, MF. Epigenetic differences arise during the lifetime of monozygotic twins. *PNAS*. 2005, year 102, pp. 10604-9, ISSN 1091-6490.