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### RENAL LYMPH OXYGEN TENSION DURING GRADED RENAL ISCHEMIA

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Concentrations of respiratory gases in tissues such as the kidney are important for several reasons. They indicate the relationship between oxidative metabolism of renal tissue and it's blood supply. They help us to understand the inter-relationship between external respiration, blood and internal respiration.

Since lymphatics drain the interstitial spaces, we felt that renal lymph fluid would serve as a useful means of assessing tissue oxidation.

Renal capsular lymphatics were cannulated in ten anesthetized mongrel dogs. Renal lymph was collected under mineral oil. An endotracheal tube was connected to an automatic respirator. Compressed air was administered to seven animals. Oxygen-air (20-80%) was administered to the remaining three. Renal ischemia was produced by a Goldblatt clamp. An electro-magnetic flow-meter gauged the degree of renal arterial constriction.

The normal renal lymph oxygen tension is listed in tabular form (Table I). Mean renal lymph oxygen tension was 150 mm of Hg. Corresponding femoral arterial oxygen tension was 99 mm of Hg. (mean). The mean renal venous oxygen tension was 64 mm of Hg.

From the Department of Surgery/Urology, Harbor General Hospital and the University of California (Los Angeles) School of Medicine. Supported by U. S. Public Health Service Grant HE-09834-02, and the National Aeronautics and Space Administration NSG 237-62. Renal ischemia (50%) resulted in a reduction in lymph oxygen tension.  $PO_2$  was now 75-115 mm of Hg.

Our data would suggest that oxydative metabolic processes are extremely

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active within the kidney. Renal lymph oxygen tension levels significantly exceeded the arterial levels. The relatively high level of oxygen tension at the renal interstitial level was completely unexpected. Our findings are not in keeping with the levels published by Bergofsky et al.<sup>1</sup> who monitored thoracic duct lymph concentrations of respiratory gases. Their oxygen tension value of 40 mm of Hg. is much lower than our renal lymph levels.

Further work in this area is clearly indicated. Underway in our laboratory are studies determining lactic acid/pyruvic acid concentrations in renal lymph fluid. It would appear that the kidney has a number of efficient enzymatic processes for storage of oxygen.

#### REFERENCE

1. Bergofsky, E. H., Jacobson, J. H. II and Fishman, A. P.: The use of lymph for the measurement of gas tensions in interstitial fluid and tissues. J. Clin. Invest. 1962, 41:1971.

TABLE I

#### NORMAL RENAL LYMPH OXYGEN TENSION

DOG #	LYMPH PO <sub>2</sub>	ARTERY PO <sub>2</sub>	RENAL VEIN PO <sub>2</sub>
1	158 mm Hg	64 mm Hg	56 mm Hg
2	133	90	59
3	142	99	76
4	166	98	55
5	138	146	80
6	166	100	57
MEAN --	150 mm Hg	99 mm Hg	64 mm Hg

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