Immunoreactivity for calretinin in interneurons of the hippocampal CA1 field and dentate gyrus in adult rats after administration of habanero peppers (Capsicum chinense Jacq.)

J. Jaworska-Adamu¹, A. Krawczyk¹, K. Rycerz¹, M. Gołyński², A. Wawrzyniak¹, K. Lutnicki², I. Balicki³

¹Department of Animal Anatomy and Histology, Faculty of Veterinary Medicine, University of Life Sciences, Akademicka 12, 20-033, Lublin, Poland
²Subdepartment of Internal Diseases of Farm Animals and Horses, Faculty of Veterinary Medicine, University of Life Sciences, Głęboka 30, 20-612 Lublin, Poland
³Department and Clinic of Animal Surgery, Faculty of Veterinary Medicine, University of Life Sciences, Głęboka 30, 20-612 Lublin, Poland

Abstract

Calretinin (CR), a calcium-binding protein from EF-hand family, is localised in non-pyramidal GABA-ergic interneurons of the hippocampus. CR takes part in maintaining calcium binding homeostasis, which suggests its neuroprotective role. Hippocampal neurons contain membrane transient receptor potential vanilloid 1 (TRPV1) which binds to capsaicin (CAP) contained in habanero pepper fruits. Few in vivo studies have revealed the effect of CAP on interneurons containing CR. The aim of the present study was to investigate the CR immunoreactivity in interneurons of the hippocampal CA1 field and dentate gyrus (DG) in adult rats after intragastric administration of the habanero pepper fruits. Wistar rats received a peanut oil – control group (C), and oil suspension of habanero pepper fruits at doses of 0.025 g dm/kg b.w. – group I and 0.08 g dm/kg b.w. – group II for 28 days. After euthanasia, the brains were collected and embedded in paraffin blocks using a routine histological technique. Frontal hippocampal sections were immunohistochemically stained for CR by using a peroxidase-antiperoxidase method. CR immunoreactive (CR-IR) interneurons were morphologically and morphometrically analyzed under a light microscope. The results showed similar shapes and distribution of cells in both areas of the brain in group C and I of animals. However, CR-IR interneurons in the hippocampal CA1 field and in DG were occasionally observed in the group II of rats.

The results of morphometric studies did not reveal statistically significant differences in the surface area and shape index of cells between examined brain regions from groups I and II compared to group C.

Only in group II of rats, an increase in the digital immunostaining intensity of CR-IR interneurons was found in DG. Low number of CR-IR interneurons in the hippocampal CA1 field and in the DG, under the influence of a large dose of habanero pepper fruits containing CAP, may be caused by the activation of TRPV1 receptors and the increase in Ca2+ ions in these cells. This phenomenon may ultimately lead to neuronal death and may disturb neuronal conduction.

Key words: capsaicin, interneurons, calretinin, hippocampus, rats

Correspondence to: J. Jaworska-Adamu, jadwiga.jaworska@up.lublin.pl