

Publications by ZMHN Scientists 2006 - 2008

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Institute for Molecular and Cellular Cognition

Director: Prof. Dr. Dietmar Kuhl (Institute established in 2008)

Artunc, F., Sandulache, D., Nasir, O., Boini, K.M., Friedrich, B., Beier, N., Dicks, E., Potzsch, S., Klingel, K., Amann, K., Blazer-Yost, B.L., Scholz, W., Risler, T., Kuhl, D., and Lang, F. (2008). Lack of the serum and glucocorticoid-inducible kinase SGK1 attenuates the volume retention after treatment with the PPARgamma agonist pioglitazone. *Pflugers Arch.* 456, 425-436.

Boini, K.M., Nammi, S., Grahammer, F., Osswald, H., Kuhl, D., and Lang, F. (2008). Role of serum- and glucocorticoid-inducible kinase SGK1 in glucocorticoid regulation of renal electrolyte excretion and blood pressure. *Kidney Blood Press. Res.* 31, 280-289.

Hussain, A., Wyatt, A.W., Wang, K., Bhandaru, M., Biswas, R., Avram, D., Foller, M., Rexhepaj, R., Friedrich, B., Ullrich, S., Muller, G., Kuhl, D., Risler, T., and Lang, F. (2008). SGK1-dependent upregulation of connective tissue growth factor by angiotensin II. *Kidney Blood Press. Res.* 31, 80-86.

Kumar, P., and Ohana, O. (2008). Inter- and intralaminar subcircuits of excitatory and inhibitory neurons in layer 6a of the rat barrel cortex. *J. Neurophysiol.*, 100, 1909-1922.

Nielsen, M.S., Keat, S.J., Hamati, J.W., Madsen, P., Gutzmann, J.J., Engelsberg, A., Pedersen, K.M., Gustafsen, C., Nykjaer, A., Gliemann, J., Hermans-Borgmeyer, I., Kuhl, D., Petersen, C.M., and Hermey, G. (2008). Different motifs regulate trafficking of SorCS1 isoforms. *Traffic* 9, 980-994.

Park, S., Park, J.M., Kim, S., Kim, J.A., Shepherd, J.D., Smith-Hicks, C.L., Chowdhury, S., Kaufmann, W., Kuhl, D., Ryazanov, A.G., Huganir, R.L., Linden, D.J., and Worley, P.F. (2008). Elongation factor 2 and fragile X

mental retardation protein control the dynamic translation of Arc/Arg3.1 essential for mGluR-LTD. *Neuron* 59, 70-83.

Rexhepaj, R., Boini, K.M., Huang, D.Y., Amann, K., Artunc, F., Wang, K., Brosens, J.J., Kuhl, D., and Lang, F. (2008). Role of maternal glucocorticoid inducible kinase SGK1 in fetal programming of blood pressure in response to prenatal diet. *Am. J. Physiol. Regul. Integr. Comp. Physiol.* 294, R2008-2013.

Nielsen, M. S., Gustafsen, C., Madsen, P., Nyengaard, J.R., Hermey, G., Bakke, O., Mari, M., Schu, P., Pohlmann, R., Dennes, A., and Petersen, C.M. (2007). Sorting by the cytoplasmic domain of the amyloid precursor protein binding receptor SorLA. *Mol. Cell. Biol.*, 27, 6842-6851

Sandu, C., Artunc, F., Grahammer, F., Rotte, A., Boini, K.M., Friedrich, B., Sandulache, D., Metzger, M., Just, L., Mack, A., Skutella, T., Rexhepaj, R., Risler, T., Wulff, P., Kuhl, D., and Lang, F. (2007). Role of the serum and glucocorticoid inducible kinase SGK1 in glucocorticoid stimulation of gastric acid secretion. *Pflugers Arch.* 455, 493-503.

Ullrich, S., Zhang, Y., Avram, D., Ranta, F., Kuhl, D., Haring, H.U., and Lang, F. (2007). Dexamethasone increases Na⁺/K⁺ ATPase activity in insulin secreting cells through SGK1. *Biochem. Biophys. Res. Commun.* 352, 662-667.

Zhang, W.Z., Xia, X.F., Reisenauer, M.R., Rieg, T., Lang, F., Kuhl, D., Vallon, V., and Kone, B.C. (2007). Aldosterone-induced Sgk1 relieves Dot1a-Af9-mediated transcriptional repression of epithelial Na⁺ channel alpha. *J. Clin. Invest.* 117, 773-783.

Artunc, F., Amann, K., Nasir, O., Friedrich, B., Sandulache, D., Jahovic, N., Risler, T., Vallon, V., Wulff, P., Kuhl, D., and Lang, F. (2006). Blunted DOCA/high salt induced albuminuria and renal tubulointerstitial damage in gene-targeted mice lacking SGK1. *J. Mol. Med.* 84, 737-746.

Boini, K.M., Hennige, A.M., Huang, D.Y., Friedrich, B., Palmada, M., Boehmer, C., Grahammer, F., Artunc, F., Ullrich, S., Avram, D., Osswald, H., Wulff, P., Kuhl, D., Vallon, V., Haring, H.U., and Lang, F. (2006). Serum- and glucocorticoid-inducible kinase 1 mediates salt sensitivity of glucose tolerance. *Diabetes* 55, 2059-2066.

Chowdhury, S., Shepherd, J.D., Okuno, H., Lyford, G., Petralia, R.S., Plath, N., Kuhl, D., Huganir, R.L., and Worley, P.F. (2006). Arc/Arg3.1 interacts with the endocytic machinery to regulate AMPA receptor trafficking. *Neuron* 52, 445-459.

Engelsberg, A., Kobelt, F., and Kuhl, D. (2006). The N-terminus of the serum- and glucocorticoid-inducible kinase Sgk1 specifies mitochondrial localization and rapid turnover. *Biochem. J.* 399, 69-76.

Grahammer, F., Artunc, F., Sandulache, D., Rexhepaj, R., Friedrich, B., Risler, T., McCormick, J.A., Dawson, K., Wang, J., Pearce, D., Wulff, P., Kuhl, D., and Lang, F. (2006). Renal function of gene-targeted mice lacking both SGK1 and SGK3. *Am. J. Physiol. Regul. Integr. Comp. Physiol.* 290, R945-950.

Grahammer, F., Henke, G., Sandu, C., Rexhepaj, R., Hussain, A., Friedrich, B., Risler, T., Metzger, M., Just, L., Skutella, T., Wulff, P., Kuhl, D., and Lang, F. (2006). Intestinal function of gene-targeted mice lacking serum- and glucocorticoid-inducible kinase 1. *Am. J. Physiol. Gastrointest. Liver Physiol.* 290, G1114-1123.

Hermey, G., Sjøgaard, S.S., Petersen, C.M., Nykjaer, A. and Gliemann, J. (2006). Tumor necrosis factor α -converting enzyme mediates ectodomain shedding of Vps10p-domain receptor family members. *Biochem. J.*, 395, 285-293

Huang, D.Y., Boini, K.M., Osswald, H., Friedrich, B., Artunc, F., Ullrich, S., Rajamanickam, J., Palmada, M., Wulff, P., Kuhl, D., Vallon, V., and Lang, F. (2006). Resistance of mice lacking the serum- and glucocorticoid-inducible kinase SGK1 against salt-sensitive hypertension induced by a high-fat diet. *Am. J. Physiol. Renal Physiol.* 291, F1264-F1273.

Huang, D.Y., Boini, K.M., Friedrich, B., Metzger, M., Just, L., Osswald, H., Wulff, P., Kuhl, D., Vallon, V., and Lang, F. (2006). Blunted hypertensive effect of combined fructose and high-salt diet in gene-targeted mice lacking functional serum- and glucocorticoid-inducible kinase SGK1. *Am. J. Physiol. Regul. Integr. Comp. Physiol.* 290, R935-R944.

- Plath, N., Ohana, O., Dammermann, B., Errington, M.L., Schmitz, D., Gross, C., Mao, X.S., Engelsberg, A., Mahlke, C., Weizl, H., Kobaz, U., Stavrakakis, A., Fernandez, E., Waltereit, R., Bick-Sander, A., Therstappen, E., Cooke, S.F., Blanquet, V., Wurst, W., Salmen, B., Boesl, M.R., Lipp, H.P., Grant, S.G.N., Bliss, T.V.P., Wolfer, D.P., and Kuhl, D. (2006). Arc/Arg3.1 is essential for the consolidation of synaptic plasticity and memories. *Neuron* 52, 437-444.
- Rexhepaj, R., Artunc, F., Grahammer, F., Nasir, O., Sandu, C., Friedrich, B., Kuhl, D., and Lang, F. (2006). SGK1 is not required for regulation of colonic ENaC activity. *Pflugers Arch.* 453, 97-105.
- Sandulache, D., Grahammer, F., Artunc, F., Henke, G., Hussain, A., Nasir, O., Mack, A., Friedrich, B., Vallon, V., Wulff, P., Kuhl, D., Palmada, M., and Lang, F. (2006). Renal Ca²⁺ handling in sgk1 knockout mice. *Pflugers Arch.* 452, 444-452.
- Shepherd, J.D., Rumbaugh, G., Wu, J., Chowdhury, S., Plath, N., Kuhl, D., Huganir, R.L., and Worley, P.F. (2006). Arc/Arg3.1 mediates homeostatic synaptic scaling of AMPA receptors. *Neuron* 52, 475-484.
- Vallon, V., Wyatt, A.W., Klingel, K., Huang, D.Y., Hussain, A., Berchtold, S., Friedrich, B., Grahammer, F., BelAiba, R.S., Gorlach, A., Wulff, P., Daut, J., Dalton, N.D., John, R., Flogel, U., Schrader, J., Osswald, H., Kandolf, R., Kuhl, D., and Lang, F. (2006). SGK1-dependent cardiac CTGF formation and fibrosis following DOCA treatment. *J. Mol. Med.* 84, 396-404.
- Wallhausser-Franke, E., Cuautle-Heck, B., Wenz, G., Langner, G., and Mahlke, C. (2006). Scopolamine attenuates tinnitus-related plasticity in the auditory cortex. *Neuroreport* 17, 1487-1491.
- Wyatt, A.W., Hussain, A., Amann, K., Klingel, K., Kandolf, R., Artunc, F., Grahammer, F., Huang, D.Y., Vallon, V., Kuhl, D., and Lang, F. (2006). DOCA-induced phosphorylation of glycogen synthase kinase 3 beta. *Cell. Physiol. Biochem.* 17, 137-144.

Institute for Neuroimmunology and Clinical Multiple Sclerosis Research

Director: Prof. Dr. Roland Martin (Institute established in 2006)

Martin, Roland

- Bester, M., Heesen, C., Schippling, S., Martin, R., Ding, X.Q., Holst, B., and Fiehler, J. (2008). Early anisotropy changes in the corpus callosum of patients with optic neuritis. *Neuroradiology* 50, 549-557.
- Comabella, M., Camino-Tato, M., Morcillo, C., Lopez, C., Navarro, A., Rio, J., BiomarkerMS Study Group, Montalban, X., and Martin, R. (2008). Identification of a novel risk locus for multiple sclerosis at 13q31.3 by a pooled genome-wide scan of 500,000 single nucleotide polymorphisms. *PLoS ONE* 3, e3490.
- Kawamura, K., Yao, K., Shukaliak-Quandt, J.A., Huh, J., Baig, M., Quigley, L., Ito, N., Necker, A., McFarland, H.F., Muraro, P.A., Martin, R., and Ito, K. (2008). Different development of myelin basic protein agonist- and antagonist-specific human TCR transgenic T cells in the thymus and periphery. *J. Immunol.* 181, 5462-5472.
- Lünemann, J.D., Jelcic, I., Roberts, S., Lutterotti, A., Tackenberg, B., Martin, R., and Münz, C. (2008). EBNA1-specific T cells from patients with multiple sclerosis cross-react with myelin antigen and co-produce IFN-gamma and IL-2. *J. Exp. Med.* 205, 1763-1773.
- Lutterotti, A., and Martin, R. (2008). Getting specific – monoclonal antibodies in multiple sclerosis. *Lancet Neurol.* 7, 538-547.
- Martin, R. (2008). Humanized anti-CD25 antibody treatment with daclizumab in multiple sclerosis. *Neurodegener. Dis.* 5, 23-26.
- Martin, R., Heesen, C., and Schippling, S. (2008). Zukünftige Therapie der MS. *Akt. Neurologie* 5, 1-8.
- Martin, R., O'Shea, J., Birnbaum, L.S., and Luebke, R. (2008). Community corner. Striking the balance in multiple sclerosis. *Nat. Med.* 14, 491.

- Martin, R. (2008). Neutralisation of IL12p40 or IL23p40 does not block inflammation in multiple sclerosis. *Lancet Neurol.* 7, 765-766.
- Prinz, M., Schmidt, H., Mildner, A., Knobeloch, K.P., Hanisch, U.K., Raasch, J., Merkler, D., Detje, C., Gutcher, I., Mages, J., Lang, R., Martin, R., Gold, R., Becher, B., Brück, W., and Kalinke, U. (2008). Distinct and nonredundant in vivo functions of IFNAR on myeloid cells limit autoimmunity in the central nervous system. *Immunity* 28, 675-686.
- Sospedra, M., and Martin, R. (2008). Immunology of Multiple Sclerosis. In *Multiple Sclerosis*, C.S. Raine, H.F. McFarland, R. Hohlfeld, eds. (Harcourt Publishers, London, UK), 192-213.
- Zhang, X., Tang, Y., Sujkowska, D., Wang, J., Ramgolam, V., Sospedra, M., Adams, J., Martin, R., Pinilla, C., and Markovic-Plese, S. (2008). Degenerate TCR recognition and dual DR2 restriction of autoreactive T cells: implications for the initiation of the autoimmune response in multiple sclerosis. *Eur. J. Immunol.* 38, 1297-1309.
- Cassiani-Ingoni, Muraro, P.A., Magnus, T., Reichert-Schrivner, S., Schmidt, J., Huh, J., Quandt, J.A., Bratincsak, A., Shahar, T., Eusebi, F., Sherman, L.S., Mattson, M.P., Martin, R., and Rao, M.S. (2007). Disease progression after bone marrow transplantation in a model of multiple sclerosis is associated with chronic microglial and glial progenitor response. *J. Neuropathol. Exp. Neurol.* 66, 637-649.
- Comabella, M., and Martin, R. (2007). Genomics in multiple sclerosis – current state and future directions. *J. Neuroimmunol.* 187, 1-8.
- Gelderblom, H., Londoño, D., Bai, Y., Cabral, E.S., Quandt, J., Hornung, R., Martin, R., Marques, A., and Cadavid, D. (2007). High production of CXCL13 in blood and brain during persistent infection with the relapsing fever spirochete *Borrelia turicatae*. *J. Neuropathol. Exp. Neurol.* 66, 208-217.
- Lünemann, J.D., Kamradt, T., Martin, R., and Münz, C. (2007). Epstein Barr Virus: environmental trigger of multiple sclerosis. *J. Virol.* 81, 6777-6784.
- Martin, R. (2007). Is hematopoietic stem cell transplantation a treatment option for severe MS or not? *Brain* 130, 1181-1182.
- McFarland, H.F., and Martin, R. (2007). Multiple sclerosis: a complicated picture of autoimmunity. *Nat. Immunol.* 9, 913-919.
- Preller, V., Gerber, A., Wrenger, S., Togni, M., Marguet, D., Tadje, J., Lendeckel, U., Röcken, C., Faust, J., Neubert, K., Schraven, B., Martin, R., Ansorge, S., Brocke, S., and Reinhold, D. (2007). TGF-beta 1-mediated control of central nervous system inflammation and autoimmunity through the inhibitory receptor CD26. *J. Immunol.* 178, 4632-4640.
- Bielekova, B., Catalfamo, M., Reichert-Schrivner, S., Cerna, M., Waldmann, T., McFarland, H.F., Henkert, P., Martin, R. (2006). Regulatory CD56bright NK cells mediate immunomodulatory effects of IL-2Ra-targeted therapy (Daclizumab) in multiple sclerosis. *Proc. Natl. Acad. Sci. USA* 103, 5941-5946.
- Sospedra, M., Muraro, P., Stefanova, I., Zhao, Y., Chung, K., Li, Y., Giulianotti, M., Simon, R., Mariuzza, R., Pinilla, C., and Martin, R. (2006). Redundancy in antigen presenting function of the HLA-DR and -DQ molecules in the multiple sclerosis-associated HLA-DR15 haplotype. *J. Immunol.* 176, 1951-1956.
- Heesen, Christoph**
- Bester, M., Heesen, C., Schippling, S., Martin, R., Ding, X.Q., Holst, B., and Fiehler, J. (2008). Early anisotropy changes in the corpus callosum of patients with optic neuritis. *Neuroradiology* 50, 549-557.
- Heesen, C., Böhm, J., Reich, C., Kasper, J., Goebel, M., and Gold, S.M. (2008). Patient perception of bodily functions in multiple sclerosis: gait and visual function are the most valuable. *Mult. Scler.* 14, 988-991.
- Heesen, C., Poettgen, J., and Gross, R. (2008). Kognitive Störungen bei Multipler Sklerose. *Psychoneuro* 34, 259-264.
- Martin, R., Heesen, C., and Schippling, S. (2008). Zukünftige Therapie der MS. *Akt. Neurologie* 35, 1-8.

Gold, S.M., and Heesen, C. (2006). Stress and disease progression in multiple sclerosis and its animal models. *Neuroimmunomodulation* 13, 318-326.

Hamann, J., Loh, A., Kasper, J., Neuner, B., Spies, C., Kissling, W., Harter, M., and Heesen, C. (2006). [Effects of a shared decision making model in psychiatric and neurologic practice]. *Nervenarzt* 77, 1071-1076, 1078.

Heesen, C., Nawrath, L., Reich, C., Bauer, N., Schulz, K.H., and Gold, S.M. (2006). Fatigue in multiple sclerosis: an example of cytokine mediated sickness behaviour? *J. Neurol. Neurosurg. Psychiatry* 77, 34-39.

Heesen, C., Romberg, A., Gold, S., and Schulz, K.H. (2006). Physical exercise in multiple sclerosis: supportive care or a putative disease-modifying treatment. *Expert Rev. Neurother.* 6, 347-355.

Heesen, C., Segal, J., Reich, C., Hamalainen, P., Broemel, F., Niemann, S., Simon, U., Gross, R., and Kasper, J. (2006). Patient information on cognitive symptoms in multiple sclerosis - acceptability in relation to disease duration. *Acta Neurol. Scand.* 114, 268-272.

Kasper, J., Köpke, S., Muhlhauser, I., and Heesen, C. (2006). Evidence-based patient information about treatment of multiple sclerosis--a phase one study on comprehension and emotional responses. *Patient Educ. Couns.* 62, 56-63.

Tolosa, Eva (2006 – August 2009)

Alba, A., Planas, R., Clemente, X., Carrillo, J., Ampudia, R., Puertas, M.C., Pastor, X., Tolosa, E., Pujol-Borrell, R., Verdaguer, J., and Vives-Pi, M. (2008). Accelerated Type 1 diabetes triggered by IFN β is driven by Natural Killer cells. *Clin. Exp. Immunol.* 151, 467-475.

Kessler, T., Reich, M., Jahn, G., Tolosa, E., Beck, A., Kalbacher, H., Overkleeft, H., Schempp, S., and Driessen, C. (2008). Human cytomegalovirus infection interferes with MHC II-maturation and endocytic proteases in dendritic cells at multiple levels. *J Gen Virol* 89, 2427-2436.

Adamopoulou, E.C., Diekmann, J., Tolosa, E., Kuntz, G., Einsele, H., Rammensee, H.G., and Topp, M. (2007). Human CD4+ T cells displaying viral epitopes elicit a full virus-specific CD8+ T cell response. *J. Immunol.* 178, 5465-5472.

Burster, T., Beck, A., Poeschel, S., Oren, A., Baechle, D., Reich, M., Rötzschke, O., Falk, K., Youssef, S., Kalbacher, H., Overkleeft, H., Tolosa, E., and Driessen, C. (2007). Interferon-gamma regulates cathepsin G activity and controls the proteolytic processing of myelin basic protein *in vitro*. *Immunology* 121, 82-93.

Feger, U., Tolosa, E., Yu-Hwa, H., Biedermann, T., Melms, A., and Wiendl, H. (2007). HLA-G expression defines a novel regulatory T cell subset present in human peripheral blood and sites of neuroinflammation. *Blood* 110, 568-577.

Feger, U., Luther, C., Schreiner, B., Pöschel, S., Melms, A., Tolosa, E., and Wiendl, H. (2007). The frequency of CD4+CD25+ T regulatory cells is increased in the CSF but not in the blood of MS patients. *Clin. Exp. Immunol.* 147, 412-418.

Rosenkranz, D., Weyer, S., Tolosa, E., Gånslen, A., Berg, D., Leyhe, T., Gasser, T., and Stoltze, L. (2007). Higher frequency of regulatory T cells in the elderly and increased suppressive activity in neurodegeneration. *J. Neuroimmunol.* 188, 117-127.

Viken, M.K., Sollid, H.D., Joner, G., Dahl-Jørgensen, K., Rønningen, K.S., Undlien, D.E., Flatø, B., Selvaag, A.M., Førre, Ø., Kvien, T.K., Thorsby, E., Melms, A., Tolosa, E., and Lie, B.A. (2007). Polymorphisms in the cathepsin L2 (CTSL2) gene show association with type 1 diabetes and early-onset myasthenia gravis. *Human Immunol* 68, 748-755.

Institute for Neural Signal Transduction

Director: Prof. Dr. Olaf Pongs (Institute established in 1991)

Ader, C., Schneider, R., Hornig, S., Velisetty, P., Wilson, E., Lange, A., Giller, K., Ohmert, I., Eauclaire M. F., Trauner D., Becker S., Pongs O., and Baldus M. (2008). A structural link between inactivation and block of a K₊ channel. *Nature Struct. Mol. Biol.* **15**, 605-612.

Korukottu, J., Schneider, R., Vijayan, V., Lange, A., Pongs, O., Becker, S., Baldus, A., and Zweckstetter, M. (2008). High-resolution 3D structure determination of kaliotoxin by solid-state NMR spectroscopy. *PLoS One* **3**, e2359

Mewe, M., Wulfsen, I., Schuster, A.M.E., Middendorff, R., Glassmeier, G., Schwarz, J.R., and Bauer, C.K. (2008). Erg K₊ channels modulate contractile activity in the bovine epididymal duct. *Am. J. Physiol. Regul. Integr. Comp. Physiol.* **294**, R895-R904

Pongs, O. (2008). Regulation of excitability by potassium channels. *Results Probl. Cell Differ.* **44**, 145-161.

Pongs, O. (2008). Ion Channel Target - Informa Conference. *Drugs* **11**, 318-321.

Schneider, R., Ader, C., Lange, A., Giller, K., Hornig, S., Pongs, O., Becker, S., and Baldus, M. (2008). Solid-state NMR spectroscopy applied to a chimeric potassium channel in lipid bilayers. *J. Am. Chem. Soc.* **130**, 7427-7435.

Wen, S., Schwarz, J.R., Niculescu, D., Dinu, C., Bauer, C.K., Hirdes, W., and Boehm, U. (2008). Functional characterization of genetically labeled gonadotropes. *Endocrinology* **149**, 2701-11.

Zachariae, U., Schneider, R., Velisetty, P., Lange, A., Seeliger, D., Wacker, S. J., Karimi-Nejad, Y., Vriend, G., Becker, S., Pongs, O., Baldus, M., and de Groot, B. L. (2008). The molecular mechanism of toxin-induced conformational changes in a potassium channel: relation to C-type activation. *Structure* **16**, 747-754.

Fliegert, R., Glassmeier, G., Schmid, F., Cornils, K., Genisyurek, S., Harneit, A., Schwarz, J.R., and Guse, A.H. (2007). Modulation of Ca²⁺ entry and plasma membrane potential by human TRPM4b. *FEBS J.* **274**, 704-713.

Legros, C., Martin-Eauclaire, M.F., Pongs, O., and Bougis, P.E. (2007). Toxin binding to chimeric K₊ channels immobilised on a solid nitrocellulose support. *Biochem. Biophys. Res. Commun.* **353**, 1086-1090.

Boehm, U. (2006). The vomeronasal system in mice: From the nose to the hypothalamus and back. *Sem. Cell. Dev. Biol.* **17**, 471-479.

Choe, C.U., Schulze-Bahr, E., Neu, A., Xu, J., Zhu, Z.I., Sauter, K., Bähring, R., Priori, S., Guicheney, P., Mönnig, G., Neapolitano, C., Heidemann, J., Clancy, C.E., Pongs, O., and Isbrandt, D. (2006). C-terminal HERG (LQT2) mutations disrupt I_{Kr} channel regulation through 14-3-3. *Hum. Mol. Genet.* **15**, 2888-2902.

Lange, A., Giller, K., Hornig, S., Martin-Eauclaire, M.-F., Pongs, O., Becker, S., and Baldus, M. (2006). Toxin-induced conformational changes in a potassium channel revealed by solid-state NMR. *Nature* **440**, 959-962.

Oelze, M., Warnholtz, A., Faulhaber, J., Wenzel, P., Kleschyov, A.L., Coldewey, M., Hink, U., Pongs, O., Fleming, I., Wassmann, S., Meinertz, T., Ehmke, H., Daiber, A., and Munzel, T. (2006). NADPH oxidase accounts for enhanced superoxide production and impaired endothelium-dependent smooth muscle relaxation in BKbeta1-/mice. *Arterioscler. Thromb. Vasc. Biol.* **26**, 1753-1759.

Shamgar, L., Ma, L., Schmitt, N., Haitin, Y., Peretz, A., Wiener, R., Hirsch, J., Pongs, O., and Attali, B. (2006). Calmodulin is essential for cardiac I_{Ks} channel gating and assembly: impaired function in long QT mutations. *Circ. Res.* **98**, 1055-1063.

Institute for Biosynthesis of Neural Structures

Director: Prof. Dr. Melitta Schachner Camartin (Institute established in 1995)

Ango, F., Wu, C., Van der Want, J.J., Wu, P., Schachner, M., and Huang, Z.J. (2008). Bergmann glia and the recognition molecule CHL1 organize GABAergic axons and direct innervation of Purkinje cell dendrites. *PLoS Biol.* 6, e103.

Ben-Zvi, A., Manor, O., Schachner, M., Yaron, A., Tessier-Lavigne, M., and Behar, O. (2008). The Semaphorin receptor PlexinA3 mediates neuronal apoptosis during dorsal root ganglia development. *J. Neurosci.* 28, 12427-12432.

Bodrikov, V., Sytnyk, V., Leshchyns'ka, I., den Hertog, J., and Schachner, M. (2008). NCAM induces CaMKIIalpha-mediated RPTPalpha phosphorylation to enhance its catalytic activity and neurite outgrowth. *J. Cell Biol.* 182, 1185-1200.

Desarnaud, F., Jakovcevski, M., Morellini, F., and Schachner, M. (2008). Stress downregulates hippocampal expression of the adhesion molecules NCAM and CHL1 in mice by mechanisms independent of DNA methylation of their promoters. *Cell Adh. Migr.* 2, 38-44.

Diedrich, M., Mao, L., Bernreuther, C., Zabel, C., Nebrich, G., Kleene, R., and Klose, J. (2008). Proteome analysis of ventral midbrain in MPTP-treated normal and L1cam transgenic mice. *Proteomics* 8, 1266-1275.

Dityatev, A., Bukalo, O., and Schachner, M. (2008). Modulation of synaptic transmission and plasticity by cell adhesion and repulsion molecules. *Neuron Glia Biol.* 4, 197-209.

Hargus, G., Cui, Y., Schmid, J.S., Xu, J., Glatzel, M., Schachner, M., and Bernreuther, C. (2008). Tenascin-R promotes neuronal differentiation of embryonic stem cells and recruitment of host-derived neural precursor cells after excitotoxic lesion of the mouse striatum. *Stem Cells* 26, 1973-1984.

Jakovcevski, M., Schachner, M., and Morellini, F. (2008). Individual variability in the stress response of C57BL/6J male mice correlates with trait anxiety. *Genes Brain Behav.* 7, 235-243.

Kolata, S., Wu, J., Light, K., Schachner, M., and Matzel, L.D. (2008). Impaired working memory duration but normal learning abilities found in mice that are conditionally deficient in the close homolog of L1. *J. Neurosci.* 28, 13505-13510.

Li, Y.L., Wu, G.Z., Dawe, G.S., Zeng, L., Cui, S.S., Loers, G., Tilling, T., Sun, L., Schachner, M., and Xiao, Z.C. (2008). Cell surface sialylation and fucosylation are regulated by L1 via phospholipase Cgamma and cooperate to modulate neurite outgrowth, cell survival and migration. *PLoS One* 3, e3841.

Liao, H., Huang, W., Schachner, M., Guan, Y., Guo, J., Yan, J., Qin, J., Bai, X., and Zhang, L. (2008). Beta 1 integrin-mediated effects of tenascin-R domains EGFL and FN6-8 on neural stem/progenitor cell proliferation and differentiation in vitro. *J. Biol. Chem.* 283, 27927-27936.

Ma, Q.H., Futagawa, T., Yang, W.L., Jiang, X.D., Zeng, L., Takeda, Y., Xu, R.X., Bagnard, D., Schachner, M., Furley, A.J., Karagogeos, D., Watanabe, K., Dawe, G.S., and Xiao, Z.C. (2008). A TAG1-APP signalling pathway through Fe65 negatively modulates neurogenesis. *Nat. Cell Biol.* 10, 283-294. Erratum in: *Nat. Cell Biol.* 10, 497.

Ponimaskin, E., Dityateva, G., Ruonala, M.O., Fukata, M., Fukata, Y., Kobe, F., Wouters, F.S., Delling, M., Bredt, D.S., Schachner, M., and Dityatev, A. (2008). Fibroblast growth factor-regulated palmitoylation of the neural cell adhesion molecule determines neuronal morphogenesis. *J. Neurosci.* 28, 8897-8907.

Schmidt, C., Lepsverdize, E., Chi, S.L., Das, A.M., Pizzo, S.V., Dityatev, A., and Schachner, M. (2008). Amyloid precursor protein and amyloid beta-peptide bind to ATP synthase and regulate its activity at the surface of neural cells. *Mol. Psychiatry.* 13, 953-969.

Tereshchenko, Y., Brandewiede, J., Schachner, M., Irintchev, A., and Morellini, F. (2008). Novelty-induced behavioral traits correlate with numbers of brainstem noradrenergic neurons and septal cholinergic neurons in C57BL/6J mice. *Behav. Brain Res.* 191, 280-284.

- Wijayawardhane, N., Shonesy, B.C., Vaithianathan, T., Pandiella, N., Vaglenova, J., Breese, C.R., Dityatev, A., and Suppiramaniam, V. (2008). Ameliorating effects of preadolescent aniracetam treatment on prenatal ethanol-induced impairment in AMPA receptor activity. *Neurobiol. Dis.* 29, 81-91.
- Ye, H., Tan, Y.L., Ponniah, S., Takeda, Y., Wang, S.Q., Schachner, M., Watanabe, K., Pallen, C.J., and Xiao, Z.C. (2008). Neural recognition molecules CHL1 and NB-3 regulate apical dendrite orientation in the neocortex via PTP alpha. *EMBO J.* 27, 188-200.
- Ahlborn, P., Schachner, M., and Irinchev, A. (2007). One hour electrical stimulation accelerates functional recovery after femoral nerve repair. *Exp. Neurol.* 208, 137-144.
- Bukalo, O., Schachner, M., and Dityatev, A. (2007). Hippocampal metaplasticity induced by deficiency in the extracellular matrix glycoprotein tenascin-R. *J. Neurosci.* 27, 6019-6028.
- Chen, J., Wu, J., Apostolova, I., Skup, M., Irinchev, A., Kügler, S., and Schachner, M. (2007). Adeno-associated virus-mediated L1 expression promotes functional recovery after spinal cord injury. *Brain* 130, 954-969.
- Deumens, R., Lübbbers, M., Jaken, R.J., Meijis, M.F., Thurlings, R.M., Honig, W.M., Schachner, M., Brook, G.A., and Joosten, E.A. (2007). Mice lacking L1 have reduced CGRP fibre in-growth into spinal transection lesions. *Neurosci. Lett.* 420, 277-281.
- Dityatev, A., Brückner, G., Dityateva, G., Grosche, J., Kleene, R., and Schachner, M. (2007). Activity-dependent formation and functions of chondroitin sulfate-rich extracellular matrix of perineuronal nets. *Dev. Neurobiol.* 67, 570-5
- Gurevicius, K., Gureviciene, I., Sivukhina, E., Irinchev, A., Schachner, M., and Tanila, H. (2007). Increased hippocampal and cortical beta oscillations in mice deficient for the HNK-1 sulfotransferase. *Mol. Cell. Neurosci.* 34, 189-98.
- Jakovcevski, I., Wu, J., Karl, N., Leshchyns'ka, I., Sytnyk, V., Chen, J., Irinchev, A., and Schachner, M. (2007). Glial scar expression of CHL1, the close homolog of the adhesion molecule L1, limits recovery after spinal cord injury. *J. Neurosci.* 27, 7222-7233.
- Johann, V., Schiefer, J., Sass, C., Mey, J., Brook, G., Krüttgen, A., Schlangen, C., Bernreuther, C., Schachner, M., Dihné, M., and Kosinski, C.M. (2007) Time of transplantation and cell preparation determine neural stem cell survival in a mouse model of Huntington's disease. *Exp. Brain Res.* 177, 458-470.
- Kaifi, J.T., Reichelt, U., Quaas, A., Schurr, P.G., Wachowiak, R., Yekebas, E.F., Strate, T., Schneider, C., Pantel, K., Schachner, M., Sauter, G., and Izicki, J.R. (2007). L1 is associated with micrometastatic spread and poor outcome in colorectal cancer. *Mod. Pathol.* 20, 1183-1190.
- Kleene, R., Loers, G., Langer, J., Frobert, Y., Buck, F., and Schachner, M. (2007). Prion protein regulates glutamate-dependent lactate transport of astrocytes. *J. Neurosci.* 27, 12331-12340.
- Loers, G., and Schachner, M. (2007). Recognition molecules and neural repair. *J. Neurochem.* 101, 865-882.
- Macias, M., Dwornik, A., Ziemińska, E., Fehr, S., Schachner, M., Czarkowska-Bauch, J., and Skup, M. (2007). Locomotor exercise alters expression of pro-brain-derived neurotrophic factor, brain-derived neurotrophic factor and its receptor TrkB in the spinal cord of adult rats. *Eur J. Neurosci.* 25, 2425-2444.
- Maness, P.F., and Schachner, M. (2007). Neural recognition molecules of the immunoglobulin superfamily: signaling transducers of axon guidance and neuronal migration. *Nat. Neurosci.* 10, 19-26.
- Morellini, F., Lepsveridze, E., Kähler, B., Dityatev, A., and Schachner, M. (2007). Reduced reactivity to novelty, impaired social behavior, and enhanced basal synaptic excitatory activity in perforant path projections to the dentate gyrus in young adult mice deficient in the neural cell adhesion molecule CHL1. *Mol. Cell. Neurosci.* 34, 121-136.
- Papastefanaki, F., Chen, J., Lavdas, A.A., Thomaidou, D., Schachner, M., and Matsas, R. (2007). Grafts of Schwann cells engineered to express PSA-NCAM promote functional recovery after spinal cord injury. *Brain* 130, 2159-2174.

- Ponimaskin, E., Voyno-Yasenetskaya, T., Richter, D.W., Schachner, M., and Dityatev, A. (2007). Morphogenic signaling in neurons via neurotransmitter receptors and small GTPases. *Mol. Neurobiol.* 35, 278-287.
- Schweitzer, J., Gimnopoulos, D., Lieberoth, B.C., Pogoda, H.M., Feldner, J., Ebert, A., Schachner, M., Becker, T., and Becker, C.G. (2007). Contactin1a expression is associated with oligodendrocyte differentiation and axonal regeneration in the central nervous system of zebrafish. *Mol. Cell. Neurosci.* 35, 194-207.
- Sibbe, M., Taniguchi, M., Schachner, M., and Bartsch, U. (2007). Development of the corticospinal tract in Semaphorin3A- and CD24-deficient mice. *Neuroscience* 150, 898-904.
- Thies, A., Berlin, A., Brunner, G., Schulze, H.J., Moll, I., Pfuller, U., Wagener, C., Schachner, M., Altevogt, P., and Schumacher, U. (2007). Glycoconjugate profiling of primary melanoma and its sentinel node and distant metastases: Implications for diagnosis and pathophysiology of metastases. *Cancer Lett.* 248, 68-80.
- Wachowiak, R., Fiegel, H.C., Kaifi, J.T., Quaas, A., Krickhahn, A., Schurr, P.G., Erttmann, R., Schachner, M., Kluth, D., Sauter, G., and Izicki J.R. (2007). L1 is associated with favorable outcome in neuroblastomas in contrast to adult tumors. *Ann. Surg. Oncol.* 14, 3575-3580.
- Wijayawardhane, N., Shonesy, B.C., Vaglenova, J., Vaithianathan, T., Carpenter, M., Breese, C.R., Dityatev, A., and Suppiramaniam, V. (2007). Postnatal aniracetam treatment improves prenatal ethanol induced attenuation of AMPA receptor-mediated synaptic transmission. *Neurobiol. Dis.* 26, 696-706.
- Wong, Y.W., Schulze, C., Streichert, T., Gronostajski, R.M., Schachner, M., and Tilling, T. (2007). Gene expression analysis of nuclear factor I-A deficient mice indicates delayed brain maturation. *Genome Biol.* 8, R72.
- Wright, A.G., Demyanenko, G.P., Powell, A., Schachner, M., Enriquez-Barreto, L., Tran, T.S., Polleux, F., and Maness, P.F. (2007). Close homolog of L1 and neuropilin 1 mediate guidance of thalamocortical axons at the ventral telencephalon. *J. Neurosci.* 27, 13667-13679.
- Anderson, R.B., Turner, K.N., Nikonenko, A.G., Hemperly, J., Schachner, M., and Young, H.M. (2006). The cell adhesion molecule L1 is required for chain migration of neural crest cells in the developing mouse gut. *Gastroenterology* 130, 1221-1232.
- Apostolova, I., Irinchev, A., and Schachner, M. (2006). Tenascin-R restricts posttraumatic remodeling of motoneuron innervation and functional recovery after spinal cord injury in adult mice. *J. Neurosci.* 26, 7849-7859.
- Bachle, D., Loers, G., Guthohrlein, E.W., Schachner, M., and Sewald, N. (2006). Glycomimetic cyclic peptides stimulate neurite outgrowth. *Angew. Chem. Int. Ed. Engl.* 45, 6582-6585.
- Bernreuther, C., Dihne, M., Johann, V., Schiefer, J., Cui, Y., Hargus, G., Schmid, J.S., Xu, J., Kosinski, C.M., and Schachner, M. (2006). Neural cell adhesion molecule L1-transfected embryonic stem cells promote functional recovery after excitotoxic lesion of the mouse striatum. *J. Neurosci.* 26, 11532-11539.
- Bühnemann, C., Scholz, A., Bernreuther, C., Malik, C.Y., Braun, H., Schachner, M., Reymann, K.G., and Dihne, M. (2006). Neuronal differentiation of transplanted embryonic stem cell-derived precursors in stroke lesions of adult rats. *Brain* 129, 3238-3248.
- de Chevigny, A., Lemasson, M., Saghatelyan, A., Sibbe, M., Schachner, M., and Lledo, P.M. (2006). Delayed onset of odor detection in neonatal mice lacking tenascin-C. *Mol. Cell. Neurosci.* 32, 174-186.
- Dihne, M., Bernreuther, C., Hagel, C., Wesche, K.O., and Schachner, M. (2006). Embryonic stem cell-derived neuronally committed precursor cells with reduced teratoma formation after transplantation into the lesioned adult mouse brain. *Stem Cells* 24, 1458-1466.
- Dityatev, A., and Schachner, M. (2006). The extracellular matrix and synapses. *Cell Tissue Res.* 326, 647-654.
- Dityatev, A., Frischknecht, R., and Seidenbecher, C.I. (2006). Extracellular matrix and synaptic functions. *Results Probl. Cell Differ.* 43, 69-97.

- Eberhardt, K.A., Irinchev, A., Al-Majed, A.A., Simova, O., Brushart, T.M., Gordon, T., and Schachner, M. (2006). BDNF/TrkB signaling regulates HNK-1 carbohydrate expression in regenerating motor nerves and promotes functional recovery after peripheral nerve repair. *Exp. Neurol.* **198**, 500-510.
- Fellini, L., Schachner, M., and Morellini, F. (2006). Adult but not aged C57BL/6 male mice are capable of using geometry for orientation. *Learn. Mem.* **13**, 473-481.
- van Gemert, N.G., van Riel, E., Meijer, O.C., Fehr, S., Schachner, M., and Joels, M. (2006). No effect of prolonged corticosterone over-exposure on NCAM, SGK1, and RGS4 mRNA expression in rat hippocampus. *Brain Res.* **1093**, 161-166.
- Hammond, M.S., Sims, C., Parameshwaran, K., Suppiramaniam, V., Schachner, M., and Dityatev, A. (2006). Neural cell adhesion molecule-associated polysialic acid inhibits NR2B-containing N-Methyl-D-aspartate receptors and prevents glutamate-induced cell death. *J. Biol. Chem.* **281**, 34859-34869.
- Johann, V., Schiefer, J., Sass, C., Mey, J., Brook, G., Kruttgen, A., Schlangen, C., Bernreuther, C., Schachner, M., Dihne, M., and Kosinski, C.M. (2006). Time of transplantation and cell preparation determine neural stem cell survival in a mouse model of Huntington's disease. *Exp. Brain Res.* **177**, 458-470.
- Kaifi, J.T., Heidtmann, S., Schurr, P.G., Reichelt, U., Mann, O., Yekebas, E.F., Wachowiak, R., Strate, T., Schachner, M., and Izbicki, J.R. (2006). Absence of L1 in pancreatic masses distinguishes denocarcinomas from poorly differentiated neuroendocrine carcinomas. *Anticancer Res.* **26**, 1167-1170.
- Kaifi, J.T., Strelow, A., Schurr, P.G., Reichelt, U., Yekebas, E.F., Wachowiak, R., Quaas, A., Strate, T., Schaefer, H., Sauter, G., Schachner, M., and Izbicki, J.R. (2006). L1 (CD171) is highly expressed in gastrointestinal stromal tumors. *Mod. Pathol.* **19**, 399-406.
- Kaifi, J.T., Zinnkann, U., Yekebas, E.F., Schurr, P.G., Reichelt, U., Wachowiak, R., Fiegel, H.C., Petri, S., Schachner, M., and Izbicki, J.R. (2006). L1 is a potential marker for poorly-differentiated pancreatic neuroendocrine carcinoma. *World J. Gastroenterol.* **12**, 94-98.
- Kalus, I., Bormann, U., Mzoughi, M., Schachner, M., and Kleene, R. (2006). Proteolytic cleavage of the neural cell adhesion molecule by ADAM17/TACE is involved in neurite outgrowth. *J. Neurochem.* **98**, 78-88.
- Leshchyns'ka, I., Sytnyk, V., Richter, M., Andreyeva, A., Puchkov, D., and Schachner, M. (2006). The adhesion molecule CHL1 regulates uncoating of clathrin-coated synaptic vesicles. *Neuron* **52**, 1011-1025.
- Lewejohann, L., Reinhard, C., Schrewe, A., Brandewiede, J., Haemisch, A., Gortz, N., Schachner, M., and Sachser, N. (2006). Environmental bias? Effects of housing conditions, laboratory environment and experimenter on behavioral tests. *Genes Brain Behav.* **5**, 64-72.
- Metzger, M., Bartsch, S., Bartsch, U., Bock, J., Schachner, M., and Braun, K. (2006). Regional and cellular distribution of the extracellular matrix protein tenascin-C in the chick forebrain and its role in neonatal learning. *Neuroscience* **141**, 1709-1719.
- Morellini, F., and Schachner, M. (2006). Enhanced novelty-induced activity, reduced anxiety, delayed resynchronization to daylight reversal and weaker muscle strength in tenascin-C-deficient mice. *Eur. J. Neurosci.* **23**, 1255-1268.
- Nie, D.Y., Ma, Q.H., Law, J.W., Chia, C.P., Dhingra, N.K., Shimoda, Y., Yang, W.L., Gong, N., Chen, Q.W., Xu, G., Hu, Q.D., Chow, P.K., Ng, Y.K., Ling, E.A., Watanabe, K., Xu, T.L., Habib, A.A., Schachner, M., and Xiao, Z.C. (2006) Oligodendrocytes regulate formation of nodes of Ranvier via the recognition molecule OMgp. *Neuron Glia Biol.* **2**, 151-164.
- Nikonenko, A.G., Sun, M., Lepsveridze, E., Apostolova, I., Petrova, I., Irinchev, A., Dityatev, A., and Schachner, M. (2006). Enhanced perisomatic inhibition and impaired long-term potentiation in the CA1 region of juvenile CHL1-deficient mice. *Eur. J. Neurosci.* **23**, 1839-1852.
- Peeva, G.P., Angelova, S.K., Guntinas-Lichius, O., Streppel, M., Irinchev, A., Schütz, U., Popratiloff, A., Savaskan, N.E., Bräuer, A.U., Alvanou, A., Nitsch, R., and Angelov, D.N. (2006). Improved outcome of facial nerve repair in rats is associated with enhanced regenerative response of motoneurons and augmented neocortical plasticity. *Eur. J. Neurosci.* **24**, 2152-2162.

- Plappert, C.F., Schachner, and M., Pilz, P.K. (2006). Neural cell adhesion molecule (NCAM) null mice show impaired sensitization of the startle response. *Genes Brain Behav.* 5, 46-52.
- Schweitzer, J., Becker, T., Schachner, M., Nave, K.A., and Werner, H. (2006). Evolution of myelin proteolipid proteins: Gene duplication in teleosts and expression pattern divergence. *Mol. Cell. Neurosci.* 31, 161-177.
- Senkov, O., Sun, M., Weinhold, B., Gerady-Schahn, R., Schachner, M., and Dityatev, A. (2006). Polysialylated neural cell adhesion molecule is involved in induction of long-term potentiation and memory acquisition and consolidation in a fear-conditioning paradigm. *J. Neurosci.* 26, 10888-10898.
- Simova, O., Irintchev, A., Mehanna, A., Liu, J., Dihne, M., Bachle, D., Sewald, N., Loers, G., and Schachner, M. (2006). Carbohydrate mimics promote functional recovery after peripheral nerve repair. *Ann. Neurol.* 60, 430-437.
- Stoenica, L., Senkov, O., Gerady-Schahn, R., Weinhold, B., Schachner, M., and Dityatev, A. (2006). In vivo synaptic plasticity in the dentate gyrus of mice deficient in the neural cell adhesion molecule NCAM or its polysialic acid. *Eur. J. Neurosci.* 23, 2255-2264.
- Strelakova, H., Buhmann, C., Kleene, R., Eggers, C., Saffell, J., Hemperly, J., Weiller, C., Muller-Thomsen, T., and Schachner, M. (2006). Elevated levels of neural recognition molecule L1 in the cerebrospinal fluid of patients with Alzheimer disease and other dementia syndromes. *Neurobiol. Aging* 27, 1-9.
- Sytnyk, V., Leshchyns'ka, I., Nikonenko, A.G., and Schachner, M. (2006). NCAM promotes assembly and activity-dependent remodeling of the postsynaptic signaling complex. *J. Cell Biol.* 174, 1071-1085.
- Zabel, C., Sagi, D., Kaindl, A.M., Steireif, N., Klare, Y., Mao, L., Peters, H., Wacker, M.A., Kleene, R. and Klose, J. (2006). Comparative proteomics in neurodegenerative and non-neurodegenerative diseases suggest nodal point proteins in regulatory networking. *J. Proteome Res.* 5, 1948-1958.

Emeritus Group Cell Biochemistry and Clinical Neurobiology

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- Gäde, G., Marco, H.G., Richter, D., and Weaver, R.J. (2008). Structure-activity studies with endogenous allatostatins from Periplaneta americana: expressed receptor compared with functional bioassay. *J. Insect. Physiol.* 54, 988-996.
- Christenn, M., Kindler, S., Schulz, S., Buck, F., Richter, D., and Kreienkamp, H.J. (2007). Interaction of brain somatostatin receptors with the PDZ domains of PSD-95. *FEBS Lett.* 581, 5173-5177.
- Francke, F., Ward, R. J., Jenkins, L., Kellett E., Richter, D., Milligan G., and Bächner, D. (2006). Interaction of neurochondrin with the melanin-concentrating hormone receptor 1 interferes with G protein-coupled signal transduction but not agonist-mediated internalization. *J. Biol. Chem.* 281, 32496-32507.
- Meyerhof, W. and Richter, D. (2006). Signaling in chemosensory systems. *Cell. Mol. Life Sci.* 13, 1463-1464.
- Wang, X.P., Norman, M., Yang, J., Magnusson, J., Kreienkamp, H.-J., Richter, D., DeMayo, F.J. and Brunicardi, F.C. (2006). Alterations in glucose homeostasis in SSTR1 gene-ablated mice. *Mol. Cell. Endocrinol.* 247, 82-90.
- Richter, D. and Tiedge, H. (2006-2009). Results and Problems in Cell Differentiation. Vol. 41-49 (Heidelberg: Springer Press).

Institute for Molecular Neuropathology

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Hentschke, M., Wiemann, M., Hentschke, S., Kurth, I., Hermans-Borgmeyer, I., Seidenbecher, T., Jentsch, T.J., Gal, A., and Hubner, C.A. (2006). Mice with a targeted disruption of the Cl-/HCO₃- exchanger AE3 display a reduced seizure threshold. *Mol. Cell. Biol.* **26**, 182-191.

Kharkovets, T., Dedek, K., Maier, H., Schweizer, M., Khimich, D., Nouvian, R., Vardanyan, V., Leuwer, R., Moser, T., and Jentsch, T.J. (2006). Mice with altered KCNQ4 K⁺ channels implicate sensory outer hair cells in human progressive deafness. *EMBO J.* **25**, 642-652.

Lange, P.F., Wartosch, L., Jentsch, T.J., and Fuhrmann, J.C. (2006). CIC-7 requires Ostm1 as a beta-subunit to support bone resorption and lysosomal function. *Nature* **440**, 220-223.

Maritzen, T., Rickheit, G., Schmitt, A., and Jentsch, T.J. (2006). Kidney-specific upregulation of vitamin D3 target genes in CIC-5 KO mice. *Kidney Int.* **70**, 79-87.

Maritzen, T., Lisi, S., Botta, R., Pinchera, A., Fanelli, G., Vacava, P., Marcocci, C., and Marino, M. (2006). CIC-5 does not affect megalin expression and function in the thyroid. *Thyroid* **16**, 725-730.

Poët, M., Kornak, U., Schweizer, M., Zdebik, A.A., Scheel, O., Hoelter, S., Wurst, W., Schmitt, A., Fuhrmann, J.C., Planells-Cases, R., *et al.* (2006). Lysosomal storage disease upon disruption of the neuronal chloride transport protein CIC-6. *Proc. Natl. Acad. Sci. USA* **103**, 13854-13859.

Rust, M.B., Faulhaber, J., Budack, M.K., Pfeffer, C., Maritzen, T., Didie, M., Beck, F.X., Boettger, T., Schubert, R., Ehmke, H., *et al.* (2006). Neurogenic mechanisms contribute to hypertension in mice with disruption of the K-Cl cotransporter KCC3. *Circ. Res.* **98**, 549-556.

Schwake, M., Athanasiadu, D., Beimgraben, C., Blanz, J., Beck, C., Jentsch, T.J., Saftig, P., and Friedrich, T. (2006). Structural determinants of M-type KCNQ (Kv7) K⁺ channel assembly. *J. Neurosci.* **26**, 3757-3766.

BMBF/DFG Emmy-Noether Team Neuronal Networks in Developing Brain

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Kilb*, W., Hanganu*, I.L., Okabe, A., Shimizu-Okabe, C., Fukuda, A., and Luhmann, H.J. (2008). Glycine receptors mediate excitation of subplate neurons in neonatal rat cerebral cortex. *J. Neurophysiol.* **100**, 698-707.

Hanganu, I.L., Staiger, J., Ben-Ari, Y., and Khazipov, R. (2007). Cholinergic modulation of spindle bursts in the neonatal rat visual cortex *in vivo*. *J. Neurosci.* **27**, 5694-5705.

Hanganu, I.L., Ben-Ari, Y., and Khazipov, R. (2006). Retinal waves trigger spindle bursts in the neonatal visual cortex. *J. Neurosci.* **26**, 6728-6736.

Dupont*, E., Hanganu*, I.L., Kilb, W., Hirsch, S., and Luhmann, H.J. (2006). Rapid developmental switch in the mechanisms driving early cortical columnar networks. *Nature* **439**, 79-83.

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DFG Emmy-Noether Team Neuroimmunology

Head: Dr. Manuel Friese (Group established in 2008)

Friese, M.A., Jakobsen, K.B., Friis, L., Etzensperger, R., Craner, M.J., McMahon, R.M., Jensen, L.T., Huygelen, V., Jones, E.Y., Bell, J.I., and Fugger, L. (2008). Opposing effects of HLA class I molecules in tuning autoreactive CD8+ T cells in multiple sclerosis. *Nat. Med.* **14**, 1227-1235.

Tzartos, J.S.*., Friese, M.A.*., Craner, M.J., Palace, J., Newcombe, J., Esiri, M.M., and Fugger, L. (2008). Interleukin-17 production in central nervous system-infiltrating T cells and glial cells is associated with active disease in multiple sclerosis. *Am. J. Pathol.* **172**, 146-155. (* equal contribution)

Friese, M.A., Craner, M.J., Etzensperger, R., Vergo, S., Wemmie, J.A., Welsh, M.J., Vincent, A., and Fugger, L. (2007). Acid-sensing ion channel-1 contributes to axonal degeneration in autoimmune inflammation of the central nervous system. *Nat. Med.* **13**, 1483-1489.

Friese, M.A., and Fugger, L. (2007). T cells and microglia as drivers of multiple sclerosis pathology. *Brain* **130**, 2755-2757.

Friese, M.A., Jensen, L.T., Willcox, N., and Fugger, L. (2006). Humanized mouse models for organ-specific autoimmune diseases. *Curr. Opin. Immunol.* **18**, 704-709.

Friese, M.A., Montalban, X., Willcox, N., Bell, J.I., Martin, R., and Fugger, L. (2006). The value of animal models for drug development in multiple sclerosis. *Brain* **129**, 1940-1952.

Eisele, G., Wischhusen, J., Mittelbronn, M., Meyermann, R., Waldhauer, I., Steinle, A., Weller, M., and Friese, M.A. (2006). TGF-beta and metalloproteinases differentially suppress NKG2D ligand surface expression on malignant glioma cells. *Brain* **129**, 2416-2425.

DFG Heisenberg Team Experimental Neuropediatrics

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ten Hove, M., Makinen, K., Sebag-Montefiore, L., Hunyor, I., Fischer, A., Wallis, J., Isbrandt, D., Lygate, C., and Neubauer, S. (2008). Creatine uptake in mouse hearts with genetically altered creatine levels. *J. Mol. Cell. Cardiol.* **45**, 453-459.

Schneider, J.E., Stork, L.A., Bell, J.T., ten Hove, M., Isbrandt, D., Clarke, K., Watkins, H., Lygate, C.A., and Neubauer, S. (2008). Cardiac structure and function during ageing in energetically compromised Guanidinoacetate N-methyltransferase (GAMT)-knockout mice - a one year longitudinal MRI study. *J. Cardiovasc. Magn. Reson.* **10**, 9.

Kan, H.E., Meeuwissen, E., van Asten, J.J., Veltien, A., Isbrandt, D., and Heerschap, A. (2007). Creatine uptake in brain and skeletal muscle of mice lacking guanidinoacetate methyltransferase assessed by magnetic resonance spectroscopy. *J. Appl. Physiol.* **102**, 2121-2127.

Heerschap, A., Kan, H.E., Nabuurs, C.I., Renema, W.K., Isbrandt, D., and Wieringa, B. (2007). In vivo magnetic resonance spectroscopy of transgenic mice with altered expression of guanidinoacetate methyltransferase and creatine kinase isoenzymes. *Subcell. Biochem.* **46**, 119-148.

Choe, C.U., Schulze-Bahr, E., Neu, A., Xu, J., Zhu, Z.I., Sauter, K., Bahring, R., Priori, S., Guicheney, P., Monnig, G., et al. (2006). C-terminal HERG (LQT2) mutations disrupt IKr channel regulation through 14-3-3epsilon. *Hum. Mol. Genet.* **15**, 2888-2902.

Research Group Protein Trafficking and Synapse Formation

Head: Prof. Dr. Matthias Kneussel (Group established in 2002)

Lappe-Siefke, C., Maas, C., and Kneussel, M. (2008). Microinjection into cultured hippocampal neurons: a straightforward approach for controlled cellular delivery of nucleic acids, peptides and antibodies. *J. Neurosci. Methods* **175**, 88-95.

Kneussel, M., and Loebrich, S. (2007). Trafficking and synaptic anchoring of ionotropic inhibitory neurotransmitter receptors. *Biol. Cell.* **99**, 297-309.

Pilo Boyl, P., Di Nardo, A., Mulle, C., Sasse-Pognetto, M., Panzanelli, P., Mele, A., Kneussel, M., Costantini, V., Perlas, E., Massimi, M., et al. (2007). Profilin2 contributes to synaptic vesicle exocytosis, neuronal excitability, and novelty-seeking behavior. *EMBO J.* 26, 2991-3002.

Tagnaouti, N., Loebrich, S., Heisler, F., Pechmann, Y., Fehr, S., De Arcangelis, A., Georges-Labouesse, E., Adams, J.C., and Kneussel, M. (2007). Neuronal expression of muskelin in the rodent central nervous system. *BMC Neurosci.* 8, 28.

Kneussel, M. (2006). Dynamic stabilization: Structural plasticity at inhibitory postsynaptic sites. *Traffic* 7, 1604-1606.

Loebrich, S., Bahring, R., Katsuno, T., Tsukita, S., and Kneussel, M. (2006). Activated radixin is essential for GABA_A receptor alpha5 subunit anchoring at the actin cytoskeleton. *EMBO J.* 25, 987-999.

Maas, C., Tagnaouti, N., Loebrich, S., Behrend, B., Lappe-Siefke, C., and Kneussel, M. (2006). Neuronal cotransport of glycine receptor and the scaffold protein gephyrin. *J. Cell. Biol.* 172, 441-451.

Research Group Synaptic Protein Networks

Head: Dr. Hans-Christian Kornau (Group established in 2001)

Kornau, H.-C. (2006). GABA_B receptors and synaptic modulation. *Cell Tissue Res.* 326, 517-533.

Research Group Development and Maintenance of the Nervous System

Head: Dr. Edgar Kramer (Group established in March 2008)

Jaehrling, N., Becker, K., Kramer, E.R., and Dodt, H.-U. (2008). 3D-visualisation of nerve fibre bundles by ultramicroscopy. *Medical Laser Application* 23, 209-215.

Deininger, K., Eder, M., Kramer, E.R., Ziegglänsberger, W., Dodt, H.-U., Dornmair, K., Colicelli, J., and Klein, R. (2008).. The Rab5 guanylate exchange factor Rin1 links internalization of activated EphA4 to synaptic plasticity. *Proc. Natl. Acad. Sci. USA* 105, 12539-12544.

Mishra, A., Knerr, B., Paixão, S., Kramer, E.R., and Klein, R. (2008). Dendrite arborization and synapse maturation (Dasm)-1 is dispensable for dendrite arborization. *Mol. Cell. Biol.* 28, 2782-2791.

Lücking, C.B., Lichtner, P., Kramer, E.R., Gieger, C., Illig, T., Dichgans, M., Berg D., and Gasser, T. (2008). Polymorphisms in the receptor for GDNF (*Ret*) are not associated with Parkinson's disease in Southern Germany. *Neurobiol. Aging* (Epub Apr 22)

Becker, K., Jaehrling, N., Kramer, E.R., Schnorrer, F., and Dodt, H.-U. (2008). Ultramicroscopy: 3D reconstruction of large microscopical specimens. *J. Biophoton.* 1, 36-42.

Kowsky, S.* , Poeppelmeyer, C.* , Kramer, E.R.* , Falkenburger, B.H., Klein, R., and Schulz, J.B. (2007). Ret does not modulate MPTP toxicity but is required for regeneration. *Proc. Natl. Acad. Sci. USA* 104, 20049-20054.

Kramer, E.R., Aron, L., Ramaker, G.M.J., Seitz, S., Zhuang, X., Beyer, K., Smidt, M.P., and Klein, R. (2007). Absence of Ret signaling in mice causes progressive and late degeneration of the nigrostriatal system. *PLoS Biol.* 5, 616-628.

Kramer, E.R.* , Knott, L.* , Su, F., Dessaoud, E., Krull, C., Helmbacher, F., and Klein, R. (2006). Cooperation between GDNF/Ret and ephrinA/EphA4 signals for motor-axon pathway selection in the limb. *Neuron* 50, 35-47.

* contributed equally

Research Group Neuronal Protein Degradation

Head: PD Dr. Thorsten Hoppe (Group 2003 – 2008)

Mouysset, J., Deichsel, A., Moser, S., Hoege, C., Hyman, A.A., Gartner, A., and Hoppe, T. (2008). Cell cycle progression requires the CDC-48UFD-1/NPL-4 complex for efficient DNA replication. *Proc. Natl. Acad. Sci. USA.* **105**, 12879-12884.

Kim, J., Löwe, T., and Hoppe, T. (2008). Protein quality control gets muscle into shape. *Trends Cell Biol.* **18**, 264-272.

Hoppe, T. (2008). Less is more: how protein degradation regulates muscle development. *Ernst Schering Found Symp Proc.* **1**, 67-73.

Janiesch, P.C., Kim, J., Mouysset, J., Barikbin, R., Lochmüller, H., Cassata, G., Krause, S., and Hoppe, T. (2007). The ubiquitin-selective chaperone CDC-48/p97 links myosin assembly to human myopathy. *Nat. Cell. Biol.* **9**, 379-390.

Landsverk, M.L., Hutagalung, A.H., Li, S., Najafov, A., Hoppe, T., Barral, J.M., and Epstein, H.F. (2007). The UNC-45 Chaperone mediates sarcomere assembly through myosin degradation in

C. elegans. *J. Cell. Biol.* **177**, 205-210.

Mouysset, J., Kähler, C., and Hoppe, T. (2006). A conserved role of *C. elegans* CDC-48 in ER-associated protein degradation. *J. Struct. Biol.* **156**, 41-49.

Kim, J., and Hoppe, T. (2006). The ubiquitin/proteasome system and muscle development. In *Protein Degradation: Cell Biology of the Ubiquitin-Proteasome System*, Volume 3, R.J. Mayer, A.J. Ciechanover, M. Rechsteiner, eds. (New York: Wiley-VCH) pp. 21-39.

Research Group Development of the Peripheral Nervous System

Head: PD Dr. Dieter Riethmacher (Group 1999-2008)

Sonnenberg-Riethmacher, E., Wüstefeld, T., Miehe, M., Trautwein, C., and Riethmacher, D. (2007). Maid (GCIP) is involved in cell cycle control of hepatocytes. *Hepatology* **45**, 404-411.

Wetzel, C., Hu, J., Riethmacher, D., Benckendorff, A., Harder, L., Eilers, A., Moshourab, R., Kozienkov, A., Labuz, D., Caspani, O., Erdmann, B., Machelska, H., Heppenstall, P., and Lewin, G.R. (2007). A stomatin-domain protein essential for touch sensation in the mouse. *Nature* **445**, 206-209.

Brockschnieder, D., Sabanay, H., Riethmacher, D., and Peles, E. (2006). Ermin, a myelinating oligodendrocyte-specific protein that regulates cell morphology. *J. Neurosci.* **26**, 757-762.

Gosgnach, S., Lanuza, G.M., Butt, S.J., Saueressig, H., Zhang, Y., Velasquez, T., Riethmacher, D., Callaway, E.M., Kiehn, O., and Goulding, M. (2006). V1 spinal neurons regulate the speed of vertebrate locomotor outputs. *Nature* **440**, 215-219.

Brockschnieder, D., Pechmann, Y., Sonnenberg-Riethmacher, E., and Riethmacher, D. (2006). An improved mouse line for Cre-induced cell ablation due to Diphtheria toxin A, expressed from the Rosa 26 locus. *Genesis* **44**, 322-327.

Riethmacher, D., Lim, F., and Schimmang, T. (2006). Efficient transfer of HSV-1 amplicon vectors into embryonic stem cells and their derivatives. *Methods. Mol. Biol.* **329**, 265-272.

ZMNH Service Groups

- Jacobs, S., Ruusuvuori, E., Sipilä, S.T., Haapanen, A., Damkier, H.H., Kurth, I., Hentschke, M., Schweizer, M., Rudhard, Y., Laatikainen, L.M., Tyynelä, J., Praetorius, J., Voipio, J., and Hübner, C.A. (2008). Mice with targeted Slc4a10 gene disruption have small brain ventricles and show reduced neuronal excitability. *Proc. Natl. Acad. Sci. USA.* **105**, 311-316.
- Nielsen, M.S., Keat, S.J., Hamati, J.W., Madsen, P., Gutzmann, J.J., Engelsberg, A., Pedersen, K.M., Gustafsen, C., Nykjaer, A., Gliemann, J., Hermans-Borgmeyer, I., Kuhl, D., Petersen, C.M., and Hermey, G. (2008). Different motifs regulate trafficking of SorCS1 isoforms. *Traffic* **9**, 980-994.
- Trowe, M.O., Maier, H., Schweizer, M., and Kispert, A. (2008). Deafness in mice lacking the T-box transcription factor Tbx18 in otic fibrocytes. *Development* **135**, 1725-1734.
- Turner, J.E., Paust, H.J., Steinmetz, O.M., Peters, A., Meyer-Schwesinger, C., Heymann, F., Helmchen, U., Fehr, S., Horuk, R., Wenzel, U., Kurts, C., Mitträcker, H.W., Stahl, R.A., and Panzer, U. (2008). CCR5 deficiency aggravates crescentic glomerulonephritis in mice. *J. Immunol.* **181**, 6546-6556.
- Blanz, J., Schweizer, M., Auberson, M., Maier, H., Muenscher, A., Hübner, C.A., and Jentsch, T.J. (2007). Leukoencephalopathy upon disruption of the chloride channel ClC-2. *Neurosci.* **27**, 6581-6589.
- Hansen, K., Wagner, B., Hamel, W., Schweizer, M., Haag, F., Westphal, M., and Lamszus, K. (2007). Autophagic cell death induced by TrkA receptor activation in human glioblastoma cells. *J. Neurochem.* **103**, 259-275.
- Hoffmeister-Ullerich, S. (2007). Hydra - ancient model with modern outfit. *Cell. Mol. Life Sci.* **64**, 3012-3016.
- Krebs, C., Hammig, I., Sadaghiani, S., Steinmetz, O.M., Meyer-Schwesinger, C., Fehr, S., Stahl, R.A., Garrelds, I.M., Danser, A.H., van Goor, H., Contrepas, A., Nguyen, G., and Wenzel, U. (2007). Antihypertensive therapy upregulates renin and (pro)renin receptor in the clipped kidney of Goldblatt hypertensive rats. *Kidney Int.* **72**, 725-730.
- Kurth, I., Thompson, D., Rüther, K., Feathers, K.L., Chrispell, J.D., Schroth, J., McHenry, C.L., Schweizer, M., Skosyrski, S., Gal, A., and Hübner, C.A. (2007). Targeted disruption of the murine retinal dehydrogenase gene Rdh12 does not limit visual cycle function. *Mol. Cell. Biol.* **27**, 1370-1379.
- Loges, S., Butzal, M., Otten, J., Schweizer, M., Fischer, U., Bokemeyer, C., Hossfeld, D.K., Schuch, G., and Fiedler, W. (2007). Cilengitide inhibits proliferation and differentiation of human endothelial progenitor cells in vitro. *Biochem. Biophys. Res. Commun.* **357**, 1016-1020.
- Macias, M., Dwornik, A., Ziemińska, E., Fehr, S., Schachner, M., Czarkowska-Bauch, J., and Skup, M. (2007). Locomotor exercise alters expression of pro-brain-derived neurotrophic factor, brain-derived neurotrophic factor and its receptor TrkB in the spinal cord of adult rats. *Eur. J. Neurosci.* **25**, 2425-2444.
- Steinmetz, O.M., Panzer, U., Fehr, S., Meyer-Schwesinger, C., Stahl, R.A., and Wenzel, U.O. (2007). A pitfall of glomerular sieving: profibrotic and matrix proteins derive from the Bowman's capsule and not the glomerular tuft in rats with renovascular hypertension. *Nephrol. Dial. Transplant.* **22**, 3055-3060.
- Steinmetz, O.M., Sadaghiani, S., Panzer, U., Krebs, C., Meyer-Schwesinger, C., Streichert, T., Fehr, S., Hamming, I., van Goor, H., Stahl, R.A., and Wenzel, U. (2007). Antihypertensive therapy induces compartment-specific chemokine expression and a Th1 immune response in the clipped kidney of Goldblatt hypertensive rats. *Am. J. Physiol. Renal. Physiol.* **292**, F876-887.
- Tagnaouti, N., Loebrich, S., Heisler, F., Pechmann, Y., Fehr, S., De Arcangelis, A., Georges-Labouesse, E., Adams, J.C., and Kneussel, M. (2007). Neuronal expression of muskelin in the rodent central nervous system. *BMC Neurosci.* **8**, 28.
- Wong, Y.W., Schulze, C., Streichert, T., Gronostajski, R.M., Schachner, M., and Tilling, T. (2007). Gene expression analysis of nuclear factor I-A deficient mice indicates delayed brain maturation. *Genome Biol.* **8**, R72.

Blaesse, P., Guillemin, J., Schindler, J., Schweizer, M., Delpire, E., Khirug, L., Friauf, E., and Nothwang, H., (2006). Oligomerization of KCC2 correlates with development of inhibitory neurotransmission. *J. Neurosci.* 26, 10407-10419.

Hentschke, M., Wiemann, M., Hentschke, S., Kurth, I., Hermans-Borgmeyer, I., Seidenbecher, T., Jentsch, T.J., Gal, A., and Hübner, C.A. (2006). Mice with a targeted disruption of the Cl-/HCO₃- exchanger AE3 display a reduced seizure threshold. *Mol. Cell. Biol.* 26, 182-191.

Kharkovets, T., Dedek, K., Maier, H., Schweizer, M., Khimich, D., Nouvian, R., Vardanyan, V., Leuwer, R., Moser, T., and Jentsch, T. (2006). Mice with altered KCNQ4 K⁺channels implicate sensory outer hair cells in human progressive deafness. *EMBO J.* 25, 642-652.

Panzer, U., Steinmetz, O.M., Reinking, R.R., Meyer, T.N., Fehr, S., Schneider, A., Zahner, G., Wolf, G., Helmchen, U., Schaerli, P., Stahl, R.A., and Thaiss, F. (2006). Compartment-specific expression and function of the chemokine IP-10/CXCL10 in a model of renal endothelial microvascular injury. *J. Am. Soc. Nephrol.* 17, 454-464.

Poet, M., Kornak, U., Schweizer, M., Zdebik, A.A., Scheel, O., Hoelter, S., Wurst, W., Schmitt, A., Fuhrmann, J.C., Planells-Cases, R., Mole, S.E., Hubner, C.A., and Jentsch, T.J. (2006). Lysosomal storage disease upon disruption of the neuronal chloride transport protein ClC-6. *Proc. Natl. Acad. Sci. USA.* 103, 13854-13859.

Urný, J., Hermans-Borgmeyer, I., and Schaller, H.C. (2006). Cell-surface expression of a new splice variant of the mouse signal peptide peptidase. *Biochim. Biophys. Acta.* 1759, 159-165.

Van Gemert, N.G., van Riel, E., Meijer, O.C., Fehr, S., Schachner, M., and Joels, M. (2006). No effect of prolonged corticosterone over-exposure on NCAM, SGK1, and RGS4 mRNA expression in rat hippocampus. *Brain Res.* 1093, 161-6.