

STUDIES ON THE IMMUNOLOGICAL RESPONSE TO DIFFERENT ANTIGENS IN PIGS

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The immunological response to an antigen in animals is influenced by genetics and environment. The genetic variation of immunological response to a specific antigen in pigs has been studied by several investigators (Buschmann, 1974. Huang, 1977). Selective breeding for immunological response has also been conducted in mice (Biozzi, 1970, 1972) and poultry (Siegel, 1980). The nature of antigen, dosage, frequency and route of administration of antigen could be some of the environmental factors which induce the variation of immunological response. The objective in the present study was to determine whether competition between different antigens existed and to correlate immunological response to different antigens in the same individual.

A total of 230 two-way crossbreed pigs at the age of 120 to 130 days were used in the present study. All animals were raised under constant feeding management conditions and were given the same dosage and route of administration of antigens. The three antigens were E. Coli (6×10^9 /ml); Salmonella (6×10^9 /ml) and 10% SRBC. Each of the pigs received two inoculations of antigens. The three different antigens were not mixed but were given at the same time. The second injection was given seven days after the first injection. Pigs were bled at 0, 14 and 28 days after the first injection. After the complement activity was destroyed by heating to 50°C for 30 minutes, the serum samples were stored at -20°C for further use. The antibody titers were measured by the method of hemagglutination. The titer values were expressed in a log₂ scale, then transformed by $\sqrt{1+x}$ before statistical analysis.

The results showed the antibody titer increased in a normal curve after the inoculation of the three antigens. The pigs showed the highest titer to E. Coli and the lowest to SRBC. The difference in antibody titer between the different antigens employed was highly significant in the 14 days and 28 days antiserum samples. Even though antigen competition may have occurred in the immunological response (Radouch, 1967). The difference is more probably due to the antigenicity of the experimental antigens (Huang, 1981, unpublished). The antibody titer in 0-day samples, which represent the nonspecific antibody, showed also highest titer in E. Coli and lowest in SRBC. Therefore the non-specific antibody may also be involved in the difference.

An experiment has been conducted to determine whether SRBC affected the antibody response to the other two antigens. The results showed that the antibody responses were not coordinated in the E. Coli and Salmonella antigens whether SRBC was employed or not, indicating that SRBC did not affect the antibody response to the other two antigens.

Since one animal received three different antigens at the same time and there were three bleedings in the same animal, it was possible to study the correlation of antibody response between antigens and between different bleeding dates. The results indicated that there was significant correlation of immunological response to different antigens in the same individual and there was also highly significant correlation of immunological response to the same antigen at different bleeding dates. In other words pigs having a high antibody titer to one antigen also had more often a high antibody titer to another one. And those with a high antibody titer produced more often than those with a lower one. There appears to be a common control of immunological response to the three different antigens.

In conclusion, there was no competition of immunological response to different antigens when they were given to one animal at the same time. There was a significant positive correlation of immunological response between unrelated antigens. It was probably genetics in common which influences the antibody producing ability. And it is proposed that selective breeding for general immunological response ability to different antigens could be reached by using only one antigen.

Selected References:

1. Biozzi, G., C. Stiffel, D. Mouton, Y. Bouthillier, and C. Decreusefond, 1970, In protides of the biological fluids. Pergamon press, Oxford.
2. Biozzi, G., C. Stiffel, D. Mouton, T. Bouthillier, and C. Decreusefond, 1972. J. Exp. Med. 135:1071-1094.
3. Huang, J.Y. 1977. Ph. D. Theses, Hawaii University.
4. Radouch, J. and D.W. Talmange, 1976. Science, N. Y. 158:152.