

 DENDRITES

Getting to the roots of branches

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Dendritic spines are thought to be important for information processing; however, the mechanisms that govern their development and maintenance are only now beginning to be understood. Here, Tada *et al.* and Xie *et al.* reveal a key role for the GTP-binding cytoskeletal protein septin 7 (SEPT7) in dendrite branching and spine morphogenesis.

In yeast, septins form ring-like structures at the bud neck and are critical for plasma membrane compartmentalization and budding. Septins are also found in the mammalian brain, but little is known about their functions in neurons. Both groups examined SEPT7 expression in cultured hippocampal neurons and found that it was present in dendritic and axonal growth cones after 2 days in culture. At later stages in development, it was found clustered at dendritic branch sites and at the base of the dendritic protrusions that develop into dendritic spines.

To investigate the role of SEPT7 in dendrite development, Tada *et al.* overexpressed SEPT7 in hippocampal neurons. They observed an increase in the density and complexity of dendritic protrusions, as well as an overall increase in dendritic branching. Both groups used RNA interference strategies to downregulate SEPT7. This resulted in an increase in the length of

dendritic protrusions and spines, together with a reduction in dendritic branching and an overall decrease in protrusion density. Xie *et al.* showed that overexpression of a mutant form of SEPT7 that lacks a GTP-binding domain also reduced dendritic branching, indicating that the GTP-binding activity of SEPT7 is important for this function.

These studies demonstrate the importance of SEPT7 in dendritic branching and the development of spines. Further work will be required to determine whether these findings can be replicated *in vivo*. Furthermore, it will be of interest to investigate whether SEPT7's role in yeast, where it forms a diffusion barrier to prevent the movement of proteins between different membrane compartments, is replicated in neurons, where it might separate the spine and the dendritic shaft.

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ORIGINAL RESEARCH PAPERS Xie, Y. *et al.* The GTP-binding protein septin 7 is critical for dendrite branching and dendritic-spine morphology. *Curr. Biol.* **17**, 1746–1751 (2007) | Tada, T. *et al.* Role of septin cytoskeleton in spine morphogenesis and dendrite development in neurons. *Curr. Biol.* **17**, 1752–1758 (2007)

