

DEPENDENCE OF THE NUMBER OF ANTIBODY-FORMING
CELLS IN THE SPLEEN OF RATS IMMUNIZED WITH
TYPHOID ANTIGEN *Salmonella typhi* ON THE NUMBER
OF CELLS SPONTANEOUSLY PRODUCING ANTIBODIES
AGAINST THIS ANTIGEN

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(*Salmonella*)

It was shown by the method of local passive hemolysis in gel that the number of antibody-forming cells (AFC) in the spleen of five batches of rats obtained at different times from the nursery correlates after immunization with *Salmonella typhi* O antigen with the number of spontaneous AFC against that same antigen in animals of the same batch. This may indicate that the number of spontaneous AFC reflects the number of B lymphocytes immunocompetent toward the particular antigen and that it can be used to some degree to assess immunologic reactivity to that antigen before immunization.

KEY WORDS: spontaneous antibody-forming cells; immune response.

The intensity of humoral immunity depends on the number of antibody-producing cells that are formed in response to injection of the foreign antigen. Antibody-forming cells (AFC) arise from precursor cells, which are B lymphocytes. Naturally, therefore, the more precursor cells start to differentiate after the antigenic stimulus, the greater the intensity of the immune response. The height of an immune response is genetically encoded [2, 3]; consequently, the number of precursor cells against each antigen is also determined genetically. Their number may also depend on the conditions of their existence: nutrition, external environmental factors, climate, season of the year, and so on.

Determination of concrete (against a particular antigen) immunologic reactivity before immunization is an extremely important problem [2, 3].

A connection between the number of spontaneous AFC (before injection of the antigen) and the number of precursor cells against that particular antigen has been postulated in the literature [1, 5, 6]. Data to the contrary have also been obtained [3].

The object of this investigation was to study how the number of AFC after immunization depends on the number of cells spontaneously producing antibodies against the particular antigen.

EXPERIMENTAL METHOD

Experiments were carried out on 74 noninbred male albino rats weighing 180-250 g obtained from the nursery five times in the course of 4 years. Each of these five batches, consisting of 14-16 rats, was divided into two equal groups. The animals of one group were immunized by a single subcutaneous injection of Boivin's antigen from *Salmonella typhi* O-901 in a dose of 50 μ g and a volume of 0.1 ml and they were killed on the fourth day after immunization; the animals of the other group were killed simultaneously without immunization.

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TABLE 1. Number of Cells Forming Antibodies Against O Antigen of *S. typhi* in Unimmunized Rats and After Immunization with Typhoid Antigen

Animals	Series of experiments				
	I	II	III	IV	V
Intact	$1,4 \times 1,34$	$2,9 \times 1,32$	$3,6 \times 1,35$	$5,5 \times 1,15$	$12,0 \times 1,25$
Immunized	$160 \times 1,12$	$280 \times 1,29$	$335 \times 1,27$	$630 \times 1,17$	$2030 \times 1,14$

The number of AFC in 1 million living nucleated spleen cells was determined by the local hemolysis in gel method [7] in the modification of Solov'ev et al. [4]. To determine the true number of cells forming antibodies against the O-antigen of *S. typhi*, a parallel determination was made of the number of AFC against sheep's red cells sensitized with Boivin antigen from *S. typhi* O-901 and against unsensitized sheep's red cells, and the second result was subtracted from the first [1].

The results were subjected to statistical analysis (calculation of the geometric mean with their errors for the number of AFC, the level of significance of these means, and the coefficient of correlation between the number of AFC in the unimmunized and immunized animals). Results were regarded as significant when $P \leq 0.05$.

EXPERIMENTAL RESULTS

The geometric mean values for the number of AFC in each series of animals tested are given in Table 1.

As Table 1 shows, the more numerous the AFC against this antigen before immunization, the more numerous they were after immunization. The coefficient of correlation $r = 0.96$. This correlation is significant ($P \sim 0.01$). The coefficient of correlation is close to one, which means that the dependence is close to functional.

In the writer's view, these results show that the number of spontaneous AFC against *S. typhi* O antigen reflects the number of B lymphocytes predetermined toward this antigen and it can serve to some extent as a means of estimating the intensity of the immune response of this antigen without immunization.

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