Mini Review

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Astrocytes and its good relation with neurons

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The relationship between different cells in the brain starts to be important to neuroscience. Neurons and astrocytes represent the more abundant cells in the human brain and they communicate and speak between them and with other cells, such microglia and oligodendroglia. In the last decade, astroglia has been considered more important than neurons, because they did not many things about them. Astrocytes control neuron connection and synapsis, are involve in processing, transfer and storage brain information, express metabolic genes than increase learning, protect from oxidative stress and inflammation, produce transmitter between neurons and astrocytes, interfere in sleep modulation acting in sleep dynamics and behavior, modulate brain rhythms and help controlling the connections between neurons. Those cells with a lot of functions are playing a central role in our brain and we need to search a lot to understand their functions and contributions to neurodegenerative diseases. Astrocytes are cells development later than neurons in our brain. The physiological role of astrocytes depends on neurons that can drive and indicate the way for the specialized properties of astrocytes.[1]

That cells help control the connections between neurons and control the cerebrovasculature in brain[2,3] and the last decade authors discover the role of astrocytes in synaptic physiology, when astrocytes have a bidirectional communication between them and neurons. At this moment, we know than astrocytes regulate synaptic transmission, are involve in the processing, transfer and storage of information and perhaps in memory process in the nervous system.[4,5] The coupling by neuron and astrocytes express key metabolic genes producing adaptations than produce learning.[6] A critical dependence exists between astrocytes and neurons because there are a neurotransmitter trafficking and recycling, ion homeostasis, energy metabolism and protection in front of oxidative stress. All indicate us that pathogenic situations produce changes in astrocytes and neurons function and cell viability, such as in Alzheimer's disease and hepatic encephalopathy in where inflammation can be an important element of destruction of neurons.[7] Astrocytes respond to all forms of central nervous system insults because they have the capacity to change to reactive astrocytes producing reversible alterations in gene expression and cell hypertrophy[8] Protoplasmic or fibrous are the two main subtypes of astrocytes, and they are present in the gray matter and in the white matter respectively.[9]

Both astrocytes subtypes make extensive contact with blood vessels. Each astrocytes contact with a few neuronal cell bodies, hundreds of dendrites and tens of thousands of synapses. Moreover, astrocytes can be coupled by gap junctions forming a network between astrocytes themselves and with neurons network. The structural support to the extracellular space and neuromodulation are produced by the impact of astrocytes on synaptic physiology.[9] Furthermore, astrocytes clear extracellular excitatory and inhibitory neurotransmitter, process that help and ensures optim synaptic transmission.[10] In fact D-serine increases the current flowing through NMDA receptors producing activation and providing a regulatory feedback that controls synaptic transmission and plasticity.[11] In contrast, ATP can bind to purinergic receptors or activates adenosine receptors to modulate neuronal excitability and transformation of information in the synapsis.[12] Furthermore, astrocytes provide modulation of sleep dynamics and behavior.[13] One of the key functions of sleep is its role in memory and astrocytes actively modulate brain rhythms mediating the sleep process to control and produce memory. Computational studies of astrocytes function could help us to understand the two possible sleep functions or theories.[14] Astrocytes have a lot of functions and they are playing a central role in the central nervous system and its disfunction can contribute in many illness in our body.[15,16] We show here the roles of these cells as important cells with a high relationship with neurons.[17]

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Conflict of interest

Author declares that there is no conflict of interest.

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