EDITORIAL

Role of Antioxidants Treatments on Oxidative Stress and Calcium Entry in Neurological Disease: Focus on TRP Channels

Calciumion (Ca^{2+}) plays an important role in many cellular responses of neurons. Ca^{2+} passes the cell membranes through different cation channels. One key source of Ca^{2+} entry into sensory neurons is the opening TRP channels. The TRP channel superfamily includes TRP canonical (TRPC), TRP vanilloid (TRPV), TRP melastatin (TRPM), TRP polycystein (TRPP), TRP mucolipin (ML), and TRP ankyrin (TRPA) subfamilies. Some subfamilies of the TRP channels such as TRPV1 and TRPM2 are activated by oxidative stress and they are involved in oxidative stress-dependent Ca^{2+} homeostasis disruption in neuronal cells. In the recent years, evidence has been presented showing that Ca^{2+} entry-induced oxidative stress is related to activation of TRP channels such as TRPA1, TRPV1 and TRPM2, and it is also related to neurological diseases such as neuropathic pain, epilepsy and depression. For this special issue, I invited expert reviews of therapeutic targets on the roles of oxidative stress, Ca^{2+} influx and neurological diseases, including its involvement in the functioning of some neuronal and brain cation channels such as TRPA1, TRPV1 and TRPM2. In addition I invited antioxidants treatment papers on oxidative stress and calcium entry in neuronal channels. In the special issue, there are six review papers. In the first review paper, Dr. Mori and his colleagues investigated oxidative stress, cysteine and thiol groups on activation of TRPA1 channels. In the second review paper, Dr. Savaskan and his colleagues reviewed the mechanisms of glutamate release via the glutamate/cystine antiporter CT and role of TRP channels on malignant gliomas in the tumor microenvironment. In third and fourth papers, we reviewed role of TRP and TRPV1 channels in psychiatric disorders and epilepsy, respectively. In the fifth paper, Dr. Akbarali and Dr. Kang reviewed the post-translational modifications of calcium and potassium channels in smooth muscle cells during colonic inflammation. In the last paper, Dr. Zholos summarized the current knowledge of TRP channels in sensing oxidative, chemical irritant and temperature stimuli by discussing expression and function of several TRP channels in relevant cell types within the respiratory tract, ranging from sensory neurons to airway smooth muscle and epithelial cells.

In conclusion, it seems that oxidative stress plays an important role in activation of many TRP channels, including TRPA1, TRPM2 and TRPV1 channels. As yet, the TRP channels have not been fully recognized as a potentially novel drug target by the drug industry. In the future, there is a need to investigate TRPV1 channel inhibitors as possible new neuronal diseases drugs.

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