to renal transport of these amino acids. To our knowledge, up to now nobody has reported on an in vitro effect of insulin upon renal amino acid transport.

Zusammenfassung. An Nierenrindenschnitten von Lämmern und Schafen wurde untersucht, ob die Anwesenheit von Insulin bzw. Glukagon im Inkubationsmedium die gegen ein Konzentrationsgefälle erfolgende Aufnahme von α-Aminoisobuttersäure in Nierenrindenzellen beeinflusst. Insulin stimulierte in diesen Versuchen (Inkubationszeit: 80 min) die Akkumulation von α-Aminoisobuttersäure in Nierenrindenzellen bei jungen Lämmern, nicht jedoch bei älteren Lämmern und Schafen. Für Glukagon konnte kein Effekt nachgewiesen werden.

E. SCHARRER, C. LANDES and H. SCHOLL[14]

[13] *Handbook of Physiology*, Section 8: *Renal Physiology* (American Physiological Society, Washington, D.C. 1973), p. 653.

[14] Acknowledgment. The investigation was supported by the Deutsche Forschungsgemeinschaft (SFB 147 Jungtierkunde).

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Release of Renomedullary Prostaglandins in Normal and Hypertensive Rats

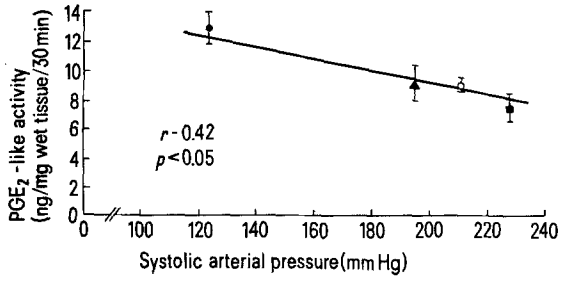
Previous studies have shown that prostaglandins might be involved in the control of arterial pressure. NEKRASOVA et al.[1–3] have demonstrated the presence of prostaglandin E-like lipids in the kidneys of renal hypertensive rabbits and have associated the onset of hypertension and elevated blood pressure with low renal prostaglandins. Similarly, ZUSMAN et al.[4] and LEE et al.[5] have postulated a deficiency of circulating prostaglandins in essential hypertension in man. On the other hand, incubated renal papillae of 'post salt' hypertensive rats (hypertension obtained after salted diet) released more prostaglandin E_2 than papillae from normotensive rats[6]. The present work was undertaken to study the effect of the first type Goldblatt hypertension (one kidney clamped and the other intact), the second type (one kidney clamped with contralateral nephrectomy) and spontaneous hypertension (genetically hypertensive rats, of the strain of Akamoto-Aoki and bred in our laboratory[7]) upon the release of prostaglandin E_2-like material from the rat renal papilla.

Methods. Albino rats of either sex weighing 100–125 g were divided into 4 groups: A) controls, B) second type Goldblatt hypertension, C) first type Goldblatt hypertension and D) genetically hypertensive rats. All operations were performed under ether anesthesia. The animals were given Purina chow and water ad libidum. Systolic arterial pressure was measured before each experiment with a tail cuff connected to a W. & W. blood pressure recorder. 4 to 5 weeks after clamping the renal artery, the surviving animals showed hypertensive values (higher than 160 mm Hg). The animals were then decapitated, and the kidneys were removed, weighted and put in cold Krebs solution. The papillae were then dissected out, cut in small pieces (1–2 mm) and incubated in Krebs solution at 37 °C for 30 min. Following incubation, prostaglandins in the medium were extracted and bioassayed according to SIROIS and GAGNON[8]. Results are expressed as prostaglandin E_2-like activity and are given as means ± S.E.M. Significance of differences and correlation coefficients were calculated according to STEEL and TORRIE[9].

Results and discussion. As demonstrated in the Table, the release of prostaglandins from renal papillae (pooled kidneys) of normotensive (blood pressure: 124 ± 5 mm Hg) rats (group A) averaged 12.8 ± 1.1 ng/mg wet tissue/30 min, whereas the renal papillae of animals with one kidney clamped and contralateral nephrectomy (group B) released only 7.4 ± 1.1 ng/mg. The rats of this last group had developed hypertension (blood pressure: 228 ± 8 mm Hg) and their total output of prostaglandins was decreased by 43% as compared to control animals ($p < 0.05$).

Rats which were submitted only to clamping of the left renal artery (group C) developed less severe hypertension (195 ± 11 mm Hg). Again, the release of prostaglandins from the left papillae of these animals was lower than that observed in control animals showing mean values of 9.9 ± 1.4 ng/mg. These values represent a 23% decrease in prostaglandins release as compared to controls.

When used in these experiments, the genetically hypertensive rats (group D) had a mean arterial pressure of 211 ± 7 mm Hg, a value that lies between those observed in groups B and C. Similarly, the release of prostaglandins (8.9 ± 0.5 ng/mg) was respectively higher and lower than that observed in rats of groups B and C. This



Release of renomedullary prostaglandins as a fonction of systolic arterial pressure in normal (●), clamped (▲), nephrectomized and clamped (■), and genetically hypertensive rats (○).

[1] A. A. NEKRASOVA and L. A. LANTSBERG, Kardiologiya *9*, 86 (1969).
[2] A. A. NEKRASOVA, E. N. NIKOLAEVA and V. V. KHUKHAREV, Kardiologiya *8*, 16 (1968).
[3] A. A. NEKRASOVA, Y. A. SEREBROVSKAYA, L. A. LANTSBERG and I. A. UCHITEL, Kardiologiya *10*, 31 (1970).
[4] R. ZUSMAN, D. SPECTOR, B. CALDWELL, L. SPEROFF, B. FORMAN, G. SCHNEIDER and P. MULROW, J. clin. Invest. *52*, 93a (1973).
[5] J. B. LEE, A. ATTALLOW, V. K. VANCE, C. ELLWOOD and A. PREZYNA, J. clin. Invest. *52*, 50a (1973).
[6] L. TOBIAN and S. AZAR, *Hypertension 72* (Eds. J. GENEST and E. KOIW; Springer-Verlag, New York 1972), p. 393.
[7] The initial breeding stock was kindly provided by Dr. F. HERR, Ayerst Laboratories, Montréal.
[8] P. SIROIS and D. J. GAGNON, Eur. J. Pharmac., in press (1974).
[9] R. G. D. STEEL and J. H. TORRIE, *Principles and Procedures of Statistics* (McGraw-Hill, New York 1960).

Group	No.	Body weight (g)	Systolic arterial pressure (mm Hg)	Prostaglandin-like activity (ng/mg wet tissue/30 min)	
				Left papilla	Right papilla
A) Control animals	1	298	130	9.2	11.8
	2	288	110	11.1	8.8
	3	286	100	6.0	10.9
	4	257	120	6.7	6.5
	5	260	120	14.0	11.0
	6	294	120	14.5	26.4
	7	325	120	9.1	10.3
	8	331	115	8.8	16.9
	9	266	135	22.5	29.8
	10	289	110	17.7	17.2
	11	302	110	10.3	8.5
	12	318	145	11.7	10.2
	13	375	175	13.7	9.6
Mean	—	—	123.8 ± 5.2	12.8 ± 1.1	
B) Nephrectomy and clamped animals	1	245	220	5.7	—
	2	259	230	10.8	—
	3	289	220	8.7	—
	4	309	210	4.0	—
	5	390	260	7.7	—
Mean	—	—	228.0 ± 7.8	7.4 ± 1.1	—
C) Clamped animals	1	350	220	14.4	—
	2	290	165	8.9	—
	3	314	185	6.6	—
	4	315	210	9.6	—
Mean	—	—	195.0 ± 10.7	9.9 ± 1.4	—
D) Genetically hypertensive animals	1	253	200	9.9	8.5
	2	239	225	10.1	6.4
	3	262	225	10.3	8.8
	4	252	195	10.1	7.6
Mean	—	—	211.2 ± 7.3	8.9 ± 0.5	

correlation ($r = -0.42$) between the systemic arterial pressure and the release of prostaglandins by the papillae is illustrated in the Figure ($p < 0.05$).

Prostaglandins of the E and A series decrease the arterial pressure, and recent findings indicate that the level of circulating prostaglandins is decreased in human essential hypertension[4,5]. These authors also showed that the kidney contributes to the pool of circulatory prostaglandins and that a deficiency of prostglandins production by the kidney may play a role in the pathogenesis of hypertension. Our results clearly showed that the papillae of rats rendered hypertensive by experimental manipulations or rats spontaneously hypertensive, tended to produce or release less prostaglandins than papillae from normotensive rats. Although our results do not permit us to conclude whether the decrease in the production of renal prostaglandins is secondary to or the cause of hypertension, they strongly suggest that these events are closely linked together. Hence, we were able to correlate the severity of hypertension with the extent of decrease in prostaglandins production. Identification of the intermediate processes involved in these physiological phenomena requires further studies[10].

Résumé. On a montré que les papilles rénales de rats rendus hypertendus par diverses manipulations expérimentales ou de rats spontanément hypertendus, ont tendance à produire moins de prostaglandines que les papilles de rats normotendus. Sans permettre d'établir une relation certaine de cause à effet, les résultats suggèrent fortement qu'il y ait une corrélation entre la sévérité de l'hypertension et l'importance de la diminution de la production des prostaglandines rénales.

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