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News & Comments

Neuronal Architecture Differs Between Primate and Non-primate Brains

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Axons are known to transmit electrical signals (action potential) from one neuron to another. And it has been textbook knowledge that axon arises from the cell bodies of neurons, except for a few which arise from dendrites (better known as axon-carrying dendrite).

A team of scientists used many years old archived tissue and slide preparations of different specimens including rodents, pigs, cats, and humans of other primates, to study 34,000 neurons only to differentiate between primates from non-primates.

They found that Primates have fewer axon-carrying dendrites in their excitatory pyramidal neurons than non-primates in the outer layers II and III of their cerebral cortex. Using high-resolution microscopy, the team was able to detect the precise origin of the axons, which is very difficult to do with the conventional microscope.

The stark difference between Axon-carrying dendrites from other axons is that there is no role for either somatic integration or inhibition in triggering action potentials evoked by depolarizing inputs to these dendrites.

The reason behind the evolution of this species difference is still unknown, and more studies are needed to answer whether the neocortex may benefit from such evolution.

KEYWORDS

Evolutionary biology; neuroscience; subplate; interstitial cells; inhibitory interneurons; axon initial segment; neurofilament; evolution; genetics and genomics; axon; brain research; dendrites; evolution; evolutionary neuroscience; inhibitory interneurons; neurobiology; neurons.