

Title: Provocation of sudden death in animals related to metabolic abnormalities of magnesium and potassium

Motoomi Nakamura, Shimako Abe and Yoshinobu Goto*

Graduate school of Health and Nutrition Sciences, NAKAMURA-GAKUEN and

*Institute of Neurology, Kyushu University Medical School,
Fukuoka, Japan

Summary

Magnesium (Mg) deficiency can cause generalized seizure and sudden death in animals. The role of Mg deficiency in sudden infant death syndrome and cardiac arrhythmias remains unclear. In vitro studies suggested that decrease in extracellular Mg ion leads to epileptiform discharge in human epileptogenic neocortex, which was prevented by N-methyl-d-aspartate (NMDA) receptor blocker.

We induced seizure and sudden death by exposing Mg deficient rats to white-noise and electrocardiograms and electroencephalograms were recorded before, during and after seizure, apparently the first such documentation. Thereafter, effects of intraperitoneal administration of NMDA receptor blocker were studied.

The NMDA receptor blocker but not the non-NMDA blocker completely prevented the induction of seizure, while Mg deficiency and hypomagnesemia in rats caused no tachyarrhythmia but marked bradyarrhythmia was evident during seizure. We conclude that white-noise-induced seizure in Mg deficient rats is linked to increased neuronal excitability via the NMDA receptor in the brain.