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998-92-430 **Marek Kimmel*** (kimmel@rice.edu) and **Anna Marciniak - Czochra** (anna.marciniak@iwr.uni-heidelberg.de). *Modeling spread of tumors along linear and tubular structures.* Preliminary report.

Growth and morphogenesis in nodular tumors was already studied using the formalism of reaction-diffusion systems. Notably, Chaplain et al. (2001) examined spatio-temporal pattern formation in reaction-diffusion systems on the surface of the unit sphere in 3D. Also, systems with linear structure were applied for studying morphogenesis of hydra (a primitive metazoan with tubular body plan). These were mostly devoted to explanation of the results of cutting and grafting experiments (Meinhardt 1993, Sherrat et al. 1995, Marciniak-Czochra 2002). In this paper, we consider a simple model of a tubular sheet of proliferating cells sensitive to a hormonal regulator (called "growth factor" further on). In the absence of diffusion, the growth factor maintains a stable equilibrium of the number of cells in the sheet. If the growth factor is allowed to diffuse over the tubular sheet, and the diffusion coefficient is large enough, the equilibrium, as we will demonstrate, becomes unstable to perturbations. Simulations show that instabilities result in an increased growth rates of cells at certain spots of the sheet. The tubular sheet may be considered a model for a population of cancer cells along linear structures such as blood vessels, ducts in the breast, or small bronchi in the lungs. Consequently, the destabilization of the steady state is interpreted as leading to further growth and invasion of the tumor. (Received March 17, 2004)