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&6th International Conference on **Vascular Dementia** February 27-March 01, 2017**Electric axon guidance in embryonic retina: Involvement of integrins****Masayuki Yamashita**

International University of Health and Welfare, Japan

The axons of embryonic brain, spinal cord and retina extend along the extracellular voltage gradient towards the cathode in a process known as galvanotropism. In embryonic nervous tissues, positive direct current (DC) potentials are generated by neuroepithelial cell's sodium transport, of which disruption results in erroneous axon path-finding, suggesting that electric fields play a pivotal role in orienting newborn axons. However, the experimental evidence was lacking for the cell surface molecule that is activated asymmetrically in an electric field. Here, it is shown that integrin activation mediates electric axon guidance. Retinal strips of chick embryos were embedded in Matrigel[®], and cultured in the electric field of the same strength as that in vivo (15 mV/mm). Matrigel[®] contained the same extracellular matrix proteins as in the embryonic retina, laminin and collagen, to which integrins bind. Retinal ganglion cell axons extended towards the cathode. A monoclonal anti-chicken integrin antibody (TASC), which enhances integrin-ligand binding, accelerated the cathodal growth. A reduction in the extracellular free Ca²⁺ with EGTA also enhanced the cathodal growth, which suggested that millimolar Ca²⁺ inhibited axon growth, and also that the influx of Ca²⁺ was unlikely to be essential for cathodal steering. In the presence of Mn²⁺, which non-specifically activates integrin-ligand binding, the axons formed local meshes. These results suggested that the inhibition of integrins by the extracellular Ca²⁺ underlies electric axon guidance.

Biography

Masayuki Yamashita is a Professor of Physiology at International University of Health and Welfare. He completed his PhD in Department of Neurophysiology, University of Tokyo in 1986. He moved to National Institute for Physiological Sciences (Okazaki, Japan) as a JSPS Fellow and a Research Associate. In 1989, he started physiological studies of retina in Department of Neuroanatomy, Max-Planck-Institute for Brain Research. After the reunification of Germany, he moved to the Department of Physiology, Osaka University Medical School. He studied the calcium signaling systems in embryonic chick retina. Then, he moved to the Department of Physiology, Nara Medical University as a Professor (1999-2014). He has been interested in "The electrophysiological properties of neuroepithelial cells and newborn neurons". The retina is a nice model for studying the early development of central nervous systems.

my57@iuhw.ac.jp

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