Plasma Haptoglobin Level in Twins

Subjects are 61 monozygotic (MZ), 8 same-sexed dizygotic (DZ), 3 different-sexed dizygotic twin pairs aged 11 to 12 years, and 66 fathers and 68 mothers. Twins are those who applied to the Junior High school of the Faculty of Education, University of Tokyo in the years of 1977-1980. Plasma haptoglobin (Hp) level was measured using the single radial immunodiffusion method (Haptoglobin M-Partigne Plates Behringwerke). Hp genotype was determined by 5% polyacrylamide gel electrophoresis.

Hp levels are significantly different among genotypes, and the mean and standard deviation are 150.6 ± 97.2mg/dl (n=18) in 1-1 type, 265.6 ± 107.3 (n=119) in 2-1 type, and 167.0 ± 96.2 (n=136) in 2-2 type. High and virtually the same intraclass correlations were revealed in MZ twins, 0.5865 (n=32, p<0.005) in 2-2 type, 0.5082 (n=25, p<0.05) in 2-1 type. If we take the parents and the offspring with the same genotype, mid-parent-offspring regressions were 0.7104 (n=25) in 2-2 type and -0.1746 (n=20) in 2-1 type, and parent-offspring regressions were 0.3521 (n=89) in 2-2 type and 0.0555 (n=72) in 2-1 type, indicating a marked difference between homozygotes and heterozygotes in both regressions. Same results were obtained, if differences due to sex, age and sampling year were corrected and standardized, where linear regression of the value on age is assumed.

The finding suggests a possibility that expressivity of the $\beta^1$ and $\beta^2$ alleles of Hp is influenced by different genetic background, which is shared by MZ twin and thus yielding the same correlation in homozygotes and heterozygotes, while in mid-parent-offspring and parent-offspring regressions heterozygotes indicate a reduced regression due to partly different genetic background between parents and offspring.