Prof. Gabor Petzold

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Institute

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Research Expertise

Our aim is to investigate mechanisms that contribute to neurodegeneration and cognitive impairment in Alzheimer's disease, cerebral small-vessel disease and acute stroke. We are particularly interested in the role of glial cells such as astrocytes and microglia, as well as signaling pathways within the neurovascular unit in these conditions. We use techniques such as multiphoton imaging of cellular network activity in awake behaving animals, genetic modification techniques, complex behavioral assessments, single-cell transcriptomics, ultrahigh field MRI, and whole-brain clearing and imaging techniques.

We focus on these topics:

* Role and functional impact of reactive astrocytes in Alzheimer's disease
* Role of astrocytes and glial scar formation in the pathophysiology of acute stroke
* Contribution of neuroinflammation to white matter damage in models of small-vessel disease
* Pathophysiology of cerebral microinfarcts and microhemorrhages in vascular cognitive impairment and Alzheimer's disease
* Cellular mechanisms contributing to blood-brain barrier dysfunction and neurodegeneration in cerebral amyloid angiopathy
* Brain clearance mechanisms in neurodegeneration

Informed by the mechanistical insight gleaned from these studies, we also conduct translational and clinical trials focused on the pathophysiology and treatment of acute stroke, small vessel disease, post-stroke dementia and cerebral amyloid angiopathy.

Education / Training

I obtain my MD degree (Approbation) from the University of Düsseldorf, Germany. I completed my residency and obtained my habilitation in clinical neurology at Charité Berlin, Germany. During my residency, I was a postdoctoral research fellow in cellular neuroscience at Harvard University.

Appointments / Positions Held

since 2021: Full tenured Professor (W3 level) University Hospital Bonn

since 2021: Head, Division of Vascular Neurology, University Hospital Bonn

since 2013: Senior Group Leader (tenured) and Head of Vascular Neurology Group, DZNE Bonn

2013-2021: Associate Professor (W2 level), University Hospital Bonn

2011-2021: Attending physician, Dpt. of Neurology, University Hospital Bonn

2011-2013: Junior Group Leader, DZNE Bonn

2009-2011: Attending physician, Dpt. of Neurology, Charité University Hospital Berlin

2009-2011: Junior Group Leader, Experimental Neurology, Charité University Hospital Berlin

Honors / Awards

2008: Young Scientist Award, German Competence Network Stroke

1996-1999: Scholar, German National Merit Foundation (Studienstiftung des deutschen Volkes)

10 Most Relevant Publications for Prof. Petzold

1. Escartin C, Galea E, Lakatos A, O'Callaghan JP, Petzold GC (...) Verkhratsky A. Reactive astrocyte nomenclature, definitions, and future directions. Nat Neurosci 2021 24:312-325.
2. Kugler C, Thielscher C, Tambe BA, Schwarz MK, Halle A, Bradke F, Petzold GC. Epothilones Improve Axonal Growth and Motor Outcomes after Stroke in the Adult Mammalian CNS. Cell Rep Med 2020 1:100159.
3. Rakers C, Schleif M, Blank N, Matušková H, Ulas T, Händler K, Torres SV, Schumacher T, Tai K, Schultze JL, Jackson WS, Petzold GC. Stroke target identification guided by astrocyte transcriptome analysis. Glia 2019 67:619-633.
4. Reichenbach N, Delekate A, Plescher M, Schmitt F, Krauss S, Blank N, Halle A, Petzold GC. Inhibition of Stat3-mediated astrogliosis ameliorates pathology in an Alzheimer's disease model. EMBO Mol Med 2019 11:e9665.
5. Reichenbach N, Delekate A, Breithausen B, Keppler K, Poll S, Schulte T, Peter J, Plescher M, Hansen JN, Blank N, Keller A, Fuhrmann M, Henneberger C, Halle A, Petzold GC. P2Y1 receptor blockade normalizes network dysfunction and cognition in an Alzheimer's disease model. J Exp Med 2018 215:1649-1663.
6. Rakers C, Petzold GC. Astrocytic calcium release mediates peri-infarct depolarizations in a rodent stroke model. J Clin Invest 2017 127:511-516.
7. Delekate A, Füchtemeier M, Schumacher T, Ulbrich C, Foddis M, Petzold GC. Metabotropic P2Y1 receptor signalling mediates astrocytic hyperactivity in vivo in an Alzheimer's disease mouse model. Nat Commun 2014 5:5422.
8. Petzold GC, Murthy VN. Role of astrocytes in neurovascular coupling. Neuron 2011 71:782-797.
9. Petzold GC, Hagiwara A, Murthy VN. Serotonergic modulation of odor input to the mammalian olfactory bulb. Nat Neurosci 2009 12:784-791.
10. Petzold GC, Albeanu DF, Sato TF, Murthy VN. Coupling of neural activity to blood flow in olfactory glomeruli is mediated by astrocytic pathways. Neuron 2008 58:897-910.