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RENAL LYMPHATIC FUNCTION FOLLOWING VENOUS PRESSURE ELEVATION

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ABSTRACT

The renal lymphatic system plays an important role in removing excess fluid from the kidneys. Unfortunately, the factors influencing lymphatic flow are difficult to measure. We used a simple model to represent renal lymphatics as a single pressure source (P_L) pushing lymph through a single resistance (R_L). In anesthetized dogs, we cannulated renal lymphatics and measured lymph flow rate (Q_L) as we varied pressure (P_O) at the outflow end of the lymphatics. There was no significant change in Q_L as we increased P_O from -5 to 0 cm H_2O. In other words, there was a plateau in the Q_L vs. P_O relationship. At higher P_O's, Q_L decreased linearly with increases in P_O. From this linear relationship, we calculated R_L as - P_O/ Q_L and we took P_L as the P_O at which Q_L = 0 µl/min. At baseline, R_L = 0.34 ± 0.14 (SD) cm H_2O min/µl and P_L = 8.2 ± 4.4 cm H_2O. When we increased renal venous pressure (P_V) from baseline (3.5 ± 3.0 cm H_2O), the plateau in the Q_L vs. P_O relationship extended to higher P_O's, R_L decreased, and P_L increased. Renal interstitial fluid volume and interstitial pressure increased following elevation of P_V. The extension of the Q_L vs. P_O plateau with increasing P_V suggests that renal interstitial pressure may partially collapse intrarenal collecting lymphatics which may compromise lymph flow.