

with ACTH than in the animals treated with hypertensinogen (see Fig. 1 and 2).

Summary. Experiments on adrenalectomized and ovariectomized rats indicate that ACTH stimulates the growth of the preputial glands, even in the absence of both steroid producing endocrines. It is concluded that ACTH possesses actions which are not mediated through either the adrenals or the gonads and which do not even depend upon

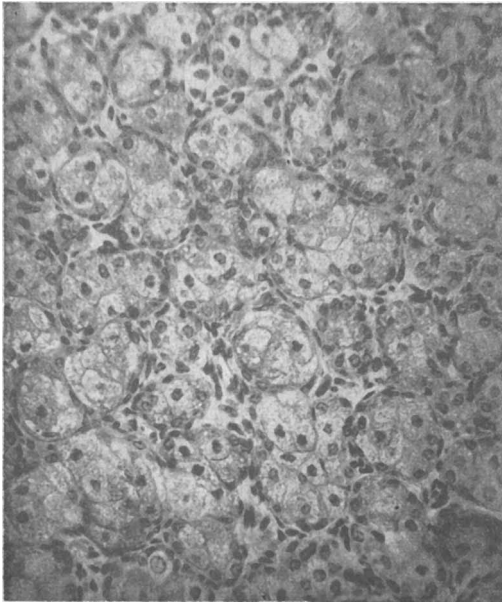


FIG. 1. Preputial gland of a rat treated with hypertensinogen.

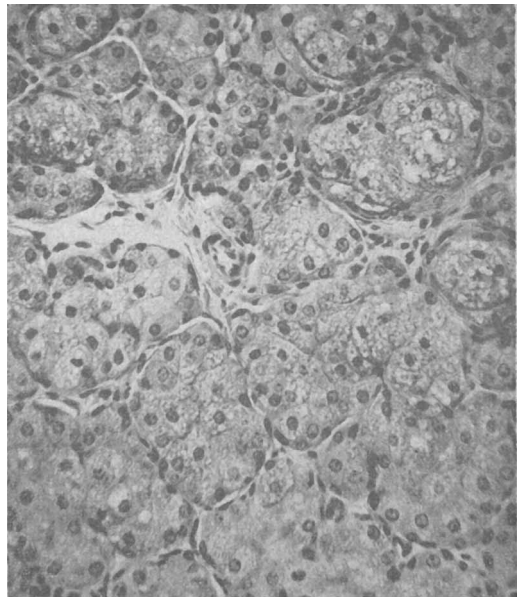


FIG. 2. Preputial gland of a rat treated with ACTH.

the simultaneous presence in the body of adrenal or gonadal hormones. It remains to be seen whether this action is due to the corticotrophic hormone itself or to some contamination in the ACTH preparation used.

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Splanchnic Removal of Bacteria from Blood Stream of Pyrogen-Tolerant Rabbits.* (18968)

GRACE P. KERBY AND IVAN L. BENNETT.

From the Department of Medicine and the Division of Dermatology and Syphilology, Duke University School of Medicine, Durham, N. C.

The tolerance produced by the repeated intravenous injection of pyrogenic materials is associated with the development of resistance to the Schwartzman phenomenon(1).

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1. Bennett, I. L., and Cluff, L. E., in mss.

Both pyrogen-tolerance and resistance to the Schwartzman phenomenon are blocked by the injection of thorotrast†(2,3). Since the

† A stabilized colloidal thorium dioxide prepared by the Heyden Chemical Corp.

2. Beeson, P. B., *J. Exp. Med.*, 1947, v86, 39.

3. Beeson, P. B., *Proc. Soc. Exp. Biol. and Med.*, 1947, v64, 146.

TABLE I. % Splanchnic Removal of Bacteria in Pyrogen-Treated Rabbits.

Group	No. of rabbits	Pyrogen received	Bacteria infused	% splanchnic removal
Control	10	—	<i>M. aureus</i>	62 ± 20 (S.D.)
	11		<i>K. pneumoniae</i>	20 ± 10 (S.D.)
A	4	Triple typhoid vaccine	<i>M. aureus</i>	67 ± 14 (S.D.)
	3		<i>K. pneumoniae</i>	8 ± 9 (S.D.)
B	5	P.V. pyromen	<i>M. aureus</i>	68 ± 12 (S.D.)
	4		<i>K. pneumoniae</i>	15 ± 11 (S.D.)
C	3	P-25 polysaccharide	<i>M. aureus</i>	62 ± 19 (S.D.)
	4		<i>K. pneumoniae</i>	11 ± 11 (S.D.)

splanchnic removal of bacteria from the blood stream also can be blocked by the injection of thorotrast(4), the present study was undertaken to see whether pyrogen-tolerance in the rabbit is associated with an alteration in the ability to clear the splanchnic blood of organisms.

Methods. Healthy albino rabbits were used. A bacteremia was induced, as in previous studies(5), by the continuous infusion of bacteria into a marginal ear vein. Blood samples were obtained for culture by means of repeated cardiac punctures or catheterization of the inferior vena cava and of the hepatic vein. Anesthesia was maintained throughout each experiment by local mety-caine infiltration. The extent of removal of organisms by the splanchnic circulation was calculated subsequently from the simultaneous hepatic venous and either cardiac or vena caval bacterial counts. The organisms used were a hemolytic *Micrococcus aureus* of human origin, coagulase-positive, and an encapsulated *K. pneumoniae* type B (obtained from Dr. J. J. Dubos). A constant infusion of one organism was maintained throughout the first half of the experiment. The infusion was then discontinued, and, after a brief period of no bacterial infusion, the second organism was substituted and infused throughout the latter half of the experiment.

The following pyrogenic materials were used: Triple typhoid vaccine containing one billion typhoid bacilli and 0.75 billion each of paratyphoid A and B organisms per ml (obtained from the North Carolina State

Laboratory of Hygiene); P. V. Pyromen, a purified pyrogen from *Proteus vulgaris* (obtained from Dr. L. G. Ginger); and P-25 polysaccharide from *Serratia marcescens* (obtained from Dr. M. J. Shear). **Group A.** Each of 4 rabbits received a daily intravenous injection of triple typhoid vaccine for 10 days on the following schedule: Stock vaccine, diluted 1:6.25 with physiologic saline, 0.25 ml on the 1st day, doubled daily thereafter through the 5th day; stock vaccine, undiluted 1.25 ml on the 6th day, 2.5 ml on the 7th day, 5.0 ml on the 8th and 9th days, 9.0 ml on the 10th day. **Group B.** Each of 4 rabbits received a daily intravenous injection of P.V. Pyromen for 6 days on the following schedule: 100 γ on the 1st, 2nd and 3rd days; 200 γ on the 5th, 6th and 7th days. One additional rabbit received double the above amounts. **Group C.** Each of 3 rabbits received a daily intravenous injection of 0.2 mg of P-25 polysaccharide for 6 days. One additional rabbit received 0.25 mg of P-25 polysaccharide daily for 6 days. In each instance in the above groups, a bacteremia was induced on the day following the last injection of the pyrogenic material.

Results. No significant alteration was observed in the splanchnic removal rate of either *M. aureus* or *K. pneumoniae* type B in the animals which had received pyrogenic material on comparison with the control groups of animals. The data are summarized in Table I.

On inspection of the data, the greatest difference lies between the animals of Group A which were infused with *K. pneumoniae* and the corresponding control group. The difference is not significant statistically ($p > 0.05$).

4. Martin, S. P., Kerby, G. P., and Holland, B. C., in mss.

5. Martin, S. P., Kerby, G. P., and Holland, B. C., PROC. SOC. EXP. BIOL. AND MED., 1949, v72, 63.

Discussion and conclusions. Beeson(2) has shown that in animals made tolerant to the pyrogenic effect of typhoid vaccine, there is an increased disappearance of the pyrogenic material from the blood stream. The increase in disappearance rate is blocked by the administration of thorotrast. He interpreted this as an indication that the reticulo-endothelial system removes the pyrogenic material from the blood stream and that it does so with increased efficiency on repeated contact with the pyrogen, thus leaving less and less pyrogen in the blood stream to damage other susceptible tissues. More recent studies by Bennett and Cluff(1) have shown that rabbits made tolerant to pyrogens become non-reactive also to the Schwartzman phenomenon. Both of

these effects are blocked by the injection of thorotrast(2,3), as is the removal of bacteria from the blood stream(4). However, although there seem to be some similarities between the characteristics of resistance to the Schwartzman phenomenon and resistance to pyrogen effect, the third effect (*i.e.* removal of bacteria from the blood) does not show a cross-relationship, at least insofar as alteration of bacterial removal by pyrogen-tolerance is concerned. The extent of splanchnic removal of bacteria from the blood stream of pyrogen-tolerant animals is not significantly different from the removal rate observed in the control groups.

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Simultaneous Recording of Pulse Contours on Central and Peripheral Arteries with Mechano-Electronic Transducers. (18969)

HANS-GEORG CLAMANN. (Introduced by U. C. Luft.)

From the School of Aviation Medicine, Department of Physiology, Randolph Field, Texas.

With each heart beat the sharp systolic rise in blood pressure expands the elastic walls of the adjacent aorta. This expansion travels rapidly along the walls of the arteries as an elastic wave of decreasing amplitude and can be felt as the pulse.

Regarding the relationship between the pulse wave and other factors in hemodynamics it must be kept in mind that the contour and velocity of any wave are determined by the energy generating it and the elastic qualities of the medium through which it travels. The energy in this case amounts to the product of stroke volume $\times$ blood pressure. Hence, these factors determine the pulse wave in principle. The medium transmitting the pulse wave is the wall of the blood filled vessels. The elastic properties of the arterial wall are based upon two components: The elastic fibers which are of passive nature and the muscular elements capable of active contraction. The tone of the muscle fibers in the arterial wall exerts a decisive influence on the velocity and contour of the pulse wave.

An evaluation of the pulse wave therefore offers a means of estimating not only peripheral vascular resistance, but also vasomotor activity as governed by the autonomic nervous system. Despite the importance of these factors in physiological research and particularly in clinical medicine, comparatively few efforts have been made to render the principle more widely applicable.

The principal functions involved are: 1. Systolic and diastolic blood pressure; 2. Diameter of the aorta; 3. Pulse wave velocity measured by simultaneous recording of the pulse contours on at least 2 different sections of the arterial system. The method described here pertains to the last item.

The air transmission sphygmograph as first developed by Frank(1), Wiggers(2), and others has been most frequently used to record pulse contours. This method, although offer-

1. Frank, O., *Z. f. Biol.*, 1930, v89, 274.

2. Wiggers, C. J., *Modern aspects of the circulation in health and disease*, 1923, Lea and Febiger, Philadelphia.