TOOLBOX

Three-dimensional re-creation reveals dendrite shapes

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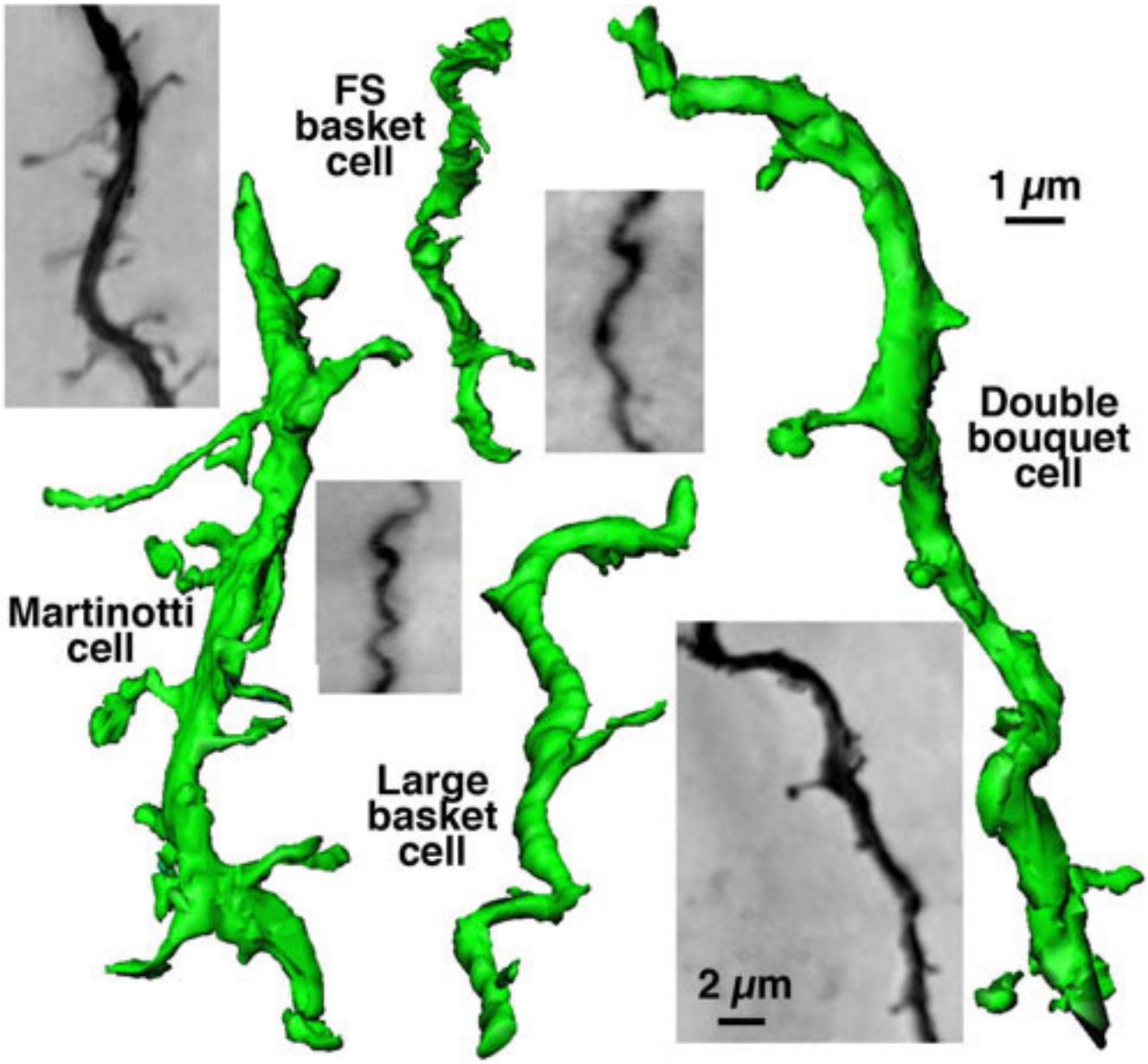
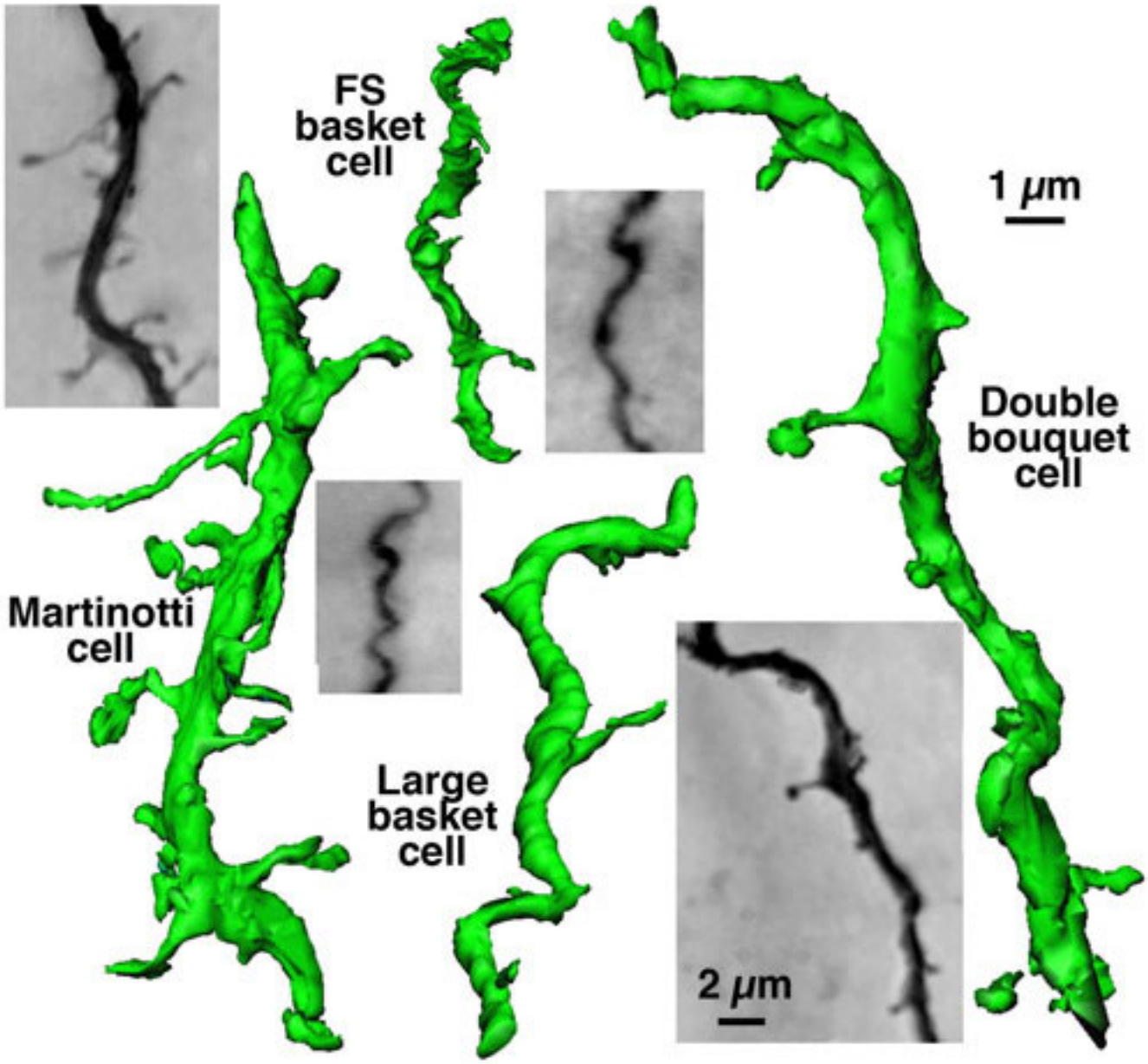
28 SEPTEMBER 2011


FS basket cell
1 μm
Double bouquet cell
Martinotti cell
Large basket cell
2 μm



Family trees: The dendrites of different interneurons, which calm signals in the brain, have some core features in common.

Researchers have created detailed three-dimensional reconstructions of the numerous complex branches of dendrites, the signal-receiving ends of neurons, according to a study published 13 September in *Scientific Reports*[1]. The study shows that dendrites from four different types of neurons have similar core properties, such as thickness and shape, which could be abnormal in people with neurological disorders such as autism.

Several studies have implicated synapses, the junctions between neurons, and dendrites in autism. For example, autism-linked mutations in **neuroligin 1** lead to **fewer dendrites** in the neurons of tadpole embryos[2].

Several studies have also shown that **dendritic spines**, small projections that form on some dendrites and play a key role in learning and memory, are abnormal in **mice that model fragile X syndrome** and in the **brains of individuals with autism**.

In the new study, researchers looked at 85 segments of various dendritic branches in four neurons from the rat frontal cortex, a brain region responsible for higher-order cognitive functions. The neurons are all **types of interneurons**, which inhibit signals in the brain: a Martinotti cell, a fast-spiking basket cell, a double bouquet cell and a large basket cell.

In general, the thickness of the dendrites tapers quickly over the first 50 micrometers, but then stays relatively consistent, the study found. The researchers also discovered that the dendritic cross section is oval, not round as was generally believed. As the dendrites get farther away from the cell body, they twist and become rounder.

Microtubules are elements of the cell's skeletal structure and carry important signaling molecules to synapses at the tips of the dendrites' many branches. The overall area of the dendrite stays consistent, allowing a large number of microtubules to travel continuously along the dendrite's many branches, the study suggests.

References:

1: Kubota Y. *et al. Sci. Reports* **1**, doi:10.1038/srep00089 **Article**

2: Chen S.X. *et al. Neuron* **67**, 967-983 (2011) **PubMed**