both the glycolytic and HMP pathways in earthworm may be more active in cold than in normal ones, whereas in warm worms glycolytic pathway is less active than in the normal worms. This in its turn may suggest the breakdown of more sugars in cold- and less sugars in warm-adaptation. It has been pointed out[2] that the temperature adaptation results in quantitative changes in carbohydrate metabolism in crabs, rather than qualitative shifts. The increase in the activity of amylase in warm-adapted crabs may ensure the availability of more sugars in cold[17].

Zusammenfassung. Im Hepatopankreas der Krabben sind Fermentsysteme, die eine Wärmeadaptation besitzen. Diese lässt sich mit ähnlichen physiologischen Erscheinungen bei kaltblütigen Vertebraten vergleichen.

R. V. KRISHNAMOORTHY and V. VENKATA REDDY

Department of Zoology, Sri Venkateswara University, Tirupati and Department of Zoology, Government Arts College, Anantapur (Andhra Pradesh, India), 22 February 1968.

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Proximal Tubular Reabsorptive Capacity in Rats with Chronic Experimental Pyelonephritis

The classical concept of chronic pyelonephritis[1,2] assumes that the inflammatory process proceeds from the pelvis to the medullary interstitium, resulting in various types of tubular damage. Thus, normal glomeruli empty in severely damaged or disrupted tubules, or, on the contrary, aglomerular nephrons with almost intact tubuli are formed. Contrary to this concept, BRICKER[3] proposed an 'intact nephron hypothesis' suggesting that the seriously damaged nephrons participate only to a small extent in urine formation. Consequently, most of the urine is produced by intact or slightly damaged nephrons. In the course of the disease, the number of these nephrons decreases gradually. Recent micropuncture studies in rats with experimental pyelonephritis have consistently shown[4,5] that both proximal and distal reabsorption in nephrons, in which the tubular fluid movement is still demonstrable, do not differ essentially from those found in healthy rats. In these experiments, reabsorption was estimated using tubular fluid/plasma inulin concentration ratio. This method, however, fails to give accurate information about the intrinsic reabsorptive capacity of the tubular wall which can actually be decreased; this decrease may be overcome by tubular dilatation resulting in an increased reabsorptive surface, as described for example by WIEDERHOLT et al.[6] in epinephrectomized rats.

In this paper, the intrinsic reabsorptive capacity was measured in proximal tubuli of pyelonephritic rats using the shrinking-drop technique as described by GERTZ[7]; in this method, the half-time of the intratubular shrinkage of an isotonic saline drop injected between 2 oil drops is measured. The original method of GERTZ based on photographic recording of drop-shrinkage was replaced by direct measurements with a filar ocular micrometer. Transit time of fluid in the proximal tubule was measured with lissamine green according to STEINHAUSEN's method[8] modified by GERTZ et al.[9]. Fractional reabsorption in proximal convolution was calculated according to the equation of BRUNNER, RECTOR and SELDIN[10] originally introduced by GERTZ et al.:

$$\% \text{ reabsorption} = \left(1 - \frac{1}{\text{antilog } (0.301\ T/t_{1/2})}\right) 100$$

where T is transit time of lissamine green in proximal convolution, $t_{1/2}$ is half-time of the drop-shrinkage.

Our data (see Table) were obtained from 12 rats in which unilateral pyelonephritis according to PRÁT et al.[11] was produced by injecting a culture of *Escherichia coli* i.v. during temporary ligation of the (left) ureter. Within 5–6 weeks, the pathological picture of a granulated contracted pyelonephritic kidney developed. In another group of animals with experimental bilateral pyelonephritis, chronic fistula of the urinary bladder[12] had been prepared

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	No.	$t_{1/2}$	TT	FR	BUN
Controls (healthy rats)	16	8.87 ± 0.93	9.10 ± 0.67	50.9	11.45 ± 1.37
Controls (temporary ureteral ligation)	9	9.02 ± 1.08	8.75 ± 0.85	49.8	13.00 ± 1.57
Unilateral pyelonephritis (temporary ureteral ligation + *Escherichia coli* i.v.)	12	8.98 ± 1.40	9.27 ± 1.07	51.2	12.86 ± 0.93
Bilateral pyelonephritis (chronic fistula of the urinary bladder)	8	9.11 ± 1.27	9.19 ± 0.97	50.3	28.03 ± 2.76

No., number of animals; $t_{1/2}$, half-time of oil shrinkage; TT, transit time of lissamine green in proximal convolution (both values in sec); FR, calculated % reabsorption in proximal convolution; BUN, blood plasma urea nitrogen concentration, in mg%. Values presented as mean + residual standard error.

4–6 months before the micropuncture study. The rats were then deliberately kept in uncleaned cages to speed up the autoinfection of the urinary tract by microorganisms from the feces. Eight animals prepared in this way were investigated. These animals had significantly higher blood urea nitrogen values. Two control groups were used: intact animals, and rats with temporarily ligated ureters injected i.v. with sterile saline only. No differences in measured values, even in animals with obvious uraemia, were obtained. The results indicate that the proximal intrinsic reabsorptive capacity of superficial nephrons in pyelonephritic rats, even with obvious uraemia of mild degree, do not differ significantly from control rats. From this point of view, our data are in accord with BRICKER's 'intact nephron hypothesis'. These data do not provide an explanation for the lack in concentrating power repeatedly described in human chronic pyelonephritis. Further studies involving the state of the collecting ducts and renal medullary circulation will be required.

Zusammenfassung. Die tubuläre Resorptionskapazität und Passage-Zeit der Tubulusflüssigkeit wurde im proximalen Konvolut der Rattenniere mit experimenteller Pyelonephritis (mit und ohne Uraemie) gemessen. Es konnten keine Unterschiede zwischen gesunden und kranken Tieren gefunden werden, was für die BRICKERsche «Intact Nephron Hypothesis» sprechen würde.

J. HELLER, ALENA NOVÁKOVÁ and J. BROD

Institute for Cardiovascular Research, Prague-Krc (Czechoslovakia), 18 March 1968.

Venous Geometry as Determined by Venous Pressure

It has been repeatedly recognized that the cross-sectional area of veins appears to be far from circular even in physiological conditions[1]. Although this fact is generally acknowledged, current literature is lacking of even basic in vivo studies, supplying direct quantitative data and limitations either for individual venous sections or for various species[2]. This uncertainty might be accounted for by the fact that hitherto venous size changes, whatever their cause, have been investigated indirectly as changes in volume, capacity, pressure etc. Thus the actual configuration of the transectional area of the vascular channels investigated has been thought to be of minor if any importance.

Using, in a recent study[3], a more direct method of establishing sympathetic control of collecting veins, it became, on the other hand, essential to explore as accurately as possible the limits within which the configuration of the venous cross-sectional area – from elliptical to circular – might be determined.

Segments approximately 8 cm in length of femoral veins of 11 penthotal-anaesthetized dogs were exposed free from surrounding tissue and hemodynamically isolated by tying off all branches, including proximal connection. Through a canula inserted in the peripheral end, the segment was connected with a saline-filled reservoir to adjust transmural pressure to the desired level. After transmural pressure was established, the venous segment was frozen (Propan-butan mixture at liquid nitrogene temperature) and immediately afterwards their shape (i.e. their circumference) was determined by the aid of an instrument very similar to that used (to determine tooth-shape) in dentistry (dentimeter).

The 'venous-shaped' forms (0.05 mm thin wire) were photographed (Figure 1) and then in 10-fold magnification the major and the minor axis (perpendicular to each other) were measured by the aid of a micrometer.

The ratio of the 2 axes (major axis, i.e. horizontal diameter D_{max}, minor axis i.e. vertical diameter D_{min}) was calculated and related to the actual transmural pressure.

As apparent in Figure 2, the D_{max}/D_{min} ratio higher than 1.6 at VP 2 cm H_2O with increasing transmural pressure declines sharply to values near 1.1 at PV 10 cm. At higher transmural pressure D_{max}/D_{min} ratio approximates asymptotically unity which indicates the diameter is practically identical in either direction. Consequently, at transmural pressure above 16.0 cm H_2O the cross-sectional area of the vein is to be considered as circular.

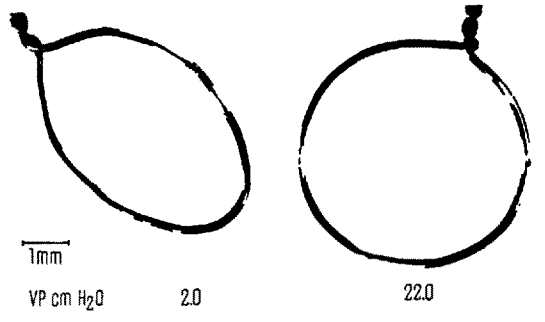

Fig. 1. Samples of the circumference of the dog's femoral vein as determined by the method described.

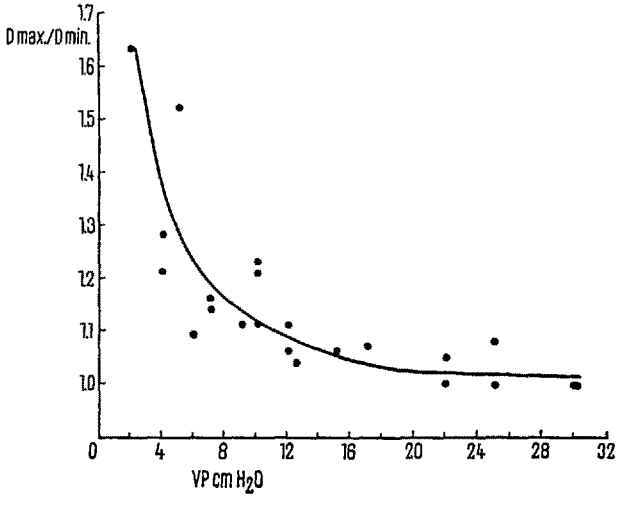

Fig. 2. Major to minor axis ratio (D_{max}/D_{min}) of the femoral vein (abscissa) related to transmural pressure (PV, cm H_2O, ordinata).

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