Brain dystrophin-glycoprotein complex: Persistent expression of beta-dystroglycan, impaired oligomerization of Dp71 and up-regulation of utrophins in animal models of muscular dystrophy

ABSTRACT

The implication is that -dystroglycan is linked to membranes at the vascular-glial interface in the forebrain. In contrast, dystrophic skeletal muscle fibres do not deprive all dystroglycins from their roles, and utrophin may counteract brain dystropin deficiencies by partially dissolving them. Dystrophin isoform Dp71's abnormal oligomerization may be involved in the pathophysiology of abnormal brain functions.

INTRODUCTION

Astrocytes are the most abundant type of cell in the central nervous system, and as such they are closely involved in modulating the activity of neuronal components and are involved with many important physio-pathological brain events including synthesis and secretion of (Neuro)trophic growth factor. Furthermore, it has been established that neurotrophin-mediated signalling may not be the exclusive factor influencing astrocyte-neuron interactions. The formation of distinct intercellular connections (gap junctions) between two cell populations, which facilitate the exchange of chemical signals (ions, small metabolites) from one cell to another and facilitate communication with adjacent neurons, may provide an additional, rapid and unique method for astrocytes to communicate with each other and interact with neighboring neurons. The modulation of astrocyte functions in mammalian symbiosis is often achieved through the use of extracellular physiological agonists, which can increase intracellular Ca2+ concentrations via voltage-dependent channels or controlled release from internal stores. The coordination of astroglial function is believed to be dependent on the transmission of Ca2+ waves through gjs. The origin and dissemination of Ca2+ waves were initially observed in brain-derived cell populations during culture, but this phenomenon has since been confirmed in more complex systems, including brain slice preparations and living rat brain. Despite the significant number of contributions published in the last decade, the mechanism responsible for Ca2+ waves' origin and propagation is still unclear. Furthermore, there is limited data available from in vivo experiments, particularly those on human astrocytes. Around ten years ago, an artificial glioblastic cell line was formed using human (GL15) cell lines. By studying the cell karyotype and immunohistochemical and cytogenetic demonstration of glial fibrillary acidic protein (GFAP) expression, they were able to characterize GL15 cells as an astrogliAL-like cell line by characterising them as such. In addition, the GL15 cellular population contained other astroglial biochemical traits that were found to be unique to astrolites, such as glutamine synthetase expression, taurine transport, transforming growth factor receptor expression and interleukin-induced cytotoxicity. The data from the previous studies indicate that astroglial phenotypes exist, but there is no conclusive evidence available to date regarding the essential physiological features of the GL15 cells related to their differentiation. As resolue to investigate the mechanism(s) of cell communication within astrocytes, we decided to focus on one of our most important concerns in physiology. GL15 cells are considered an ideal in vitro model of astrocytes due to their ability to communicate with other living cells through membrane surface receptor-operated systems and/or gjs. We define the features of this model by analyzing some morphological aspects, the mechanism of [Ca2+]i

increase induced by different extracellular physiological agonists, and the expression and functional capacity of the gjs system in relation to the differentiative pathway.

CONCLUSION

Myelin is believed to have an inhibitory effect on neurite outgrowth caused by white matter geometry, as indicated by the orienting influence. Despite the fact that myelin can hinder regeneration by disrupting its geometry near the injury site, it is no longer sufficient to prevent regeneration. Although myelin's direct influence on axonal development in an intact tract is ineffective in vitro, it may still be effective in regulating axial growth within intact tissues. Myelian may therefore restrict growth to lateral, parallel directions, and thus promote directed, long-distance growth. The promotion of parallel axonal growth and discouragement of non-parallel growth are factors that should be considered when it comes to long-distance regeneration of the spinal cord. Many researches have been successful in stimulating axonal regeneration at spinal cord or optic nerve injury sites by blocking the myelin-associated inhibitor Nogo. However, these axels often fail to return to their normal orientation within the distal stump, leading to an irregular course and frequent branching. By inhibiting axonal growth in an intact fiber tract (such as the distal stump of the injured spinal cord) by keeping it parallel to the fibers, myelin can discourage local meandering and collateral sprouting.