Investigations into the inheritance of serum IgD concentration

W. Keil and M. Rose

Dr. sc. med. W. Keil, Humboldt University, Institute for Forensic Medicine, Hannoversche Str. 6, 1040 Berlin, GDR

INTRODUCTION

Population studies repeatedly showed a trimodal distribution of the serum IgD concentration in adults (Becker et al. 1969; Dunnette et al. 1977; Rowe and Fahey 1965). Consequently, a genetic polymorphism of the serum IgD level was suggested. But also investigations in twins (Allansmith et al. 1969; Lee et al. 1980) and the correlation between IgD concentration in the serum and in the Gm phenotype (Walzer and Kunkel 1974) indicate genetic influences. Family studies (Dunnette et al. 1978) yielded evidence for an autosomal-recessive inheritance of an allele which is responsible low serum IgD concentration.

MATERIALS AND METHODS

IgD levels were measured in unselected sera of 48 healthy Berlin adults by means of single radial immunodiffusion (SRID) - partigen plates and standard of Behring, FRG; conditions of diffusion and intensification of the precipitates with DOPA-solution according to manufacturer's recommendations. Sensitivity 0.01 g of IgD/l. Coefficient of variation between 11.2 % and 18.6 %. All samples were assayed twice.

The same method was used to determine IgD serum concentrations in 14 families of the Berlin area. All children (n = 60) were grown-ups at that time or at least adolescents. No illegitimate children could be detected in the routine typing of the blood-, serum- and enzyme group systems (18 systems) and in the HLA system. All persons were obviously healthy.

RESULTS AND DISCUSSION

The size of the random sample (48 adults) is very small so that it was not possible to clearly determine the mode of distribution (fig. 1). However, the result is not in contrast with data reported by other authors (Becker et al. 1969; Dunnette et al. 1977; Rowe and Fahey 1965) which formed the basis for postulating three IgD concentration ranges: low (l) < 0.01 g/l, medium (m) 0.01-0.1 g/l, high (h) > 0.1 g/l. These ranges may be regarded as phenotypes taking into account the hypothesis of inheritance. Assuming an autosomal-codominant

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fashion of inheritance with two alleles (IgD*l, IgD*h) values result which are present in table 1. In this connection IgD m constitutes the heterozygote type. Presupposing a HARDY-WEINBERG-equilibrium, observed and expected values correlate well.

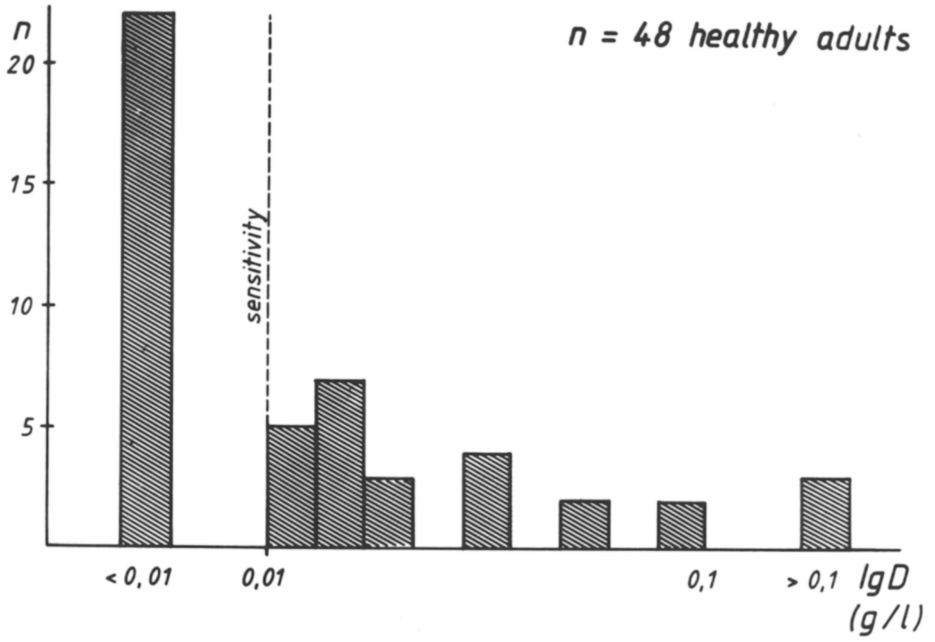

Fig. 1. Serum IgD level of 48 adults measured by means of SRID

Table 1. Ranges of serum IgD concentration: phenotypes with expected values and allelic frequencies in random sample of Berlin population

phenotype	observed (n)	expected	allelic frequencies
l	22	23,52	IgD^* l = 0,7
m	23	20,16	IgD^* h = 0,3
h	0	4,32	
total	48	48,00	

The result of the family studies is summarized in table 2. With the three parent combinations (l x m, m x m, m x h), distributions in children resulted which correlated well with the expected values for autosomal-codominant inheritance. Concerning the critical combination of IgD l x IgD l, children were found in 5 out of the 6 families who belong to the "medium" or "high" type. This finding cannot be explained by the hypothesis of either a codominant nor that of a recessive-dominant type of inheritance. The assumption of a temporary increase

Table 2. Ranges of serum IgD concentration with families from the Berlin area

parents		children			
	n	n	l	m	h
l x l	6	23	17(23)	5 (0)	1 (0)
l x m	2	6	0 (3)	6 (3)	0 (0)
l x h	0	0	-	-	-
m x m	5	26	2(6,5)	16(13)	8(6,5)
m x h	1	5	1(1,25)	3(2,5)	1(1,25)
h x h	0	9	-	-	-
total	14	60	20	30	10

of the IgD level, too, does not offer a satisfactory explanation in these cases, since more marked changes in serum IgD concentrations in healthy subjects are very rarely observed (Spiegelberg 1977).

SUMMARY

Indications exist for a genetic influence on serum IgD concentration, possibly there is polymorphism. Our own family studies did not provide any evidence of a formal genetic background.

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II. Electrophoretic Polymorphisms