1023-92-1119 **Olga Yuliana Noris*** (olga_noris20@yahoo.com), 480 Aurora Drive Apt#216, El Centro, CA 92243, and **Diana W. Verzi**, 720 Heber Ave., Calexico, CA 92243. *A Compartmental Model for an Activity-Dependent Perforated Synapse.*

Dendritic spines are tiny protrusions from the arbor of a neuron in the central nervous system. Interdependent changes in the morphology and activity of spines have been associated with learning and memory. For over a decade, experimentalists have observed perforations in post-synaptic densities (PSDs) on dendritic spines after induction of long-term potentiation. In more recent work, they suggest that activity-dependent intraspine calcium may regulate the surface area of the spine, and reorganization of PSDs.

In this paper, we develop a model of a dendritic spine with the ability to perforate both PSDs and entire areas of the spine, resulting in a dendritic spine with two heads. Dynamic equations incorporate calcium as a second messenger in regulating morphology; activity affects compartmental calcium, which regulates surface area. Conversely, surface area affects whether or not the spine initiates an action potential, as modeled by Hodgkin-Huxley kinetics. Results indicate that merely splitting the post-synaptic receptors on the surface of the spines does not change the efficiency of the synapse. However, when surface area is a dynamic variable, efficiency of the synapse can change continuously over time. (Received September 25, 2006)