

# CHARACTERISTICS OF THE GENERAL ANAPHYLACTIC REACTION IN CERTAIN LINES OF MICE

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During the reproduction of anaphylactic shock by means of normal horse serum in pure-line mice, distinct differences in the course of the anaphylactic response were observed. The shock was severest in BALB/cy, A/HEY, AKR/y, and CC57BR/y lines and mildest in mice of lines CBA/y and C57BL/6y.

The reproduction of experimental anaphylaxis is largely dependent on the species of animal used. Until recently mice were regarded as a poor object in which to study the anaphylactic reaction because of difficulty in sensitizing them, and also because of the poorly defined picture of the manifestations of this reaction. However, investigators have repeatedly returned to mice as a biological model for the reproduction of anaphylactic shock. Most work has been carried out on noninbred animals [1, 3-9]. The availability of pure-line mice at the present time enables anaphylaxis to be studied in a genetically homogeneous material, thereby yielding not only more reliable results, but also permitting their study from the genetic aspect [2].

The object of the present investigation was to study the general anaphylactic reaction in mice of six inbred lines from the Soviet collection of pure-line inbred animals.

## EXPERIMENTAL METHOD

Female mice weighing 12-14 g of lines CBA/y, C57BL/6y, CC57BR/y, AKR/y, A/Hey, and BALB/cy were used. Normal horse serum diluted 1:10 with physiological saline was used as the antigen. Two methods of sensitization were used for comparison. The mice of one group received the sensitizing dose of antigen by subcutaneous injection in a volume of 0.3 ml 5 times at intervals of 4 days, while those of the second group received two injections at intervals of 7 days. The reacting dose in both cases was given 7 days after the last sensitizing dose of antigen, in a volume of 0.5 ml intravenously.

## EXPERIMENTAL RESULTS

The response reactions in the mice were essentially indistinguishable when the two methods of sensitization were used. However, in the group of animals sensitized by five injections, the reaction was more uniform in its manifestation. During the first few minutes after injection of the reacting dose of antigen, the mice were very active and excited, but the excitation was soon replaced by depression, and the mouse lay still with its hair untidy. Sometimes it tried to move but rolled from side to side. After 15-20 min, partial paralyses of the limbs developed. Cyanosis was well marked. Clonic convulsions and dyspnea were observed. Between the convulsions the animal lay motionless in the "frog" position, and occasionally showed restlessness. In severe cases the response reaction to physical stimulation disappeared after 30-40 min, respiration became increasingly irregular and superficial, and the mouse died. In mild cases of anaphylaxis the animal's condition became normal again after 2 h.

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TABLE 1. Anaphylactic Reaction in Pure-Line Mice

Line	Number of animals in experiment	Number of animals with different degrees of manifestation of the reaction				
		-	+	++	+++	++++
C57BL/6y	20	14	6	-	-	-
CBA/y	19	3	12	3	1	-
CC57BR/y	15	-	-	9	4	2
AKR/y	10	-	-	2	7	1
A/Hey	10	-	-	2	8	-
BALB/cy	10	-	-	2	5	3

Legend: -) mild reaction in the form of "washing" or "combing" movements, slight convulsions; +) "washing," "combing," convulsions, depressed state, eyes half closed; ++ "washing," "combing," convulsions, depressed state, slight paralyses of the limbs; +++ "washing," "combing," depressed state, well-marked paralyses, "frog" position; ++++) death.

The sensitized mice reacted differently to injection of the reacting dose of antigen. The results of analysis of the anaphylactic reaction in the mice investigated are shown in Table 1. Depending on the degree of manifestation of the anaphylactic reaction, the experimental pure-line mice could be divided into two groups. The first group, with the mildest degree of anaphylactic shock, consisted of mice of lines C57BL/6y and CBA/y. The severest reaction in this group was assessed as +. Of these two lines, the C57BL/6y mice were more resistant to anaphylaxis, because most of the animals of this group responded to injection of the reacting doses of antigen by a mild reaction.

The second group, with the severest reaction, consisted of mice of lines BALB/cy, A/Hey, AKR/y, and CC57BR/y, in which the mildest reaction was assessed as ++. Some of the mice of this group died. The clinical manifestation of anaphylaxis in the different lines of mice also differed, not only in the strength of the anaphylactic reaction, but also in the character of the symptoms. For instance, in C57BL/6y mice the symptoms of "washing" and "combing" were very clearly marked, whereas in lines AKR/y, A/Hey, and CC57BR/y the stage of excitation was manifested by a variety of restless movements, but not by "washing" or by "combing." The general clinical picture of the anaphylactic reaction obtained in the mice corresponds to that described by Weiser, Golub, and Hamre [9]. The results of the present experiments, showing interlinear differences in the course of anaphylaxis between the pure-line mice, are in agreement with those obtained by Fink and Rothlauf [2] as regards the sensitivity of mice of line BALB/c to anaphylactic shock and the low sensitivity of mice of lines C57BL/6 and CBA to anaphylactic shock.

The experiments described above showed that an anaphylactic reaction can be reproduced in mice. However, the degree of its manifestation varies for mice of different lines. Mice of lines BALB/cy, A/Hey, AKR/y, and CC57BR/y, in which the anaphylactic reaction followed the most demonstrative course, are most sensitive to anaphylaxis. Mice of these lines can be recommended for experiments on the reproduction of anaphylactic shock.

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