The Role of Neuronal Nitric Oxide Synthase on the Anti-Seizure Effects of 5-HT1A Receptors in Perforant Pathway Kindling Model in Rat

Zinat Heidarnia1, Mohammad Mohammadzadeh2*, Sajad Sahab Negah3

1 Physiology Department, Sabzewar University of Medical Sciences, Sabzewar, Iran
2 Physiology Department, Mashhad University of Medical Sciences, Mashhad, Iran
3 Neuroscience Department, Mashhad University of Medical Sciences, Mashhad, Iran

Abstract

Neuronal nitric oxide synthase (nNOS) plays a role in synaptic potentiation and kindling process. The relationship between nNOS and 5-HT1A receptors also nearly has been specified. In this research, we investigate the role of nNOS on the anticonvulsant effect of 5-HT1A receptors. 24 male (280 ± 30 g) were randomly assigned to four groups (vehicle, NI, Way 100635 and NI + Way100635) (n = 6). Animals received one of the above compounds 30 min before application of the kindling stimulus. In the NI + Way100635 group, 10 min later intraventricular injection Way100635, intraperitoneal nitroindazole (NI) was injected. After application daily stimulation (12 times a day, with a 5 minute interval), up to five days, the seizure and electrophysiological quantities (after discharge duration and local field potentials) were recorded and measured. Data analysis showed that the Way100635 and NI + Way groups were kindled significantly faster than the vehicle group (P <0.001). The changes in afterdischarge duration increased in the NI + Way group over the five days when compared to the control group, but was not significant (P> 0.05). Also, the slope of field potentials in the NI + Way group was significantly higher than that of the vehicle group (P <0.05). Likely, nNOS is one of the mediators of the inhibitory effect of serotonin 5-HT1A receptors, and activating this pathway augments the anticonvulsant effects of serotonin.

Keywords: Serotonin, Kindling, Nitric Oxide Synthase, Seizure

*Corresponding Author: Mohammad Mohammadzadeh
E-mail: mohammadzadehmh@mums.ac.ir