1027-92-164 **Joseph M. Mahaffy*** (mahaffy@math.sdsu.edu), Department of Mathematical Sciences, San Diego State University, San Diego, CA 92182. *Modeling Type 1 diabetes in NOD mice.*

Type 1 diabetes (T1D) is an autoimmune disease in which immune cells, notably T-lymphocytes target and kill the insulin-secreting pancreatic beta cells. Elevated blood sugar levels and full blown diabetes result once a large enough fraction of these beta cells have been destroyed. Recent investigation of T1D in animals (the non-obese diabetic (NOD) mice) has revealed large cyclic fluctuations in the levels of T cells circulating in the blood weeks before the onset of diabetes, but the mechanism for these oscillations is unclear. A mathematical model for the immune response suggests a possible explanation for the cyclic pattern of behaviour. We show that cycles similar to those observed experimentally can occur when activation of T cells is an increasing function of self-antigen level, whereas the production of memory cells declines with that level. Our model extends previous theoretical work on T cell dynamics in T1D, and leads to interesting nonlinear dynamics, including Hopf and homoclinic bifurcations in biologically reasonable regimes of parameters. This is work I accomplished while on sabbatical at the University of British Columbia with Professor Leah Keshet. (Received February 26, 2007)