962-92-1225 **Harold Layton*** (layton@math.duke.edu). *Oscillations Mediated by Tubuloglomerular Feedback (TGF): Physiological Role and Pathophysiology.*

Nephrons, the functional units of the kidney, are tubules that produce urine from blood plasma. Experiments by others have shown that the flow of water and NaCl through the lumina of the nephrons may exhibit limit-cycle oscillations. A simple mathematical model indicates that the LCO emerge when delays in the TGF system are sufficiently long and the TGF gain magnitude γ exceeds a critical value γ_c. Model results, coupled with physiological experiments by others, indicate that γ may normally be maintained near γ_c. Numerical studies suggest that the transition from time-invariant steady states to LCO may increase NaCl excretion while leaving water excretion little affected. Analytical results and numerical evidence suggest that irregular oscillations mediated by TGF, which arise in some hypertensive rats, may be explained by a superposition of oscillatory modes, coupled with normal physiological perturbations. This research was supported in part by NIH grant DK42091. (Received October 02, 2000)