

Thesis Title Aluminum Chloride-Induced Effects On
 Rat Hippocampal Cell Cultures : A
 Feasible In Vitro Model for the Study
 of Alzheimer's Disease

Name Ratana Konggrapan

Degree Master of Science (Neurosciences)

Thesis Supervisory Committee

Wipawan	Thangnipon,	Ph.D.
Piyarat	Klangkalya,	Ph.D.
Vilai	Chentanez,	M.D.,Ph.D.

Date of Graduation 31 May B.E. 2537 (1994)

ABSTRACT

Aluminum chloride effects on hippocampal cell cultures from embryonic rat brains (18 days old) were studied in an in vitro system. Compared with untreated cultures, less neuronal cell density was demonstrated in the aluminum-treated cultures after 3 days of exposure to AlCl_3 (2-8 mM). Trypan blue exclusion studies indicated that exposure of hippocampal cell cultures to AlCl_3 apparently had deleterious effects on neuronal viability. This suggests that aluminum causes considerable neuronal degeneration and death; aluminum may directly bind to neurofilaments and induce neurofilament accumulations in neuronal perikarya, which are associated with eventual death

of nerve cells. Immunocytochemical results revealed that the number of CaBP-immunoreactive neurons was markedly reduced as time of exposure and AlCl_3 concentration increased. A significant decrease in the number of ChAT-immunoreactive neurons was also observed in aluminum-treated cultures. Our findings imply that the mechanism of aluminum-induced reduction of the population of hippocampal cell cultures may be due to the interaction of aluminum with calbindin D28k, which then caused a disturbance of Ca^{2+} homeostasis. These interactions may suggest a mechanism for the impaired axoplasmic transport of neurofilaments. Aluminum is of special interest, as it appears to be closely associated with neurons undergoing neurofibrillary tangles as in Alzheimer's disease. It would appear that our results therefore support the possibility that aluminum neurotoxicity may represent one contributing factor in the development of neurofibrillary pathology.