

Dark matter of the brain-silent neurons?

The silent neurons

The neuronal signalling is based on the fundamental electrical activity as this activity differentiates neurons from other types of cells. But the Human brain, there are numerous neurons that do not fire action potential, they are far more silent than generally thought. Such neurons as called the dark neurons or silent neurons. They form the dark matter of the brain. While conducting the representative neurological experiments these “dark” neurons do not fire, thus their role in brain function is questioned by the scientists.¹

The concept of ‘sparse coding’

The ‘sparse firing’ concept is employed in describing the physiology of the silent neurons. It proposes that a particular stimulus given to neurons only triggers activation only in a small group of neurons. Whereas the non-sparse coding is defined as that a particular stimulus activates several group of neurons, in varying degrees of activation.

The presence of silent neurons suggests sparse coding – but presence of sparse coding does not confirm the existence of silent neurons. According to the theory of sparse coding, to any given single stimulus, a large group of neurons will be silent in retort. According to Barth and Poulet the section of reactive neurons may be miscalculated due to the fact the stimulus given during the experiment may not be appropriate enough to stimulate all the neurons that are studied. To clear this out, if the neurons are truly silent that doesn’t respond to any stimulus, all the likely stimuli has to be tested on those neurons.²

Evolutionary significance of silent neurons

Scientists related the silent or nonreactive set of neurons with the phylogenetic past. According to them, immense assemblages of such petrified neurons and neuronal networks could have been a part of the fundamental fragment of well-organized neuronal circuits that had a major adaptive role in one’s own life affairs. This dark matter of

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the brain may epitomize primeval circuits of neural network that was consolidated behind the times. The exact reason behind such petrified brain circuits could be Neuronal inhibition for clampdown of brain activity.³

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Conflicts of interest

The authors declare there is no conflict of interest.

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