1125-92-1059 **D. I. Wallace*** (dwallace@math.dartmouth.edu), Department of Mathematics, Dartmouth College, Hanover, NH 03755. *A nested model of tumor growth tuned across multiple experiments.*

Cancer cell lines that have the capacity to form solid tumors can be cultured, studied and experimented upon in three modalities outside the human body. Monolayer in vitro cultures represent unrestrained exponential growth of cells in the presence of abundant nutrient. Three dimensional in vitro result in a growing ball of cells that develop a tripartite structure with a central necrotic core, an actively proliferating rim, and an intermediate zone of hypoxic quiescent cells. Spheroids remain alive but cease growth due to be the presence of a by-product of necrosis, TNF-alpha, that induces apoptosis. Xenograft experiments in vivo include the growth of vasculature in response to VEGF signaling by tumor cells which are either hypoxic or which, although proliferating, produce VEGF in response to TNF-alpha. In the presence of growing vasculature, the process that restrains growth of an in vitro spheroid is overcome, and the tumor grows again. A tumor cell is the same organism whether grown in monolayer, 3-D spheroid, or xenograft culture. A model for such an organism should have the capability of describing growth in all three scenarios. Here we present a system of nonlinear ODE's tuned to a series of results in monolayer, spheroid, and xenograft experiments. (Received September 14, 2016)