Renal Sodium Handling under Prolonged Pentobarbital Anesthesia.* (18454)

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Certain advantages are offered by the convenient anesthetic agent, sodium pentobarbital, for investigation of renal problems where surgical intervention is required in acute experiments, including ease of administration and, generally, lack of effect on filtration rate and renal plasma flow(1). During the course of such investigations it was desired to know if pentobarbital significantly influenced the tubular mechanism for sodium reabsorption, a possibility suggested by the finding of an anti-diuretic-like action of the barbiturates(2). ADH is known to be natriuretic(3). The present report gives the results of observations on the sodium mechanism in dogs subjected to an anesthetic depth suitable for surgery maintained for approximately 5 hours.

Methods. Three trained female dogs weighing from 11.3 to 13.7 kg were used in these studies. In 3 experiments in each animal, following suitable control periods, 30 mg per kg of pentobarbital were administered intravenously. Additional small amounts were given to maintain uniform anesthesia as evidenced by respiratory rate and lid reflexes. Isotonic saline was given by stomach tube about one hour prior to the beginning of each experiment in an amount of 50 cc/kg of body weight. Simultaneously, 3 g of creatinine were injected subcutaneously. An intravenous priming dose of one-half gram of creatinine was given prior to the beginning of the clearance observations and again midway during the experiment. Each experiment was divided into 4 stages (with one exception of 3 stages), each consisting of usually 2 and sometimes 3 consecutive urine collection periods of about 15 minutes duration, with intervals of one to 1½ hours between stages. Urine was collected by indwelling catheter, and 2 rinses of distilled water followed by air insufflation terminated each period. Blood was drawn early and late in each stage from the jugular vein. During the experiment the dogs lay loosely

TABLE I. Renal Sodium Mechanism Under the Action of Sodium Pentobarbital Anesthesia.

Dog	Time, min.	P_{Na}, mEQ/L	C_{Cr}, cc/min.	Load, mEQ/min.	UV, mEQ/min.	Reabs., mEQ/min.	%† reabs.
A	C*	138.2	69.0	9.535	.055	9.480	99.4
	67	138.0	69.0	9.514	.236	9.278	97.5
	180	138.3	67.8	9.365	.178	9.187	98.2
	315	138.7	68.4	9.483	.140	9.343	98.1
B	C	141.7	48.2	6.810	.039	6.770	99.4
	73	141.6	48.2	6.832	.031	6.800	99.5
	185	142.0	57.8	8.175	.138	8.037	98.4
	291	141.4	52.2	7.376	.103	7.273	98.5
C	C	133.5	58.5	7.833	.027	7.806	99.7
	82	133.0	50.6	6.735	.030	6.705	99.5
	204	133.2	59.3	7.860	.069	7.791	99.2
	285	137.4	55.3	7.591	.027	7.564	99.7

* C = Control. Each datum in the table is avg of 3 exp. in each dog. Time is given from time of inj. to end of observation period.

† % of load reabsorbed averages 99.46 (S.D. ± 0.31) for control, and 98.75 (S.D. ± 0.78) for the periods during pentobarbital action. The standard error of the difference between means is 0.180, and P = <.01, a statistically significant difference.

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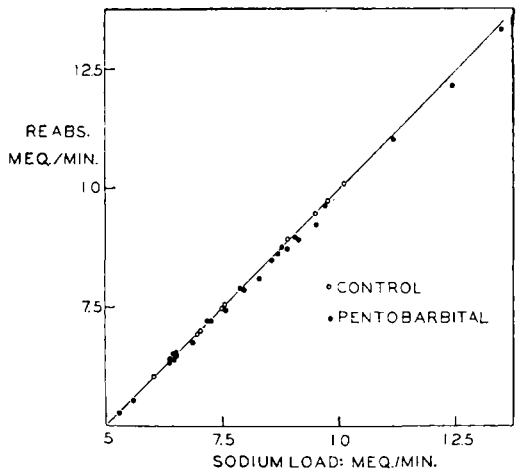

FIG. 1.

Showing the relationship of sodium reabsorption to load (filtration rate × plasma sodium conc.) in 9 exp. in 3 dogs. Duration of anesthesia was approximately 5 hr.

restrained on a padded dog board.

Creatinine clearance was used to measure glomerular filtration rate. Its concentration was measured in tungstate filtrates of the plasma and diluted urine by the alkaline picrate method. All analyses were in duplicate. Sodium was measured in diluted plasma and urine with an internal standard flame photometer. A correction factor of 0.95 was applied to the plasma sodium concentration for the Donnan effect.

Results. Emphasis is placed in Table I on the influence on tubular reabsorption of sodium as given in the last column in terms of the percent of the filtered load which is reabsorbed by the tubules before and during anesthesia. During the control periods an average of 99.46% (S.D. ± 0.31) is reabsorbed in all experiments. With pentobarbital, reabsorption averages 98.75% (S.D. ± 0.78) in all animals. Fig. 1 graphically illustrates the relation of reabsorption to load for each stage of observation. The solid line shows the trend of the control periods.

When the data on sodium excretion in Table I are examined critically it is seen that in every animal a perceptible, though variable, increase results during anesthesia. On the average, this represents an increase in excretion of 66 micro-equivalents over the control average of 41 micro-equivalents per minute. This increase in excretion results from the less than one percent decrease in reabsorption noted above. When this difference in reabsorption was analyzed statistically, it proved to be significant (P of $<.01$). However, in terms of physiological alterations generally observed during experimental procedures, *e.g.*, sodium loading(4) such small variations are considered unimportant.

Summary and conclusions. The influence of prolonged light surgical anesthesia with sodium pentobarbital on the renal tubular sodium reabsorptive ability was investigated in dogs initially given 50 cc per kg of isotonic saline by stomach tube. During time intervals averaging 5 hours, the tubules continued to reabsorb an average of 98.75% of the filtered load. The conclusion is reached that this anesthetic agent has a negligible effect on sodium reabsorption.

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Propagation of Pathogenic Fungi in the Yolk Sac of Embryonated Eggs.* (18455)

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Investigations now in progress in this laboratory show that the yolk sac of embryonated eggs provides superior nutritional and environmental conditions for the propagation of pathogenic fungi. That the chick embryo method should prove to be useful for the study of

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