

Spiros Efthimiopoulos, Ph.D.

National and Kapodistrian University of Athens

Athens, Greece

The Interrelationship of Ca²⁺ Homeostasis and APP/Homer Interaction

2009 Investigator-Initiated Research Grant

All cells, especially nerve cells, must maintain tight control of their interior calcium levels, a condition known as Ca²⁺ homeostasis. There is evidence, however, that Ca²⁺ homeostasis in brain cells is disrupted in persons with Alzheimer's disease. Such disruption could lead to brain dysfunction and nerve cell death.

Cells use a number of different systems to maintain Ca²⁺ homeostasis, including Ca²⁺ pumps, and ion channels in the cell membrane and in the membranes of organelles inside the cell. Although each of these systems is unique, they share some common properties, one of which is a close association with a family of proteins known as homer proteins.

Spiros Efthimiopoulos, Ph.D. and colleagues have observed that amyloid precursor protein (APP), a key focus of research into the causes of Alzheimer's disease, also interacts with homer proteins. This interaction may help to explain the loss of Ca²⁺ homeostasis in persons with Alzheimer's disease. Dr. Efthimiopoulos and colleagues plan to examine in detail the interactions between APP and homer proteins, how that interaction affects Ca²⁺ homeostasis, and how Ca²⁺ levels inside the cell affect APP-homer interactions. These studies will examine one of the key pathologic features of Alzheimer's disease, and they may provide valuable clues into potential targets for drug development.