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Immunity against pneumococcus afforded rats by feeding tissues of animals killed by the same germ.

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The experiments briefly reported here were undertaken in order to learn whether the resistance of rats to pneumococcus could be increased by feeding them the tissues of animals killed by injections of the same organism. It was thought that if a toxic substance is formed in the tissues of an infected animal, and if such a poison were even only partially absorbed from the intestines of the rats to which the tissue was fed, the formation of an antitoxin might be expected. As a result, an increased resistance to injections of the living organism would *perhaps* follow. Consideration, however, of the immunity experimentally produced in such diseases as typhoid, tuberculosis and diphtheria by the oral administration of the organisms causing these diseases suggested that the pneumococci present in the tissue being fed might be partly or even wholly responsible for any protection which might be created.

A number of rats from a single source was divided into two groups, one (control) was fed the tissues of healthy rats, the other (experimental) the tissues of rats killed by intraperitoneal injections of pneumococcus Type I. Following such feedings for a period of about three weeks, with a daily average ingestion of approximately seven grams per rat, controls and experimental animals were tested. A 24 hour blood broth culture of the same germ was used.

The results of one experiment are given in the accompanying table. The data show that the experimental rats survived 1000 or more times the dose which proved fatal for control rats of equal weight. Similar results were obtained on a somewhat larger number of animals in another experiment.

The effect of feeding the living pneumococcus alone was also studied. Varying numbers of cocci were fed. Rats which received two cc. of a 24 hour blood broth culture per day for 24

days showed signs of a slightly increased resistance. Another group was given the organisms alone. Each rat received each day for 23 days the germs from 10 cc. of culture with a lapse of two weeks between the first 18 and the last 5 days of treatment. These rats also showed some signs of increased resistance. Each rat in a third group was given the germs from 18 cc. culture per day during the same period. These animals show a greater degree of protection than the ones which were given smaller amounts, although the results are not so striking as in the tissue feeding experiments. The data for these experiments will be published later. Other rats which received the bacteria from 50 cc. culture per day showed a decidedly increased resistance to injections of the germ.

Table Showing Increased Resistance to Pneumococcus of Rats Which Were Fed Pneumococcus Tissue.

Rat No.	Control or Experim'tal	Quantity Injected cc.	Result.	Date. 1925.
4	C	10^{-3}	D. 4 days	June 30
22	E	10^{-1}	Survived	
6	C	10^{-4}	D. 5 days	July 1
23	E	10^{-1}	Survived	
2	C	10^{-4}	D. 5 days	2
24	E	10^{-1}	Survived	
	stock	10^{-4}	D. 2 days	
	stock	10^{-4}	D. 4 days	
1	C	10^{-5}	D. 2 days	5
3	C	10^{-5}	D. 2 days	6
5	C	10^{-5}	D. 6 days	
18	E	$2x10^{-1}$	D. 5 days	
30	E	10^{-1}	Survived	
10	C	10^{-5}	D. 2 days	9
12	C	10^{-5}	Survived	
13	C	10^{-5}	D. 3 days	
14	C	10^{-5}	D. 3 days	
25	E	10^{-1}	Survived	
26	E	10^{-1}	Survived	
29	E	10^{-1}	Survived	
15	C	10^{-6}	Survived	14
11	C	10^{-6}	Survived	
7	C	10^{-5}	Survived	
8	C	10^{-5}	Survived	
16	E	10^{-1}	Survived	
21	E	10^{-1}	Survived	
17	E	$2x10^{-1}$	Survived	
20	E	$2x10^{-1}$	D. 2 days	

Eighteen rats, each receiving five cc. of pneumococcus culture filtrate (Berkfeld) per day for the same period, failed to show that any protection against pneumococcus had been created.

The sera of four of the rats which were fed pneumococcus tissues were tested for agglutinins, precipitins and protective substances. Although used undiluted, the sera showed neither agglutinins nor precipitins during a two hour incubation period. However, protective substances of some kind do exist. Mice, injected with 0.20 cc. of such immune rat serum at the same time as they received the pneumococcus culture are protected against many times a dose which otherwise is fatal. Control experiments with normal rat serum were done at the same time.

At present an experiment is being carried out to determine whether rats which have been fed the tissues of animals killed by pneumococcus Type 1 are protected against Types 2 and 3 as well as against Type 1.

The work is being continued from several angles. Attempts to duplicate the favorable results obtained are to be made, using larger animals. Considerably larger numbers of pneumococci, both living and dead, are now being fed. Additional work is to be done on the value of the immune serum as a prophylactic agent. The duration of the protection and the therapeutic properties of the immune serum are to be determined.

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The effect of dye "blockade" on anaphylaxis and antibody formation in the guinea pig.

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The experiments reported here are a continuation of the work of Gay and Clark,[1] on the effect of endothelial blockade in antibody production.

In the present work guinea pigs were saturated with trypan

[1] PROC. SOC. EXP. BIOL. AND MED., 1924, xxii, 1.