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P Genotype Identification of Human Group A Rotaviruses

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For rotaviruses, there are two serotyping systems based on either of outer capsid proteins VP4 or VP7. P type specificity resides on the VP4 region, while G type specificity involves the VP7 region. At least ten G serotypes (G1-6, 8, 9,10, and 12) and eight P genotypes (P[3], [4], [6], [8], [9], [10], [11], and [14]) are well known in human rotaviruses. We have previously reported that while G1 serotype was generally predominant, the incidence of G2 was higher among school-age children than among preschool infants (1). In the present study, we compared the prevalence of P genotypes between two age groups: school-age children (6 - 13 years old) and preschool infants (0 - 5 years old).

Fecal specimens were collected in 1999 - 2003 from hospitals and clinics in Nara Prefecture: Kokuho Central Hospital, Mimuro Hospital, Saiseikai Gose Hospital, Saiseikai Nara Hospital, Murakami Children's Hospital, Tanaka Children's Hospital, Okamoto Clinic, Yamaga Children's Hospital, Yamamoto Children's Hospital, and Yaoi Clinic. A total of 124 G-typed specimens (G1; 73, G2; 20, G3; 10, G4; 19, and G9; 2) were used for P genotype identification. P genotypes were characterized using the RT-PCR method as described by Gentsch et al. (2). The results obtained with 115 specimens are summarized in Table 1. The rotavirus isolates were classified into three distinct genotypes: P[4]; 20 (16%), P[8]; 94 (76%), and P[9]; 1 (1%); nine specimens (7%) could not be typed. All G1, G3, G4, and G9 type specimens, except for one, were P[8] type, and all the G2 specimens were P[4] type. Figure 1 shows the age distribution peaking at 1 year of age. P[4] type was, however, distributed over relatively wide range of ages (0 - 13 years old). Table 2 shows the prevalence of P genotypes in the two age groups. Among preschool infants, the incidences of P[4], P[8], and P[9] were 14 (13%), 87 (86%), and 1 (1%), respectively. Among school-age children, the incidences of P[4] and P[8] were 6 (46%) and 7 (54%), respectively.

There are four rotavirus serotypes distributed worldwide as determined by the combination of P and G types, i.e., P[8]G1, P[8]G3, P[8]G4, and P[4]G2 (3). Although rotavirus infection is relatively rare in adults, outbreaks of gastroenteritis among adults in the United States between 1998 and 2000 were caused by a rotavirus, which was serotype G2. Griffin et al. (4) suggested that natural immunity to G2 was inadequate in adults. In fact, in this study, the incidence of P[4]G2 was higher among school-age children than preschool infants. Estes et al. (5) reported that the outer capsid protein VP4 was cleaved by trypsin to yield two polypeptides, and enhanced the infectivity of rotaviruses. VP4 (P antigen) might play an important role in infectivity, rather than VP7 (G antigen).

Table 1. Result of P genotype identification

G serotypes (VP7)	No. of specimens	P genotypes (VP4)			
		[4]	[8]	[9]	NT[1)]
1	73	–	64	–	9
2	20	20	–	–	–
3	10	–	9	1	–
4	19	–	19	–	–
9	2	–	2	–	–
Total (%)	124	20 (16)	94 (76)	1 (1)	9 (7)

[1)]: NT, Not typeable.

Table 2. Prevalence of P genotypes in two age groups

P genotypes	Age groups	
	0 - 5 y (%)	6 - 13 y (%)
[4]	14 (13)	6 (46)
[8]	87 (86)	7 (54)
[9]	1 (1)	–

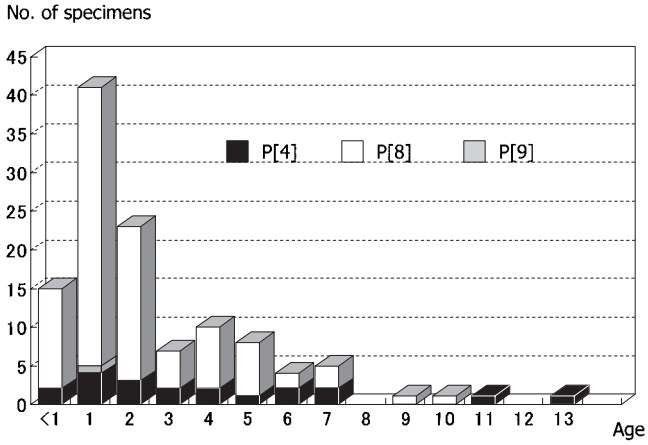

Fig. 1. Age distribution of P genotypes.

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