1966 #5

DIODRAST I^{131} TRANSPORT BY ISOLATED PERFUSED RENAL TUBULES

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In order to study the kinetics of organic acid secretion proximal renal tubules of the flounder, Pseudopleuronectes americanus, were dissected and individually perfused using a method previously developed for rabbit nephrons (Am. J. Physiol. 210:1293-98, 1966). Perfused tubules 1.0 to 3.3 mm long were immersed in a bath containing balanced salt solution which was gassed with 100% oxygen and maintained at 15° C. The tubule lumen was perfused with an identical solution. Diodrast I^{131} was added to the outside bath, and Diodrast transport was estimated from the accumulation of I^{131} in the perfused fluid. In some experiments the tubule lumen was filled with mineral oil at the termination of perfusion and Diodrast I^{131} concentration in the renal tubule cells was also measured.

In control studies with 2×10^{-5}M Diodrast in the bath and a mean tubule fluid flow rate of 3.07×10^{-9}L min^{-1} the ratio of concentration of Diodrast I^{131} (tubule fluid/outside bath) was 17.2 ± 3.2 (11) (mean ± SEM (number of studies)) during the first hour of perfusion and the Diodrast transport rate into the lumen was $9.12 \pm 1.61 \times 10^{-10}$ M $cm^{-2}min^{-1}$(11).

This represented a transport maximum for Diodrast since increasing the Diodrast concentration to 2×10^{-4}M did not result in increased Diodrast transport. In contrast when Diodrast concentration in the outside bath was decreased below 2×10^{-5}M, there was a decrease in transport rate. The transport maximum for Diodrast was little affected by changes in tubule fluid flow rate between 1.84 and 12.6×10^{-9}L min^{-1}. A mean increase in flow rate of 4.19 times resulted in an increment in transport rate of only 1.16 ± .03 (8) times. This is contrary to the findings of Deetjin (Pflugers Archiv. 285:35-44, 1965) in rat proximal tubules perfused in vivo. He found that, when perfusion rate was altered, the "transport maximum" for PAH changed proportionally.

In those control studies in which the tubule cells were analyzed the concentration of Diodrast I^{131} was found to be higher in the cells (cell/bath ratio 133 ± 36.7 (5)) than in the tubule fluid (tubule fluid/bath ratio 14.5 ± 5.8 (5)). Accordingly, it is suggested that Diodrast is actively transported from the bath into the tubule cells against a concentration gradient and subsequently diffuses across the luminal border of the cells into the tubule fluid. This is contrary to the conclusion reached from previous studies of chlorphenol red transport in which the major active transport step was found to be from cell into lumen. The difference may be due to the different organic acid used or to the difference in experimental conditions, since there was no flow in the lumen during the chlorphenol red studies.