

Cellular Neurophysiology Group, Jakob Wolfart

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We investigate the functioning of neurons and the underlying molecular mechanisms, in particular ion channel expression but also synaptic integration into the neuronal network. A current research focus of our group is the intrinsic and synaptic plasticity that occurs in dentate gyrus granule cells during temporal lobe epilepsy. For this we use patch-clamp recordings in combination with pharmacological, immunocytochemical, morphological and computational analysis. The figure shows an example of a recorded and reconstructed granule cell from a patient whose hippocampus had been resected for seizure control. Granule cell nuclei are marked in red (with Prox1). Scale bar 100 μ m.

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Research interests

- Signal integration in neurons
- Neurobiology of epilepsy
- Function of ion channels
- Intrinsic and synaptic plasticity in neurons

Research methods

- In vitro patch-clamp electrophysiology
- Morphology and immunocytochemistry
- Computer models of neurons

Publications

- Stegen M, Kirchheim F, Hanuschkin A, Staszewski O, Veh RW, Wolfart J (2011). Adaptive Intrinsic Plasticity in Human Dentate Gyrus Granule Cells during Temporal Lobe Epilepsy. Cerebral Cortex, in press, doi:10.1093/cercor/bhr294. [pdf]

- Häussler U, Bielefeld L, Froriep UP, Wolfart J, Haas CA (2011). Septotemporal Position in the Hippocampal Formation Determines Epileptic and Neurogenic Activity in Temporal Lobe Epilepsy. *Cerebral Cortex*, in press, doi:10.1093/cercor/bhr054
- Young CC, Stegen M, Bernard R, Muller M, Bischofberger J, Veh R, Haas CA, Wolfart, J (2009) Upregulation of inward rectifier K⁺ (Kir2) channels in dentate gyrus granule cells in temporal lobe epilepsy. *Journal of Physiology* 587, 4213-4233. [\[pdf\]](#)
- Comment by Vida I. (2009). 'Leaky' neurons in the epileptic hippocampus: should we get excited? *Journal of Physiology* 587, 4127-4128. [\[pdf\]](#)
- Stegen M, Young CC, Haas CA, Zentner J, Wolfart, J (2009). Increased leak conductance in dentate gyrus granule cells of temporal lobe epilepsy patients with Ammon's horn sclerosis. *Epilepsia* 50, 646-653. [\[pdf\]](#)
- Wolfart J, Debay D, Le Masson G, Destexhe A, Bal T (2005). Synaptic background activity controls spike transfer from thalamus to cortex. *Nature Neuroscience* 8, 1760-1767. [\[pdf\]](#)
- Debay D, Wolfart J, Le Franc Y, Le Masson G, Bal T (2005). Exploring spike transfer through the thalamus using hybrid artificial-biological neuronal networks. *Journal of Physiology (Paris)* 98, 540-558.
- Salthun-Lassalle B, Hirsch EC, Wolfart J, Ruberg M, Michel P (2004). Rescue of Mesencephalic Dopaminergic Neurons in Culture by Low-Level Stimulation of Voltage-gated Sodium Channels. *Journal of Neuroscience* 24, 5922-5930.
- Wolfart J, Roeper J (2002). Selective Coupling of T-type Calcium Channels to SK Potassium Channels Prevents Intrinsic Bursting in Dopaminergic Midbrain Neurons. *Journal of Neuroscience* 22, 3404-3413. [\[pdf\]](#)
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- Precht JC, von der Emde G, Wolfart J, Karamursel S, Akoev GN, Andrianov YN, Bullock TH (1998). Sensory Processing in the Pallium of a Mormyrid Fish. *Journal of Neuroscience* 18, 7381-7393. [\[pdf\]](#)

[Publications of J. Wolfart on researcherID](#)

External funding

- Since 2008: Collaborative Research Center SFB 780 (Deutsche Forschungsgemeinschaft, DFG)
- 2006-2008: Juniorprofessoren-Programm (Ministry of Science, Research, and The Arts, Baden-Württemberg)

Links

- Information about the brain (german):
[DasGehirn.info](#)
- Collaborative Research Center:
[SFB 780](#)
(Deutsche Forschungsgemeinschaft, DFG)
- German Neuroscience Society:
[NWG](#)
- Society for Neuroscience:
[SFN](#)