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Experimental Hypertension in Dogs by Constricting the Artery of a Single Transplanted Kidney.

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Shortly after Goldblatt[1] described the production of hypertension in dogs by constriction of the renal artery, Page[2] interested himself in the relationship of the renal nerves to this type of elevated arterial pressure. He found that careful denervation of the kidney did not prevent the rise in blood pressure which follows constriction of the renal artery.

A year later, Collins,[3] employing a slightly different technique for partially occluding the renal artery, confirmed these findings. Because resection of all visible nerve filaments does not completely exclude the possibility of persistent neurogenic pathways to the kidney, the further study of the problem has been undertaken. Complete denervation has been secured by transplantation of the kidney to the pelvis, reëstablishing its blood supply by means of the femoral vessels.

These studies have been carried out on male and female dogs, weighing from 10-12 kg. Throughout the course of the experiments, blood pressure readings have been taken daily by means of the Von Leersum carotid loop. After determining the normal level of blood pressure, the left kidney has been transplanted to an intraperitoneal position within the pelvis, and its circulation reëstablished by end to end anastomosis between the renal and femoral vessels. The ureter has been left intact. After a variable period of time, usually 10 to 20 days, the normal kidney has been removed. Within the next 2 weeks the femoral artery has been constricted by means of a Goldblatt clamp.

The protocol of one animal representative of these experiments is given in Table I.

On 8 animals the artery to a single transplanted kidney has been constricted. Of these, 4 have died exhibiting terminally an elevation in the blood pressure of over 100 mm. of Hg associated with symp-

1 Goldblatt, H., Lynch, J., Hanzal, R. F., and Summerville, W. W., *J. Exp. Med.*, 1934, **59**, 347.

2 Page, I. H., *Am. J. Physiol.*, 1935, **112**, 166.

3 Collins, D. A., *Am. J. Physiol.*, 1936, **116**, 616.

TABLE I.
Animal SA-37-73. Male. Weight 12 kg.

Date 1937	B.P. mm. Hg.	Course
1/11		Von Leersum carotid loop.
1/18		Blood pressure readings started.
	140-160	Normal B.P. range for this animal.
2/8		Transplantation of left kidney. Kidney deprived of its circulation for 33 minutes.
	150-170	B.P. range after transplantation.
2/26	140-160	Right nephrectomy. B.U.N. 18.0 mg./100 cc.
3/2	140-160	Animal quiet and drowsy. B.U.N. 59.6 mg./100 cc.
3/8	140-160	Goldblatt clamp applied to the left femoral artery. B.U.N. 50.0 mg./100 cc.
3/12	240-250	
3/22	240-250	B.U.N. 25.1 mg./100 cc.
3/25	130-140	X-ray showed clamp had slipped off the artery.
4/10	130-140	Animal in good health.
5/6	130-140	" " " "
5/7	130-140	Femoral artery constricted by small silver clip.
5/11	220-230	
5/19	150-160	Animal alive and in good health.

toms of an overwhelming intoxication. At autopsy, the gross and microscopic picture has paralleled that seen in normal dogs dying from too great a degree of constriction of the renal artery. In the remaining 4 animals, only transient phases of hypertension have been produced. In one animal (see table) this elevation was sustained for a period of 10 days, but, unfortunately, the clamp slipped off the artery, and the blood pressure promptly fell to normal.

Conclusion. We have concluded from these experiments that a transient hypertension can be produced by constriction of the artery to a kidney denervated by transplantation. Whether a sustained level of hypertension can be produced in the absence of the renal nerves when the artery is similarly constricted will be reported later.