

A 3-D reconstructed image of neural dendritic trees using the advanced electron microscope technology

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Neurons in the brain play a role as an electric wire conveying an electrical signal. Because this electric wire is connected with various joints (synapse), various brain functions can occur. A neuron which has dendritic trees on it, receives the signals with many synapses located on those dendritic trees, and carries out functions by combining the received signals.

The research team of Associate Professor Kubota from The National Institute for Physiological Sciences, revealed the minute properties of dendritic trees by reconstructing 3D images using the advanced electron microscope technology. The research team proved the principle that "neurons normalize receiving signals, making it easier to receive farther signals because of the morphological characteristics of dendritic trees". It is reported in *Scientific Reports*, an offshoot of English science magazine *Nature* (September 13, 2011 electronic edition).

The team focused on the four distinct neurons in the cerebral cortex of the brain (non- pyramidal neurons). A neuron receives signals from other neurons through neurites called dendritic trees. They succeeded in [3D image](#) reconstruction of minute morphology of dendritic trees on the computer using the advanced electron microscope technology. Consistent with this observation, they have been able to prove other standing principles underlying the morphology of dendritic trees. The size and distance of the dendritic tree and signal determine the clarity

and strength of reception. A larger dendritic tree can receive father signals more effectively.

Associate Professor Kubota says, "This advanced technology of 3D [image reconstruction](#) using the electron microscope can be used for other neurons. For instance, if we can find out how the minute morphology of dendritic trees changes because of various brain [degenerative diseases](#) such as schizophrenia, autism, depression, and senile dementia, it will contribute to work out the pathological condition of those diseases. "

Provided by National Institute for Physiological Sciences

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