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# Bonn Lecture Series in Neuroscience

## Mobility of voltage gated calcium channels in the neuronal membrane


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Thursday, April 27th 2017, 16:00h
Epileptology, Seminar Room, Ground Floor


Calcium channel signaling capacity is highly dependent on the time and location of the channel in the neuronal membrane. Here we have used single particle tracking in order to gain information about the surface mobility of calcium channels. Using different experimental systems we discovered that most surface expressed calcium channels are mobile and explore membrane regions that are much larger than the proposed critical distance for their potential calcium dependent signaling partners. Particular in the presynaptic membrane, $Ca_V2.1$ and $Ca_V2.2$ channels are mobile and might dynamically regulate the release probability of transmitter vesicles. In order to prove this hypothesis we created an optogenetic approach to manipulate channel dynamics acutely. We found that transient immobilization increase synaptic calcium signals, alters the initial release probability and lead to a pronounced change in synaptic transmission. We hypothesis that local calcium channel dynamics is an efficient variable to alter local signal integration on a millisecond time scale and is important for information processing in neuronal networks.


## *Selected Publications*


Biermann B, Sokoll S, Klueva J, Missler M, Wiegert JS, Sibarita JB, **Heine M** (2014) Imaging of molecular surface dynamics in brain slices using single-particle tracking. *Nat Commun*, 5:3024.

Schneider R, Hosy E, Kohl J, Klyueva Y, Choquet D, Thomas U, Voigt A, **Heine M** (2015) Mobility of calcium channels in the presynaptic membrane. *Neuron*, 86: 672-679.

Voigt A, Freund R, Heck J, Missler M, Obermair GJ, Thomas U, **Heine M** (2016) Dynamic association of calcium channel subunits at the cellular membrane. *Neurophotonics*, 3: art. no. 041809.

**Heine M**, Ciuraszkiewicz A, Voigt A, Heck J, Bikbaev A (2016) Surface dynamics of voltage-gated ion channels. *Channels*, 10:267-281.



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