the resting potential was increased in 4 experiments, except in the case shown in 1, B (solid circles in Figure 2, A). On the other hand, the relationship between the resting potencial and the maximum rate of rise of action potential showed a sigmoid curve (Figure 2, B). The upper limiting value of the maximum rate of rise of the action potentials in the cat AV nodal fibres was about 60 V/sec, in the atrial fibres 90 V/sec, and in ventricular Purkinje fibers 400 V/sec. These maximum rates were reached from resting potentials negative to −85 mV.

The maximum rate of rise of the action potential is related to the conduction velocity[12]. Measurement of the conduction time between the stimulus and the maximum rising phase of action potentials in Figure 1, A revealed a definite shortening of conduction time when the membrane was hyperpolarized.

The present results differ from those of HOFFMAN[5] who comes to the conclusion that hyperpolarization by current flow does not increase the upstroke velocity. His experiments were done with rabbit AV node and would indicate that a certain part of the node completely lacks a system capable of carrying fast Na current (so called N-region). In contrast, the present results favor the view that a fast Na-carrying system is actually present but is normally inactivated as a consequence of the very low membrane potential. Clearly, more experimentation with both the cat and rabbit AV node is necessary before the hypothesis of a species difference can be given serious consideration[13].

Zusammenfassung. Nachweis, dass bei Erhöhung des Membranpotentials im AV-Knoten der Katze eine raschere Erregungsausbreitung erzielt werden kann.

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Neurohypophyseal Origin of a Humoral Factor Restoring Volume Natriuresis in Acutely Hypophysectomized Rats

It was shown in our previous paper[1] that acute hypophysectomy markedly decreased sodium and urine output during blood volume expansion, as compared to non-hypophysectomized rats. The conclusion drawn was that pituitary is involved in the humoral part of the renal mechanism of extracellular fluid volume regulation.

Attempts have been made to restore some impaired kidney functions (decreased glomerular filtration rate and renal blood flow) in chronically hypophysectomized man, dog and rat with both adenohypophyseal (ACTH, triiodothyronine, growth hormone)[2-5] and neurohypophyseal hormones (Pituitrin, Pitocin, oxytocin)[6-9]. The results have been more successful with the latter group. Thus the aim of the present study was to investigate whether a humoral substance is present in the posterior pituitary tissue that could reverse the low natriuretic response to the extracellular fluid volume expansion with saline in acutely hypophysectomized rats.

Material and methods. 15 male Wistar rats, weighing 220–250 g, were anaesthetized, surgically prepared, heparinized, injected DOCA and continuously infused with ADH and inulin-^{14}C, as described previously[1]. Following the surgical preparation, 1 h equilibration phase and the first urine-sampling period, i.v. infusion of 0.9% saline in the amount of 4% of body weight was completed in the second 20-min period. Another 3 urine samples were taken during next 60 min. The animals were divided into 3 experimental series: I. non-hypophysectomized rats; II. hypophysectomized rats; III. hypophysectomized rats with homogenate of 3 fresh neurohypophyses in 0.5 ml of 0.1% bovine albumin injected i.p. 15 min before the first urine-sampling period. Median of the weights for both kidneys in all experimental groups was 1.88 g. Chemical and radioisotopic analysis, as well as the statistical evaluation, were the same as in the previous work[1].

Results and discussion. The results are summarized in the Table. In spite of the plasma diluting effects of saline infusion, which are known to promote sodium excretion, peak sodium excretion during the extracellular fluid volume expansion in the acutely hypophysectomized rats (series II) was approximately 10 times lower than the corresponding peak for sodium excretion in the non-hypophysectomized rats (series I). The urine output and TRF_{Na} were also decreased considerably, whereas GFR showed only a slight decrease. It is thus obvious that the diluting effects of saline infusion on the sodium and urine excretion in acutely hypophysectomized rats was negligible.

However, homogenate of neurohypophyses injected i.p. in the acutely hypophysectomized rats prior to the first urine-sampling period (series III) completely restored their GFR and the ability to excrete sodium and urine immediately after the infusion of the saline load.

It is concluded on the basis of these results that the capacity to restore the impaired ability to increase renal sodium excretion during extracellular fluid volume expansion in acutely hypophysectomized rats by homogenate of neurohypophysis injected i.p. is directly related to a humoral factor present in the posterior pituitary. Homogenate from the anterior pituitary was ineffective in this respect.

As the present results show restoration to normal of the decreased GFR in the acutely hypophysectomized rats following the i.p. administration of the posterior pituitary homogenate, a posterior pituitary natriuretic factor could,

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The influence of acute hypophysectomy (series II) and acute hypophysectomy + homogenate of neurohypophyses injected i.p. (series III) on the urine output (V), sodium excretion ($U_{Na}V$), glomerular filtration rate (GFR) and tubular rejection fraction for sodium (TRF_{Na}) as compared to the non-hypophysectomized rats (I)

Period	Time (min)	I	II	III		
		Non-hypox ($n = 5$)	Hypox ($n = 5$)	Hypox + neurohypophyses i.p. ($n = 5$)	P I:II	P I:III
			V (µl/min)			
1	0– 20	2.94 ± 0.45[a]	2.94 ± 0.65[a]	3.78 ± 0.66[a]	ns	ns
2	20– 40	35.35 ± 5.68	9.03 ± 1.11	43.75 ± 6.19	< 0.002	ns
3	40– 60	32.94 ± 3.67	9.91 ± 1.48	32.33 ± 5.06	< 0.001	ns
4	60– 80	21.04 ± 4.73	8.09 ± 2.02	7.77 ± 2.12	< 0.05	< 0.05
5	80–100	14.97 ± 3.26	6.61 ± 1.68	3.84 ± 0.85	ns	< 0.05
			$U_{Na}V$ (µEq/min)			
1	0– 20	0.06 ± 0.01	0.08 ± 0.03	0.08 ± 0.02	ns	ns
2	20– 40	6.13 ± 0.99	0.41 ± 0.11	8.54 ± 1.38	< 0.001	ns
3	40– 60	6.81 ± 1.10	0.77 ± 0.23	7.76 ± 1.29	< 0.001	ns
4	60– 80	3.73 ± 0.89	0.26 ± 0.10	1.85 ± 0.54	< 0.01	ns
5	80–100	2.58 ± 0.64	0.41 ± 0.24	0.77 ± 0.26	< 0.05	< 0.05
			GFR (ml/min)			
1	0– 20	1.37 ± 0.19	0.97 ± 0.21	1.83 ± 0.26	ns	ns
2	20– 40					
3	40– 60	1.59 ± 0.16	1.04 ± 0.16	1.34 ± 0.18	< 0.05	ns
4	60– 80	1.47 ± 0.17	0.84 ± 0.11	0.91 ± 0.27	< 0.02	ns
5	80–100	1.34 ± 0.15	1.02 ± 0.20	0.94 ± 0.49	ns	ns
			TRF_{Na} (%)			
1	0– 20	0.04 ± 0.02	0.07 ± 0.03	0.03 ± 0.01	ns	ns
2	20– 40					
3	40– 60	3.16 ± 0.50	0.55 ± 0.10	4.02 ± 0.42	< 0.001	ns
4	60– 80	1.94 ± 0.52	0.29 ± 0.08	1.49 ± 0.17	< 0.001	ns
5	80–100	1.59 ± 0.54	0.35 ± 0.24	0.88 ± 0.26	ns	ns

[a] Means ± S.E. The infusion was given in the 2nd urine-sampling period. All values were calculated per 1 g of kidney weight.

besides its possible effect on the sodium transport[10], also play a role in causing the renal haemodynamics to promote sodium excretion during the extracellular fluid volume expansion.

Zusammenfassung. Es wird gezeigt, dass die Natrium- und Wasserausscheidung hypophysektomierter Ratten durch ein Hypophysenhinterlappenextrakt korrigiert werden kann. Es handelt sich dabei nicht um ADH und das natriuretische Prinzip scheint auch vom Oxytozin verschieden zu sein.

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Period of Teratogenic Vulnerability of Rat Embryo to Induction of Hydrocephalus by Tellurium

Congenital communicating hydrocephalus has been produced in the offspring of rats fed metallic tellurium throughout or during part of the gestational period[1–4]. The objective of this work was to delineate the precise period of teratogenic susceptibility of the embryo to tellurium by limiting the maternal administration of the metal to single injections on specific days of gestation.

In previous studies[2] the daily oral intake of tellurium by pregnant rats producing hydrocephalic offspring was 15.4 mg/kg as measured in metabolism cages. This dose was used as a rough guide in preliminary experiments designed to establish a teratogenic dose level using parenterally administered tellurium. Female Long Evans rats from our own inbred colony were bred and the morning of appearance of sperm was taken as day zero of pregnancy. Finely pulverized metallic tellurium (Merck, Darmstadt, Germany) suspended in olive oil was injected i.p. or i.m. into pregnant rats in single doses on specific days of gestation. These preliminary experiments demonstrated that an i.m. maternal injection of 13 mg/kg tellurium on day 9 of gestation resulted in hydrocephalic offspring with few fetal deaths. This dose of tellurium