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1003-92-241 **Amanda L Hattaway*** (hattawaya@wit.edu), 550 Huntington Ave, Wentworth Institute of Technology, Department of Applied Mathematics, Boston, MA 02115. *Modeling Tubuloglomerular Feedback in Coupled Nephrons with Backleak*. Preliminary report.

Tubuloglomerular feedback (TGF) is a delayed negative feedback mechanism that stabilizes the glomerular filtration rate (renal blood flow) and saltconcentration in a single nephron, the basic filtering unit of the kidney. Fluid flow through the nephron exhibits three distinct patterns. It may flow at a constant rate, or it may oscillate in one of two ways: regularly or chaotically. Earlier models indicate that the TGF mechanism plays a role in the mediation of both a constant flow rate and limit cycle oscillations. However, these models do not incorporate the influence of backleak (diffusion) in coupled nephrons (those that are linked anatomically by their vasculature). This paper examines the effects of backleak on coupled nephrons. The main result is that backleak stabilizes the system: coupled nephrons with backleak exhibit steady flow rates at higher feedback gains than do those without the influence of backleak.

Numerical methods are developed and implemented to study the predictions given by the bifurcation analysis. (Received October 05, 2004)