BRIEF NOTE

Genetic Marker in Beagle Blood: Individual Difference within Blood Groups Detected by Isohemagglutinin

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Studies on genetic polymorphism of typical antigenicity on red cell membrane [5–7, 10, 11], enzyme (oxidase, G6PD) [1, 9], plasma protein (Al, Hp) [3, 10], hemoglobin [9], and lymphocytes [8] in dogs have already been reported by many researchers [4].

This report deals with isohemagglutinin and isoantigen observed in the serum and on the red cell membrane of dogs of the Beagle breed in Japan. This typical isoantigen was a genetic marker and also found in the blood of infants. The outline of the report is as follows.

Serological techniques were carried out by methods described by Campbell et al. [2]. Venous blood samples were collected from 100 Beagles. Serum was clarified by centrifugation at 3,000 rpm for 10 minutes and stored in 0.1% (w/v) sodiumazide at 5°C. Red cells three times washed were made to a 2% suspension in saline.

Isohemagglutinin: The cross-hemagglutinin test was performed by the bromelin method. Isohemagglutinin was detected in the serum of five of 50 Beagles tested. This serum was tentatively designated anti-B serum. The agglutinin titer of isoagglutinin against isoantigen was 1:2. In the absorption test, agglutinin was readily absorbed by positive red cells, but not at all by negative red cells. Agglutinin activity was reduced after treatment with 2-mercaptoethanol. By gel-filtration chromatography on DEAE cellulose column, agglutinin activity was detected in the D (IgM) fraction. These results indicated that isohemagglutinin was contained in IgM globulin.

Isoantigen (B blood type): Isoantigen was observed in red cells of 26 of the 100 Beagles tested. That is, 26 blood samples out of the 100 were positive (agglutinated) and tentatively designated B blood type. The other 74 samples were negative (not agglutinated) and tentatively designated b blood type. In this manner the Beagles were classified into two blood groups. The phenotype frequency of B type was 26% and that of b type 74% (Table 1). In
addition, antigenicity was detected on red cells from an infant (6 days old). It was reduced by treatment with 500 units of neuraminidase.

Heredity: The results of genetic studies are shown in Table 2 and Figure 1. In b×b matings, no B blood type offspring were present. In B×B or B×b matings, both B and b blood type offspring were observed. Therefore, the genotype of B phenotype seemed to have homozygous (BB) and heterozygous (Bb) types. These data consistent with a simple pattern of inheritance with a dominant allele at an autosomal locus. Based on this hypothesis, the gene frequency of B and b blood types in Beagles was estimated to be 0.14 and 0.86, respectively.

In conclusion, the existence of iso-antigen in serum from Beagles, suggested that the compatibility test might be necessary in the evaluation of blood transfusion or transplantation in veterinary clinical and medical experiments.

References


