

MODIFICATIONS OF THE ALLERGIC REACTION IN RABBITS WITH A TRANSPLANTED BROWN-PEARCE TUMOR

M. N. Nilovskii

Laboratory of Noninfectious Immunology (Head, Professor I. N. Maiskii),

Institute of Experimental Biology of the AMN SSSR, Moscow

(Presented by Active Member AMN SSSR N. N. Zhukov-Verezhnikov)

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It has been shown [2-9, 11-15] that in malignant disease the immunological reactions of the animal organism undergo considerable modification. This may take the form, for example, of depression of the function of the production of immune, complement-fixing antibodies, a fall in the titer of normal antibodies, variations in the titer of complement, and changes in the reactions of the reticulo-endothelial system. The discovery of the principles governing these reactions and of means of stimulating them would be of great importance to the study of the pathogenesis and eradication of malignant diseases.

The investigation of immunological reactivity and, in particular, of the allergic reactions in malignant disease is of undoubted interest. We have studied the course of an allergic reaction — the Arthús phenomenon — in rabbits with a transplanted Brown-Pearce tumor.

EXPERIMENTAL METHOD

Experiments were conducted on 26 male chinchilla rabbits weighing 2.5-3 kg. The animals were divided into two groups. The rabbits of the first (experimental) group (12) were inoculated intratesticularly with 0.4 ml of a 20% suspension of Brown-Pearce tumor tissue. The second group of rabbits (14) acted as controls and were not inoculated with the tumor material.

Seven days later, when the development of a tumor could be felt in the animals of the experimental group,

the rabbits of both groups were vaccinated with normal horse serum in order to reproduce the Arthús phenomenon. For this purpose the skin of the animals' flank was carefully shaved, the site of injection was painted with alcohol, and serum was then injected through a fine needle. Altogether the rabbits received five injections: the 1st, 3rd, 4th, and 5th each of 4 ml subcutaneously, and the 2nd of 2 ml intravenously. Each rabbit of both the experimental and the control groups received 18 ml of serum. The intervals between the injections were of 4-5 days.

During the experiments the extent of the edema, hyperemia, hemorrhages, and necrosis, the times of sloughing of the necrotic areas, and the times of death of the animals from the tumor were determined, and the pathologico-anatomical picture was ascertained.

Appearance of the Arthús Phenomenon in Rabbits with Transplanted Brown-Pearce Tumor and in Healthy Animals (Controls)

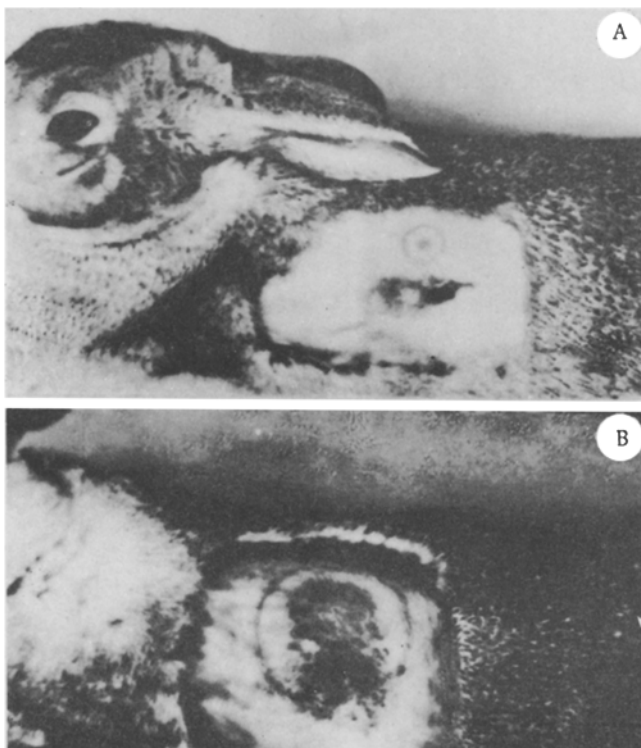
Grading of allergic reaction (Arthús phenomenon)	Experimental animals	Control animals
No. of rabbits with a positive reaction		
++++	2	6
+++	—	5
++	3	1
+	—	2
No. of rabbits with a negative reaction		
	7	—

Legend: —) phenomenon did not appear; +) slight edema of the skin; ++) edema of the skin and hyperemia; +++) edema of the skin with hyperemia, hemorrhages, and slight necrosis; ++++) edema of the skin with hyperemia, hemorrhages, and necrosis, but in a more marked form than +++.

EXPERIMENTAL RESULTS

The results of the experiments to study the appearance of the Arthús phenomenon in healthy rabbits and rabbits with a transplanted Brown-Pearce tumor are given in the table.

It should be pointed out that in individual animals



Appearance of the allergic reaction (Arthius phenomenon) after the fifth injection of normal horse serum into rabbit No. 2347 with a transplanted Brown-Pearce tumor (A) and into rabbit No. 2610 — control (B).

of the control group, sensitization appeared after the third injection, and the phenomenon could be observed after the fourth injection of serum, whereas in the group of rabbits with a transplanted Brown-Pearce tumor the fourth injection of serum did not produce these effects in any animal.

After the fifth injection of serum, the allergic response reaction (Arthius phenomenon) was obtained in all the other animals of the control group and in a few of the experimental rabbits. Consequently, after the fifth injection of horse serum into rabbits with a transplanted Brown-Pearce tumor, the Arthius phenomenon developed in only a very small proportion of cases and it was less clearly defined than in the healthy (control) rabbits, in which the phenomenon was obtained in every case (see figure).

The results agree with the observations made by other workers [1, 10]. The explanation of these findings may be that the tumor acts as a sensitizing agent, and during its development it modifies to some extent and depresses the protective functions of the organism, including the allergic reactions, to the extent of anergy.

SUMMARY

As shown in the present experimental work the reactivity of rabbits with transplanted Brown-Pearce tumors decreases considerably; it is not possible to reproduce allergic reactions (Arthius phenomenon) in all the rabbits with developing Brown-Pearce tumors; these phenomena are less acute and not as manifest as in healthy animals.

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