POLYMORPHOUS TRANSFERRINS AND THEIR IMPORTANCE FOR THE FORENSIC MEDICINE

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The genetically determined polymorphism of human transferrins (Tf), reported by O. Smithies in 1957 (11), is a polyallel autosomal co-dominant serum-group system including over 26 electrophoretical types (7, 9). The distribution of these types in European peoples is considerably irregular; the type Tf CC is most often: 96—99.80% (4, 5, 6, 7, 9). This type has a middle position during electrophoretic migration of Tf-fractions. The rest quickly or slowly moving types are quite rare and certain types can be detected only in definite race and peoples' groups. The type Tf D_{kat} is established only once until now (G. Geserik et al.) in a Czechoslovak population and for a second time P. Pavlov (3) finds it in a Bulgarian population.

The polymorphism of Tf in bulgarians has been the object of the investigations of N. Doichinova and B. Kurteva (1), also H. Walter et al. (12). Both groups of authors report only type Tf CC in the studied populations. P. Pavlov and L. Rupcheva (1979) investigate Tf-types in 1278 bulgarians and they report the following distribution of Tf-types: type Tf CC in 1252 (97.96%), type Tf BC in 23 (1.80%), type Tf CD in 2 (0.16%) and type Tf D_{kat} in only 1 (0.08%). The genetical frequency is: type Tf^b — 0.009; type Tf^c — 0.9894; type Tf^d — 0.0008 and type Tf^{d(kat)} — 0.0008. Similar distribution is found for the rest European peoples (7, 9, 10).

The high frequency of the type Tf CC and the considerably low frequencies of the rest types make the system insufficiently effective for the inquiry-investigation of a possible parental origin. The probable rejecting of a misleading fatherhood, calculated after the formula of P. Speiser and V. Pausch (2) for the bulgarian population, is considerably unreliable — 1.05%. Similar data are reported for the greater number of European peoples. However, some authors apply quite successfully this method of studying the polymorphism in certain cases of inquiry-investigated possible fatherhood (7, 9, 10). Definite importance shows the Tf-polymorphism in all cases with "supposed fatherhood", where the child and the probable father have Tf-fraction which is not detected in the mother's phenotype under the control of a rare gen. In these cases the possibility to indicate precisely the real father is quite considerable. All that, together with the nowadays technics and methods of determination of Tf-types, suggests the application of Tf-polymorphism in such inquiry-investigations. The reported by M. Rose method of posttransferrins' typing with some modifications (2, 8) provides the simultaneous determination of the types of three serum-group systems: Tf, Pt and Hp. Concerning the aforementioned advantages we apply the study of Tf-system in our inquiry-investigations for a suspected fatherhood and report certain successes in a number of cases. To support our opinion we demonstrate the following case:
Mother K. S. with the child E. indicates as a father of E. the man A. A. We investigated the blood-group formulae and the following results were established:

Mother K. S. — 0 (alpha, beta); MN; P+; CcDEe; kk:Hp2-2; Gc2-1; Pt — B; Tf CC.
Child E. — A1 (beta); MN; P+; ccDEe; kk; Hp2-2; Gc2-1; Pt BC; Tf BC.
Probable Father A. A. — A1 (beta); MN; P-; ccDEe; kk; Hp2-2; Gc2-1; Pt BC; Tf BC.

Comparing the studied blood-group formulae it is obvious that the fatherhood in our case cannot be excluded. Something more: according to the system Tf (fig. 1) the child and A. A. have fraction «B» which is not detected in the mother's phenotype. This fraction is under the control of a very rare for the bulgarians gen Tf^b (gen frequency 0.009) which suggests A. A. to be most probable father of the child. The fatherhood possibility in our case, calculated after the formula of Essen—Müller for Tf-system only, is 98.23%. This percent is considerably (and enough) high and together with the rest studied blood-group systems makes the probable fatherhood almost «proved» one.

Having in mind that the Tf-typing is investigated simultaneously with the posttransferrins and haptoglobins (it requires no additional materials and is not time-consuming), we presume it to be essential for the routine practice with definite importance for a number of «difficult» cases.

Fig. 1: Electrophoretical presentation of the three sera from our inquiry-investigation:

a) Mother K. S.; b) Child E.; c) Possible father A. A.

REFERENCES

ПОЛИМОРФИЗМ ТРАНСФЕРИНОВ И ЕГО СУДЕБНО-МЕДИЦИНСКОЕ ЗНАЧЕНИЕ

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РЕЗЮМЕ

В работе дано распределение типов трансферина среди болгарской популяции. Подчеркивается значение системы $T_f$ для судебно-медицинской практики при экспертизе по спорному родительскому происхождению. Продемонстрирован случай из практики.