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# Bonn Lecture Series in Neuroscience

## Cell shape formation controlled by cytoskeleton


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Monday, November 26, 2018, 4.00 pm
Life & Brain, Seminar Room, Ground Floor

Neurons are highly polarized cells whose shape is controlled by cytoskeleton networks. The formation of neuronal protrusions such as dendrites and axons is mediated by the dynamic nature of microtubules, and it is the basis of neuronal development. Particularly at axon branches, signaling processes trigger actin re-formation leading to the recruitment of microtubules to reinforce the branching site; however, little is known about this remodeling mechanism.

Combining the interdisciplinary methods of cryo-EM, biophysics, and cell biology, we focus on elucidating the mechanism of neuronal cell shape formation and accompanying cytoskeleton remodeling. We will present our recent discovery of a novel factor promoting axon branch formation. To understand the underlying mechanism of branch promotion, we have characterized the interaction of the protein with tubulin and reconstituted its microtubule nucleation process in vitro. Moreover, cryo-EM revealed the molecular mechanism of how microtubule remodeling leads to the formation of branches. Mutagenesis experiments in primary neurons correlate the molecular remodeling activity with the formation of axon branches.

## Selected Publications


Basnet N, Crevenna AH, Taschner M, Bodakuntla S, Cardone G, Magiera MM, Biertümpfel C, Janke C, **Mizuno N** (2018) Roles of microtubule nucleation factor SSNA1 in microtubule and axon branching. Nature Cell Biol. doi: 10.1038/s41556-018-0199-8

Wang Q, Taschner M, Ganzinger K, Heymann M, Schwille P, Lorentzen E, **Mizuno N** (2018) Membrane association and remodeling by intraflagellar transport protein IFT172 Nat Commun. doi: 10.1038/s41467-018-07037-9.

Sun Z, Tseng H, Tan S, Senger F, Kurzawa L, Dedden D, **Mizuno N**, Wasik A, Thery M, Dunn A, Fässler R (2016) Kank2 activates Talin and reduce force transduction across integrins Nature Cell Biol. 18:941-53

Adam J, Basnet N, **Mizuno N**. (2015) Structural insights into the cooperative remodeling of membranes by amphiphysin/BIN1. Sci Rep. Oct 21;5:15452.

Wang Q, Crevenna AH, Kunze I and **Mizuno N**. (2014) Structural basis for the extended CAP-Gly domains of p150(glued) binding to microtubules and the implication for tubulin dynamics. Proc Natl Acad Sci U S A. 111:11347-52.



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