with acetic anhydride and sulphuric acid (Liebermann-Burchard test.) But a sample of the whole yeast gave a decidedly positive reaction, and the water soluble extract of the yeast, to which one drop of Viosterol was added, also gave a strongly positive reaction.

The feeding of this latter diet was continued for 30 days, when the animals were again X-rayed, showing that the rickets had been cured.

This improvement was not due to time, since rats that continue to eat the rachitogenic diet for 60 days show skeletal changes that are at least as abnormal as those of the rats on the diet for 30 days, when examined by means of the X-ray.

In addition to this group of rats, other groups have been fed varying amounts of phosphate and the water soluble extract of yeast, with results that are analogous to those described.

Conclusion. It is clear that the addition of sterol free, water soluble, extract of yeast plus secondary sodium phosphate to a rachitogenic diet caused the disappearance of the rachitic skeletal changes in rats.

5364

Rôle of Certain Anaerobic Toxins in Pneumococcus Infection.

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The search for the factors responsible for the toxemia of pneumococcus infections is long and unsuccessful. The approach to this problem has been primarily by studies of the toxic substances which may be obtained from the pneumococcus *in vitro*. Following the intravenous injection of pneumococcus autolysates into guinea pigs, Rosenow[1] and Cole[2] early observed anaphylactic-like reactions which could not be correlated with the signs of toxemia in pneumococcus infections. Recently, Parker[3] described certain toxic substances obtained by the anaerobic autolysis of concentrated pneumococcus

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1 Rosenow, E. C., *J. Infect. Dis.*, 1911, **9**, 190; 1912, **11**, 94, 235.

2 Cole, R., *J. Exp. Med.*, 1912, **16**, 644.

3 Parker, J. T., *J. Exp. Med.*, 1928, **47**, 531; 1929, **49**, 695; 1929, **50**, 161.

suspensions. The toxic principles in these anaerobic autolysates are capable of producing necrosis when injected intradermally, and death associated with marked pulmonary lesions when injected intratracheally into guinea pigs. These toxins are thermolabile and very sensitive to oxidation; they are species-specific and can be neutralized by heterologous anti-autolysate serum. Parker and McCoy[4] reported the production of potent antitoxic serum in horses.

With the hope of learning something concerning the nature of the factors causing the death of pneumococcus-infected animals as well as the possible therapeutic application of Parker's antipneumotoxic serum, an attempt was made to determine whether these toxins obtained *in vitro* played any part in the course of natural infection. It seemed that a specific rôle for the anaerobically produced toxins could be established only if the "antipneumotoxic" serum added to the ordinary antibacterial serum could save those animals in which antibacterial serum alone failed to avert death.

It is well known that when mice are infected with certain large doses of pneumococci, no amount of antibacterial serum can save them from death. Since it is suggested by some that death, here, might be due to the large amounts of liberated endotoxins which are not neutralized by the antibacterial serum, the following experiment was planned to test the effect of antipneumotoxin. Fifty mice were injected with large doses of Type II Pneumococcus. One series of mice was treated with therapeutic antibacterial serum only; another series with antipneumotoxin only, and a third series with both antibacterial and antipneumotoxic serum. The results shown in Table I indicate that the antipneumotoxin had no effect. The only conclusion that may be drawn, however, is that the anaerobically produced toxins probably do not play any part in the causation of death of mice infected with very large doses of virulent pneumococci.

Goodner[5] described the production of so-called "intradermal pneumonia", which consists of a local lesion associated with bacteremia and toxemia, following the intracutaneous injection of virulent pneumococci in rabbits; most of the rabbits, when untreated, die in 3 to 4 days. Since this infection in rabbits is more nearly related to the course of lobar pneumonia in man than is any other pneumococcus infection in animals, the effect of antipneumotoxin on its course was expected to yield valuable information. Rabbits were given an intradermal injection of 0.1 cc. of a 1-100 dilution of

[4] Parker, J. T., and McCoy, M. Van S., *J. Exp. Med.*, 1929, **50**, 103.

[5] Goodner, K., *J. Exp. Med.*, 1928, **68**, 2.

TABLE I.

Effect of Various Modes of Therapy on Massive Pneumococcus Infection in Mice.

Pneumococcus Type II Culture		Therapy Simultaneous with Culture		No. of Mice	No. of Survivals
cc.	M.L.D.	*Antibacterial Serum*			
0.2	20 million	400 units		3	1
0.2	20 "	1000 "		3	0
0.4	40 "	400 "		3	0
0.4	40 "	1000 "		3	0
		"Antipneumotoxin"			
0.2	20 million	0.5 cc. (10,000 units)*		3	0
0.2	20 "	2.0 cc. (40,000 ")		3	0
0.4	40 "	0.5 cc. (10,000 ")		3	0
0.4	40 "	2.0 cc. (40,000 ")		3	0
		Antibacter.+Antipneumo.			
0.2	20 million	400 units	0.5 cc.	3	1
0.2	20 "	400 "	2.0 "	3	1
0.2	20 "	1000 "	0.5 "	3	0
0.2	20 "	1000 "	2.0 "	3	0
0.4	40 "	1000 "	0.5 "	2	0
0.4	40 "	1000 "	2.0 "	3	0

* One unit of antipneumotoxin is the smallest amount of serum required to protect a guinea pig (200-210 gm.) against one unit of toxin when the mixture is injected intratracheally. One unit of toxin is the amount which when injected intratracheally kills a guinea pig (200-210 gm.) in from 4 to 24 hrs., with typical symptoms and autopsy findings.

an 18-hour broth culture of fully virulent Type I Pneumococcus. One series of rabbits was treated with Type I antibacterial serum only, another with antipneumotoxin only, and a third series with both the antibacterial and antipneumotoxic serums. Some of the rabbits received the serums at 6 to 7 hours after infection, and others 24 hours after. The results are shown in Table II. The untreated rabbits and those receiving antipneumotoxin only, all died and within the same time. Of 4 rabbits treated with 300 units anti-

TABLE II.

Effect of Various Modes of Therapy on the Survival of Rabbits with "Intradermal Pneumonia".

Therapy	Hrs. After Intradermal Infection	No. of Rabbits	No. of Survivals
None	—	4	0
300 units Type I	7	2	0
	24	2	1
Antipneumotoxin 5 cc. (100,000 units)	7	2	0
	24	2	0
300 units Type I and Antipneumotoxin 5 cc. (100,000 units)	7	2	1
	24	2	1
	7	4	1
	24	4	0

bacterial serum only, one survived. Among the rabbits treated with 5 cc. (100,000 units) antipneumotoxin in addition to the 300 units of Type I antibacterial serum, 2 out of 4 survived in one experiment and only one out of 8 in another.

It is interesting to observe that at 6 hours after the intradermal infection, although the blood culture is strongly positive, the local lesion is either absent or characterized by very slight erythema only; the antipneumotoxic serum administered at this stage did not prevent its further development, nor did it have any apparent effect on the fully developed lesion when administered 24 hours after infection. In most of the rabbits treated at 6 to 7 hours and in some of those treated at 24 hours, the blood was sterilized and maintained sterile after the administration of the serum; in spite of the sterile blood culture, however, the local lesions grew progressively more marked and the temperature remained elevated. (Table III.) The rabbits died with an absent bacteremia and negative post-mortem culture of the hearts' blood. Death apparently was produced by the absorption of toxins from the local lesion, and these toxins were not neutralized by the presence of large amounts of antipneumotoxin, theoretically sufficient to protect 100,000 guinea pigs from death by one lethal dose of toxic autolysate.

TABLE III.

Protocols of Two Rabbits Treated with Antibacterial Serum and Antipneumotoxin.

Injections: Culture—intradermally—0.1 cc. of a 1-100, 18 hr. broth culture of fully virulent Type I Pneumococcus. Therapy—intravenously—300 units Type I serum and 5 cc. (100,000 units) antipneumotoxin, 6½ hours after culture.

Rabbit	Date	Hrs. after culture	Lesion-extent of oedema and erythema	Blood Culture		Temperature
				Plate organisms per cc. blood	Broth	
	11-7	6½	None	1200	Pos.	103.4°
	11-8	24	5×4 cm.	Neg.	Neg.	104.5°
21	11-9	52	11×6 "	"	"	105.0°
Temp. before culture	11-10	75	11×9 "	"	"	105.9°
11-6 4:00 P. M. 103.3°	11-11	96	11×11 "	"	"	104.8°
11-7 9:30 A. M. 102.5°	11-12	120	11×11 "			106.3°
	11-12	124	Dead	Culture of Heart's blood sterile		
	11-7	6½	None	1600	Pos.	103.4°
	11-8	24	6×5 cm.	8	Neg.	104.6°
22	11-9	52	8×5 "	Neg.	"	103.7°
Temp. before culture	11-10	75	10×7 "	"	"	105.6°
11-6 4:00 P. M. 102.8°	11-11	96	10×7 "			100°
11-7 9:30 A. M. 102.5°	11-12	110	Dead	Culture of Heart's blood sterile		(In shock)

Conclusions: Since the "antipneumotoxic" serum fails to modify the course of pneumococcus infection, as shown in the mice and rabbit experiments, it seems fair to assume that the anaerobically produced toxins are probably products primarily of the enzymatic changes occurring in *in vitro* autolysis, and play no part in the course of natural infection.

5365

Decremental Conduction in the Human Heart.

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Decremental conduction appears to have been demonstrated in the compressed or otherwise depressed mammalian auricular muscle (Drury[1]; Drury and Andrus[2]). This interpretation has been quite generally, but not universally accepted. No human electrocardiograms suggesting the condition have been described so far as we are aware. We have had 2 cases in which the condition is suggested. One case of interference dissociation showed a most unusual phenomenon. There were a large number of auricular impulses which penetrated to the ventricular pacemaker and disturbed its rhythm. Of these nearly 50% were blocked between that point

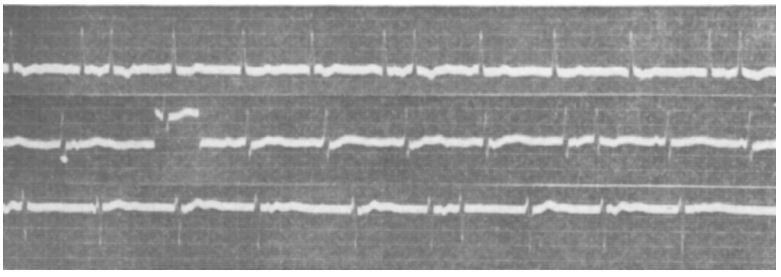

FIG. 1.

Electrocardiograms in leads 1, 2, and 3, showing the A-V rhythm with what appeared to be auricular premature contractions with occasional long R-R intervals of which there were seventeen in all of the tracings. In the T waves of which there is an activity that resembles a blocked premature auricular contraction. This activity, although not reaching the ventricle, apparently succeeds in distinctly prolonging the R-R interval as is shown in the fourth interval in lead 3.

[1] Drury, A. N., *Heart* (London), 1925, **12**, 143.

[2] Drury, A. N., and Andrus, E. C., *Heart* (London), 1924, **11**, 389.