1056-92-1570 **Christina Rose Kyrtsos*** (crkyrtso@umd.edu), 2243 AV Williams Bldg, University of Maryland, College Park, MD 20742, and **John S Baras** (baras@umd.edu), 2247 AV Williams Bldg, University of Maryland, College Park, MD 20742. *A Systems Biology Approach to Modeling Alzheimer's Disease.* Preliminary report.

A mathematical model for Alzheimer's disease (AD) has been developed using a systems biology approach. A cellular network of neurons, microglia and astrocytes has been created to model the levels of beta amyloid in the brain. The production and spatial distribution of beta amyloid, the key protein implicated in AD, has been modeled using the reaction-diffusion equation, where reaction rates have been modeled using stochastic functions. Neurons have been modeled using a previously developed McCulloch-Pitts neural network modified to account for neuronal cell death and loss of synaptic elements during high beta amyloid levels. Microglia are either in the ramified state and modeled using a continuous random walk model, or in the activated state and modeled using the Langevin equation of motion. Astrocytes are defined to set locations and contribute to removal of beta amyloid from the brain interstitial fluid. The roles that local cerebral blood flow, transport across the BBB, and local reactions play have also been modeled. Future work will look at the development of amyloid beta plaques in the cerebrovasculature and brain parenchyma, and their relationship to observed decreases in cerebral blood flow as the disease progresses. (Received September 22, 2009)