

8 LITERATURVERZEICHNIS

Abbas AK, Burstein HJ und Bogen SA: Determinants of helper T cell-dependent antibody production. *Semin Immunol* 5: 441-447, 1993.

Abbas AK, Murphy KM und Sher A: Functional diversity of helper T lymphocytes. *Nature* 383: 787-793, 1996.

Aharoni R, Teitelbaum D, Sela M und Arnon R: Copolymer 1 induces T cells of the T helper type 2 that crossreact with myelin basic protein and suppress experimental autoimmune encephalomyelitis. *Proc Natl Acad Sci USA* 94: 10821-10826, 1997.

Aharoni R, Teitelbaum D, Leitner O, Meshorer A, Sela M und Arnon R: Specific Th2 cells accumulate in the central nervous system of mice protected against experimental autoimmune encephalomyelitis by copolymer 1. *Proc Natl Acad Sci USA* 97: 11472-11477, 2000.

Aktas O, Waiczies S, Smorodchenko A, Dorr J, Seeger B, Prozorovski T, Sallach S, Endres M, Brocke S, Nitsch R und Zipp F: Treatment of relapsing paralysis in experimental encephalomyelitis by targeting Th1 cells through atorvastatin. *J Exp Med* 197: 725-733, 2003.

Aloisi F, Penna G, Cerase J, Menendez Iglesias B und Adorini L: IL-12 production by central nervous system microglia is inhibited by astrocytes. *J Immunol* 159: 1604-1612, 1997.

Aloisi F, Ria F, Columba CS, Hess H, Penna G und Adorini L: Relative efficiency of microglia, astrocytes, dendritic cells and B cells in naive CD4⁺ T cell priming and Th1/Th2 cell restimulation. *Eur J Immunol* 29: 2705-2714, 1999a.

Aloisi F, Penna G, Polazzi E, Minghetti L und Adorini L: CD40-CD154 interaction and IFN-gamma are required for IL-12 but not prostaglandin E2 secretion by microglia during antigen presentation to Th1 cells. *J Immunol* 162: 1384-1391, 1999b.

Aloisi F, Serafini B und Adorini L: Glia-T cell dialogue. *J Neuroimmunol* 107: 111-117, 2000a.

Aloisi F, Ria F und Adorini L: Regulation of T-cell responses by CNS antigen-presenting cells: different for microglia and astrocytes. *Immunol Today* 21: 141-147, 2000b.

Aloisi F, De Simone R, Columba-Cabezas S, Penna G und Adorini L: Functional maturation of adult mouse resting microglia into an APC is promoted by granulocyte-macrophage colony-stimulating factor and interaction with Th1 cells. *J Immunol* 164: 1705-1712, 2000c.

Althaus HH: Remyelination in multiple sclerosis: a new role of neurotrophins? *Prog Brain Res* 146: 415-432, 2004.

Amaral DG und Witter MP: The three-dimensional organization of the hippocampal formation: A review of anatomical data. *Neurosci* 31: 571-591, 1989.

Amaral DG und Witter MP: The hippocampal formation. In: the rat nervous system, 2nd ed (Paxinos G, ed.), San Diego: Academic Press: 443-493, 1995.

Andersen P, Bliss TV und Skrede KK: Lamellar organization of hippocampal pathways. *Exp Brain Res* 13: 222-238, 1971.

Anderson AC, Nicholson LB, Legge KL, Turchin V, Zaghouani H und Kuchroo VK: High frequency of autoreactive myelin proteolipid protein-specific T cells in the periphery of naive mice: mechanisms of selection of the self-reactive repertoire. *J Exp Med* 191: 761-770, 2000.

Ando DG, Clayton J, Kono D, Urban JL und Sercarz EE: Encephalitogenic T cells in the B10.PL model of experimental allergic encephalomyelitis (EAE) are of the Th-1 lymphokine subtype. *Cell Immunol* 124: 132-143, 1989.

Angelov DN, Waibel S, Guntinas-Lichius O, Lenzen M, Neiss WF, Tomov TL, Yoles E, Kipnis J, Schori H, Reuter A, Ludolph A und Schwartz M: Therapeutic vaccine for acute and chronic motor neuron diseases: implications for amyotrophic lateral sclerosis. *Proc Natl Acad Sci USA* 100: 4790-4795, 2003.

Araujo D: Contrasting effects of specific lymphokines on the survival of hippocampal neurons in culture. In *Treatment of Dementias* (ed. Meyer E.), 113-122, Plenum Press, New York, 1992.

Araujo D und Cotman C: Trophic effects of interleukin-4, -7 and -8 on hippocampal neuronal cultures: potential involvement of glia-derived factors. *Brain Res* 600: 49-55, 1993.

Auchincloss H Jr und Sultan H: Antigen processing and presentation in transplantation. *Curr Opin Immunol* 8: 681-687, 1996.

Awatsuji H, Furukawa Y, Hirota M, Murakami Y, Nii S, Furukawa S und Hayashi K: Interleukin-4 and -5 as modulators of nerve growth factor synthesis/secretion in astrocytes. *J Neurosci Res* 34: 539-545, 1993.

Awatsuji H, Furukawa Y, Hirota M, Furukawa S und Hayashi K: Interferons suppress nerve growth factor synthesis as a result of interference with cell growth in astrocytes cultured from neonatal mouse brain. *J Neurochem* 64: 1476-1482, 1995.

Bähr M: Live or let die- retinal ganglion cell death and survival during development and in the lesioned adult CNS. *Trends Neurosci* 23: 483-490, 2000.

Bailey K und Gibbons S: Towards understanding neural survival, differentiation and death. *Genome Biol* 3: REPORTS 4018, 2002.

Bakalash S, Kessler A, Mizrahi T, Nussenblatt R und Schwartz M: Antigenic specificity of immunoprotective therapeutic vaccination for glaucoma. *Invest Ophthalmol Vis Sci* 44: 3374-3381, 2003.

Banati RB, Gehrman J, Schubert P und Kreutzberg GW: Cytotoxicity of microglia. *Glia* 7: 111-118, 1993.

Barbacid M: The Trk family of neurotrophin receptors. *J Neurobiol* 25: 1386-1403, 1994.

Barbacid M: Neurotrophic factors and their receptors. *Curr Opin Cell Biol* 7: 148-155, 1995.

Barde YA, Edgar D und Thoenen H: Purification of a new neurotrophic factor from mammalian brain. *EMBO J* 1: 549-553, 1982.

Barde YA: Help from within for damaged axons. *Nature* 385: 391-393, 1997.

Barker PA: p75NTR is positively promiscuous: Novel partners and new insights. *Neuron* 42: 529-533, 2004.

Beattie MS, Harrington AW, Lee R, Kim JY, Boyce SL, Longo FM, Bresnahan JC, Hempstead BL und Yoon SO: ProNGF induces p75-mediated death of oligodendrocytes following spinal cord injury. *Neuron* 36: 375-386, 2002.

Bechmann I und Nitsch R: Identification of phagocytic glial cells after lesion-induced anterograde degeneration using double-fluorescence labelling: combination of axonal tracing and lectin or immunostaining. *Histochem Cell Biol* 107: 391-397, 1997a.

Bechmann I und Nitsch R: Astrocytes and microglial cells incorporate degenerating fibers following entorhinal lesion: a light, confocal, and electron microscopical study using a phagocytosis-dependent labeling technique. *Glia* 20: 145-154, 1997b.

Bechmann I und Nitsch R: Involvement of non-neuronal cells in entorhinal-hippocampal reorganization following lesions. *Ann N Y Acad Sci* 911: 192-206, 2000.

Bechmann I und Nitsch R: Plasticity following lesion: Harm and help from the immune system. *Rest Neurology* 19: 189-198, 2001.

Bechmann I, Mor G, Nilson J, Eliza M, Nitsch R und Naftolin F: FasL (CD95L, Apo1L) is expressed in the normal rat and human brain: Evidence for the existence of an immunological brain barrier. *Glia* 27: 62-74, 1999.

Bechmann I, Lossau S, Steiner B, Mor G, Gimsa U und Nitsch R: Reactive astrocytes upregulate Fas (CD95) and Fas ligand (CD95L) expression but do not undergo programmed cell death in the course of anterograde degeneration. *Glia* 32: 25-41, 2000.

Bechmann I, Peter SA, Beyer M, Gimsa U und Nitsch R: Presence of B 7-2 (CD86) and lack of B 7-1 (CD80) on myelin-phagocytosing MHC-II positive rat microglia is associated with non-destructive immune response in vivo. *FASEB J* 15: 1086-1088, 2001.

Bechmann I, Steiner B, Gimsa U, Mor G, Wolf S, Beyer M, Nitsch R und Zipp F: Astrocyte-induced T cell elimination is CD95 ligand dependent. *J Neuroimmunol* 132: 60-65, 2002.

Behar O, Mizuno K, Neumann S und Woolf CJ: Putting the spinal cord together again. *Neuron* 26: 291-293, 2000.

Ben-Nun A und Cohen IR: Experimental autoimmune encephalomyelitis (EAE) mediated by T cell lines: process of selection of lines and characterization of the cells. *J Immunol* 129: 303-308, 1982.

Benner EJ, Mosley RL, Destache CJ, Lewis TB, Jackson-Lewis V, Gorantla S, Nemachek C, Green SR, Przedborski S und Gendelman HE: Therapeutic immunization protects dopaminergic neurons in a mouse model of Parkinson's disease. *Proc Natl Acad Sci USA* 101: 9435-9440, 2004.

Benowitz LI, Rodriguez W und Neve RL: The pattern of GAP-43 immunostaining changes in the rat hippocampal formation during reactive synaptogenesis. *Brain Res Mol Brain Res* 8: 17-23, 1990.

Benowitz LI und Routtenberg A: GAP-43: an intrinsic determinant of neuronal development and plasticity. *Trends Neurosci* 20: 84-91, 1997.

Benveniste EN: Role of macrophages/microglia in multiple sclerosis and experimental allergic encephalomyelitis. *J Mol Med* 75: 165-173, 1997a.

Benveniste EN: Cytokines: influence on glial cell gene expression and function. *Chem Immunol* 69: 31-75, 1997b.

Berg MM, Sternberg DW, Parada LF und Chao MV: K-252a inhibits nerve growth factor-induced trk proto-oncogene tyrosine phosphorylation and kinase activity. *J Biol Chem* 276: 13-16, 1992.

Berkemeier LR, Winslow JW, Kaplan DR, Nikolics K, Goeddel DV und Rosenthal A: Neurotrophin-5: a novel neurotrophic factor activates trk and trkB. *Neuron* 7: 857-866, 1991.

Beyer M, Gimsa U, Eyüpoğlu IY, Hailer NP und Nitsch R: Phagocytosis of neuronal or glial debris by microglial cells: upregulation of MHC Class II expression and multinuclear giant cell formation in vitro. *Glia* 31: 262-266, 2000.

Bibel M, Hoppe E und Barde YA: Biochemical and functional interactions between the neurotrophic receptors trk and p75NTR. *EMBO J* 18: 616-622, 1999.

Bitsch A, Schuchardt J, Bunkowski S, Kuhlmann T und Brück W: Acute axonal injury in multiple sclerosis. Correlation with demyelination and inflammation. *Brain* 123: 1174-1183, 2000.

Boyd JG und Gordon T: Neurotrophic factors and their receptors in axonal regeneration and functional recovery after peripheral nerve injury. *Mol Neurobiol* 27: 277-324, 2003.

Bregman BS, McAtee M, Dai HN und Kuhn PL: Neurotrophic factors increase axonal growth after spinal cord injury and transplantation in the adult rat. *Exp Neurol* 148: 475-494, 1997.

Brennan C, Rivas-Plata K und Landis SC: The p75 neurotrophin receptor influences NT-3 responsiveness of sympathetic neurons *in vivo*. *Nat Neurosci* 2: 699-705, 1999.

Brodie C: Differential effects of Th1 and Th2 derived cytokines on NGF synthesis by mouse astrocytes. *FEBS Lett* 394: 117-120, 1996.

Brodie C, Goldreich N, Haiman T und Kazimirsky G: Functional IL-4 receptors on mouse astrocytes: IL-4 inhibits astrocyte activation and induces NGF secretion. *J Neuroimmunol* 81: 20-30, 1998.

Brosnan CF und Raine CS: Mechanisms of immune injury in multiple sclerosis. *Brain Pathol* 6: 243-257, 1996.

Brown KA: Factors modifying the migration of lymphocytes across the blood-brain barrier. *Int Immunopharmacol* 1: 2043-2062, 2001.

Burns J, Rosenzweig A, Zweimann B und Lisak RP: Isolation of myelin basic protein-reactive T-cell lines from normal human blood. *Cell Immunol* 81: 435-440, 1983.

Butovsky O, Hauben E und Schwartz M: Morphological aspects of spinal cord autoimmune neuroprotection – colocalisation of T cells with B7-2 (CD86) and prevention of cyst formation. *FASEB J* 15: 1065-1067, 2001.

Byram SC, Carson MJ, DeBoy CA, Serpe CJ, Sanders VM und Jones KJ: CD4-positive T cell-mediated neuroprotection requires dual compartment antigen presentation. *J Neurosci* 24: 4333-4339, 2004.

Campanella M, Sciorati C, Tarozzo G und Beltramo M: Flow cytometric analysis of inflammatory cells in ischemic rat brain. *Stroke* 33: 586-592, 2002.

Campbell G, Anderson PN, Turmaine M und Liebermann AR: GAP-43 in the axons of mammalian CNS neurons regenerating into peripheral nerve grafts. *Exp Brain Res* 87: 67-74, 1991.

Canossa M, Griesbeck O, Berninger B, Campana G, Kolbeck R und Thoenen H: Neurotrophin release by neurotrophins: implications for activity-dependent neuronal plasticity. *Proc Natl Acad Sci USA* 94: 13279-13286, 1997.

Caroni P und Schwab ME: Two membrane protein fractions from rat central myelin with inhibitory properties of neurite growth and fibroblast spreading. *J Cell Biol* 106: 1281-1288, 1988.

Caroni P: Neuro-regeneration: plasticity for repair and adaptation. *Essays Biochem* 33: 53-54, 1998.

Carson MJ: Microglia as liaisons between the immune and central nervous system: Functional implications for Multiple Sclerosis. *Glia* 40: 218-231, 2002.

Chen Y, Kuchroo VK, Inobe J, Hafler DA und Weiner HL: Regulatory T cell clones induced by oral tolerance: suppression of autoimmune encephalomyelitis. *Science* 256: 1237-1240, 1994.

Chen Y, Hancock WW, Marks R, Gonnella P und Weiner HL: Mechanisms of recovery from experimental autoimmune encephalomyelitis: T cell deletion and immune deviation in myelin basic protein T cell receptor transgenic mice. *J Neuroimmunol* 82: 149-159, 1998.

Chirgwin JM, Przybyla AE, MacDonald RJ und Rutter WJ: Isolation of biologically active ribonucleic acid from sources enriched in ribonuclease. *Biochemistry* 18: 5294-5299, 1979.

Clusmann H, Nitsch R und Heinemann U: Long lasting functional alterations in the rat dentate gyrus following entorhinal cortex lesion: a current source density analysis. *Neuroscience* 61: 805-815, 1994.

Coffman RL und Von der Weid T: Multiple pathways for the initiation of T helper 2 (Th2) responses. *J Exp Med* 185: 373-375, 1997.

Cohen A, Bray GM und Aguayo AJ: Neurotrophin-4/5 increases adult rat retinal ganglion cell survival and neurite outgrowth in vitro. *J Neurobiol* 25: 953-959, 1994.

Cohen IR und Schwartz M: Autoimmune T cells as a potential neuroprotective therapy for spinal cord injury. *Lancet* 355: 286-287, 2000.

Cotman C, Gentry C und Steward O : Synaptic replacement in the dentate gyrus after unilateral entorhinal lesion: electron microscopic analysis of the extent of replacement of synapses by the remaining entorhinal cortex. *J Neurocytol* 6: 455-464, 1977.

Cotman CW, Geddes JW und Kahle JS: Axon sprouting in the rodent and Alzheimer's disease brain: a reactivation of developmental mechanisms? *Prog Brain Res* 83: 427-434, 1990.

Cserr HF und Knopf PM: Cervical lymphatics, the blood-brain barrier and the immunoreactivity of the brain: a new view. *Immunol Today* 13: 507-512, 1992.

Cua DJ, Hinton DR und Stohlman AS: Self-antigen-induced Th2 responses in experimental allergic encephalomyelitis (EAE)-resistant mice. Th2-mediated suppression of autoimmune diseases. *J Immunol* 155: 4052-4059, 1995.

Deller T, Frotscher M und Nitsch R: Morphological evidence for the sprouting of inhibitory commissural fibers in response to the lesion of the excitatory entorhinal input to the rat dentate gyrus. *J Neurosci* 15: 6868-6878, 1995.

Deller T, Haas CA, Naumann T, Joester A, Faissner A und Frotscher M: Up-regulation of astrocyte-derived tenascin-C correlates with neurite outgrowth in the rat dentate gyrus after unilateral entorhinal cortex lesion. *Neuroscience* 81: 829-846, 1997.

Deller T, Haas CA und Frotscher M: Sprouting in the hippocampus after entorhinal cortex lesion is layer-specific but not translaminal: Which molecules may be involved? *Rest Neurology and Neuroscience* 19: 159-167, 2001.

Del Prete G: The concept of type-1 and type-2 helper T cells and their cytokines in humans. *Int Rev Immunol* 16: 427-455, 1998.

De Simone R, Giampaolo A, Giometto B, Gall P, Levi G, Peschle C und Aloisi F: The costimulatory molecule B7 is expressed on human microglia in culture and in multiple sclerosis acute lesions. *J Neuropathol Exp Neurol* 54: 175-187, 1995.

Diekmann S, Ohm TG und Nitsch R: Long-lasting transneuronal changes in rat dentate granule cell dendrites after entorhinal cortex lesion. A combined intracellular injection and electron microscopy study. *Brain Pathol* 6: 205-214, 1996.

Diestel A, Aktas O, Hackel D, Häke I, Meier S, Raine CS, Nitsch R, Zipp F und Ullrich O: Activation of microglial poly(ADP-ribose)-polymerase-1 by cholesterol breakdown products during neuroinflammation: a link between demyelination and neuronal damage. *J Exp Med* 198: 1729-1740, 2003.

Dolter KE und Braman JC: Small-sample total RNA purification: laser capture microdissection and cultured cell applications. *Biotechniques* 30: 1358-1361, 2001.

Dubreuil CI, Winton MJ und McKerracher L: Rho activation patterns after spinal cord injury and the role of activated Rho in apoptosis in the central nervous system. *J Cell Biol.* 162: 233-43, 2003.

Duda PW, Schmied MC, Cook SL, Krieger JI und Hafler DA: Glatiramer acetate (Copaxone) induces degenerate, Th2-polarized immune responses in patients with multiple sclerosis. *J Clin Invest* 105: 967-976, 2000.

Eder C, Schilling T, Heinemann U, Haas D, Hailer N und Nitsch R: Morphological, immunophenotypical and electrophysiological properties of resting microglia in vitro. *Eur J Neurosci* 11: 4251-4261, 1999.

Einstein G, Buranosky R und Crain BJ: Dendritic pathology of granule cells in Alzheimer's disease is unrelated to neuritic plaques. *J Neurosci* 14: 5077-5088, 1994.

Emsley HCA und Tyrrell PJ: Inflammation and infection in clinical stroke. *J Cereb Blood Flow Metab* 22: 1399-1419, 2002.

Erhard PB, Erb P, Graumann U und Otten U: Expression of nerve growth factor and nerve growth factor receptor tyrosine kinase Trk in activated CD4-positive T-cell clones. *Proc Natl Acad Sci USA* 90: 10984-10988, 1993.

Eyüpoglu I, Bechmann I und Nitsch R: Modification of microglia function protects from lesion-induced neuronal alterations and promotes sprouting in the hippocampus. *FASEB J* 17: 1110-1111, 2003.

Fabry Z, Raine CS und Hart MN: Nervous tissue as an immune compartment: the dialect of the immune response in the CNS. *Immunol Today* 15: 218-224, 1994.

Faden AI und Salzman S: Pharmacological strategies in CNS trauma. *Trends Pharmacol Sci* 13: 29-35, 1992.

Faden AI: Experimental neurobiology of central nervous system trauma. *Crit Rev Neurobiol* 7: 175-186, 1993.

Fagan AM und Gage FH: Mechanisms of sprouting in the adult central nervous system: cellular responses in areas of terminal degeneration and reinnervation in the rat hippocampus. *Neuroscience* 58: 705-725, 1994.

Fallon JH und Loughlin SE: Functional implications of the anatomical localization of neurotrophic factors. In *Neurotrophic Factors*, J. Fallon, S. Loughlin, eds. Academic Press, Harcourt Brace Jovanovich, San Diego, 1-24, 1993.

Fee D, Crumbaugh A, Jacques T, Herdrich B, Sewell D, Auerbach D, Piaskowski S, Hart MN, Sandor M und Fabry Z: Activated/effector CD4⁺ T cells exacerbate acute damage in the central nervous system following traumatic injury. *J Neuroimmunol* 136: 54-66, 2003.

Finkelmann FD, Morris SC, Orekhova T, Mori M, Donaldson D, Reiner SL, Reilly NL, Schopf L und Urban JF Jr: Stat6 regulation of in vivo IL-4 responses. *J Immunol* 164: 2303-2310, 2000.

Fisher J, Levkovitch-Verbin H, Schori H, Yoles E, Butovsky O, Kaye JF, Ben-Nun A und Schwartz M: Vaccination for Neuroprotection in the mouse optic nerve: implications for optic neuropathies. *J Neurosci* 21: 136-142, 2001.

Floyd RA: Antioxidants, oxidative stress and neurological disorders. *Proc Soc Exp Biol Med* 222: 236-245, 1999.

Frenkel D, Huang Z, Maron R, Koldzic DN, Hancock WW, Moskowitz MA und Weiner HL: Nasal vaccination with myelin oligodendrocyte glycoprotein reduces stroke size by inducing IL-10-producing CD4⁺ T cells. *J Immunol* 171: 6549-6555, 2003.

Frotscher M, Zafirov S und Heimrich B: Development of identified neuronal types and specific connections in slice cultures of rat hippocampus. *Prog Neurobiol* 45: 143-164, 1995a.

Frotscher M, Heimrich B, Deller T und Nitsch R: Understanding the cortex through the hippocampus: lamina specific connections of the rat hippocampal neurons. *J Anat* 187: 539-545, 1995b.

Frotscher M, Heimrich B und Deller T: Sprouting in the hippocampus is layer-specific. *Trends Neurosci* 20: 218-222, 1997.

Gähwiler BH, Capogna M, Debanne D, McKinney RA und Thompson SM: Organotypic slice cultures: a technique has come of age. *Trends Neurosci* 20: 471-477, 1997.

Gage FH, Olejniczak P und Armstrong DM: Astrocytes are important for sprouting in the septohippocampal circuit. *Exp Neurol* 102: 2-13, 1988.

Gajewski TF, Goldwasser E und Fitch FW: Anti-proliferative effect of IFN-gamma in immune regulation. II. IFN-gamma inhibits the proliferation of murine bone marrow cells stimulated with IL-3, IL-4, or granulocyte-macrophage colony-stimulating factor. *J Immunol* 141: 2635-2643, 1988.

Gall C, Rose G und Lynch G: Proliferative and migratory activity of glial cells in the partially deafferented hippocampus. *J Comp Neurol* 183 : 539-549, 1979.

Gehrmann J, Schoen SW und Kreutzberg GW: Lesion of the rat entorhinal cortex leads to a rapid microglial reaction in the dentate gyrus. A light and electron microscopical study. *Acta Neuropathol Berl* 82: 442-455, 1991.

Gehrmann J, Matsumoto Y und Kreutzberg GW: Microglia: intrinsic immuneffector cell of the brain. *Brain Res Rev* 20: 269-287, 1995.

Gemsa D, Kalden JR und Resch K: Immunologie. 3. Auflage, Thieme Verlag, 1991.

Gerritse K, Laman JD, Noelle RJ, Aruffo A, Ledbetter JA, Boersma WJ und Claassen E: CD40-CD40 ligand interactions in experimental allergic encephalomyelitis and multiple sclerosis. *Proc Natl Acad Sci USA* 93: 2499-2504, 1996.

Gimsa U, Peter SA, Haas D, Bechmann I und Nitsch R: Th2 cells support intrinsic anti-inflammatory properties of the brain. *J Neuroimmunol* 119: 73-80, 2001.

Gimsa U, Øren A, Pandiyan P, Teichmann DB, Nitsch R und Brunner-Weinzierl M: Astrocytes protect the CNS: antigen-specific T helper cell responses are inhibited by astrocyte-induced upregulation of CTLA-4 (CD152). *J Mol Med* 82: 364-372, 2004.

Gold R, Schmied M, Tontsch U, Hartung HP, Wekerle H, Toyka KV und Lassmann H: Antigen presentation by astrocytes primes rat T lymphocytes for apoptotic cell death. A model for T-cell apoptosis in vivo. *Brain* 119: 651-659, 1996.

Goldberg JL und Barres BA: The relationship between neuronal survival and regeneration. *Annu Rev Neurosci* 23: 579-612, 2000.

Goldberg JL, Espinosa JS, Xu Y, Davidson N, Kovacs GT und Barres BA: Retinal ganglion cells do not extend axons by default: promotion by neurotrophic signalling and electrical activity. *Neuron* 33: 689-702, 2002.

Goodman CS: Mechanisms and molecules that control growth cone guidance. *Annu Rev Neurosci* 19: 341-377, 1996.

Gschwendtner A, Liu Z, Hucho T, Bohatschek M, Kalla R, Dechant G und Raivich G: Regulation, cellular localization, and function of the p75 neurotrophin receptor (p75NTR) during the regeneration of facial motoneurons. *Mol Cell Neurosci* 24: 307-322, 2003.

Hailer N, Järhult J und Nitsch R: Resting microglia cells in vitro: analysis of morphology and adhesion molecule expression in organotypic hippocampal slice cultures. *Glia* 18: 319-331, 1996.

Hailer NP, Heppner FL, Haas D und Nitsch R: Fluorescent dye pre-labeled microglia cells migrate into organotypic hippocampal slice cultures and ramify. *Eur J Neurosci* 9: 863-866, 1997a.

Hailer NP, Bechmann I, Heizmann S und Nitsch R: Adhesion molecule expression on phagocytic microglial cells following anterograde degeneration of perforant path axons. *Hippocampus* 7: 341-349, 1997b.

Hailer NP, Heppner FL, Haas D und Nitsch R: Astrocytic factors deactivate antigen presenting cells that invade the central nervous system. *Brain Pathol* 8: 459-474, 1998.

Hailer NP, Grampp A und Nitsch R: Proliferation of microglia and astrocytes in the dentate gyrus following entorhinal cortex lesion: a quantitative BrdU-labeling study. *Eur J Neurosci* 11: 3359-3364, 1999.

Hallbook F, Ibanez CF und Persson H: Evolutionary studies of the nerve growth factor family reveal a novel member abundantly expressed in *Xenopus* ovary. *Neuron* 6: 845-858, 1991.

Halliwell B: Role of free radicals in the neurodegenerative diseases: therapeutic implications of antioxidant treatment. *Drugs Aging* 18: 685-716, 2001.

Hanisch UK: Microglia as a source and target of cytokines. *Glia* 40: 140-155, 2002.

Hansson E und Rönnbäck L: Glial neuronal signaling in the central nervous system. *FASEB J* 17: 341-348, 2003.

Harrington AW, Leiner B, Blechschmitt C, Arevalo JC, Lee R, Morl K, Meyer M, Hempstead BL, Yoon SO und Giehl KM: Secreted proNGF is a pathophysiological death-inducing ligand after adult CNS injury. *Proc Natl Acad Sci USA* 101: 6226-6230, 2004.

Harris KM und Teyler TJ: Developmental onset of long-term potentiation in area CA1 of the rat hippocampus. *J Physiol* 346: 27-48, 1984.

Hart MN und Fabry Z: CNS antigen presentation. *Trends Neurosci* 18: 475-481, 1995.

Hauben E, Nevo U, Yoles E, Moalem G, Agranov E, Mor F, Akselrod S, Neeman M, Cohen IR und Schwartz M: Autoimmune T cells as potential neuroprotective therapy for spinal cord injury. *Lancet* 35: 286-287, 2000a.

Hauben E, Butovski O, Nevo U, Yoles E, Moalem G, Agranov E, Mor F, Leibowitz-Amit R, Pevsner E, Akselrod S, Neeman M, Cohen IR und Schwartz M: Passive or active immunization with myelin basic protein promotes recovery from spinal cord contusion. *J Neurosci* 20: 6421-6430, 2000b.

Hauben E, Agranov E, Gothilf A, Nevo U, Cohen A, Smirnov I, Steinman L und Schwartz M: Posttraumatic therapeutic vaccination with modified myelin self-antigen prevents complete paralysis while avoiding autoimmune disease. *J Clin Invest* 108: 591-599, 2001.

Heese K, Hock C und Otten U: Inflammatory signals induce neurotrophin expression in human microglia cells. *J Neurochem* 70: 699-707, 1998.

Heimrich B und Frotscher M: Slice cultures as a model to study entorhinal-hippocampal interaction. *Hippocampus* 3 Spec No: 11-17, 1993.

Heppner FL, Skutella T, Hailer NP, Haas D und Nitsch R: Activated microglial cells migrate towards sites of excitotoxic neuronal injury inside organotypic hippocampal slice cultures. *Eur J Neurosci* 10: 3284-3290, 1998.

- Hickey WF, Hsu BL und Kimura H:** T-lymphocyte entry into the central nervous system. *J Neurosci Res* 28: 254-260, 1991.
- Hirsch EC:** Mechanism and consequences of nerve cell death in Parkinson's disease. *J Neural Transm Suppl* 56: 127-137, 1999.
- Hirschberg DL, Moalem G, He J, Mor F, Cohen IR und Schwartz M:** Accumulation of passively transferred primed T cells independently of their antigen specificity following central nervous system trauma. *J Neuroimmunol* 89: 88-96, 1998.
- Hofer M, Ragliusi SR, Hohn A, Leibrock J und Barde YA:** Regional distribution of brain-derived neurotrophic factor mRNA in the adult mouse brain. *EMBO J* 9: 2459-2464, 1990.
- Hofstetter HH, Sewell DL, Liu F, Sandor M, Forsthuber T, Lehmann PV und Fabry Z:** Autoreactive T cells promote post-traumatic healing in the central nervous system. *J Neuroimmunol* 134: 25-34, 2003.
- Hohlfeld R, Kerschsteiner M, Stadelmann C, Lassmann H und Wekerle H:** The neuroprotective effect of inflammation: implications for the therapy of multiple sclerosis. *J Neuroimmunol* 107: 161-166, 2000.
- Hohn A, Leibrock J, Bailey K und Barde YA:** Identification and characterization of a novel member of the nerve growth factor/brain-derived neurotrophic factor family. *Nature* 344: 339-341, 1990.
- Holtmaat AJ, Dijkhuizen PA, Oestreicher AB, Romijn HJ, Van der Lugt NM, Berns A, Margolis FL, Gipsen WH und Verhaagen J:** Directed expression of the growth-associated protein B-50/GAP-43 to olfactory neurons in transgenic mice results in changes in axon morphology and extraglomerular fiber growth. *J Neurosci* 15: 7953-7965, 1995.
- Hsieh CS, Macatonia SE, Tripp CS, Wolf SF, O'Garra A und Murphy KM:** Development of Th1 CD4+ T cells through IL-12 produced by Listeria-induced macrophages. *Science* 260: 547-549, 1993.
- Huang DW, McKerracher L, Braun PE und David S:** A therapeutic vaccine approach to stimulate axon regeneration in the adult mammalian spinal cord. *Neuron* 24: 639-647, 1999.
- Hyman BT, Van Hoesen GW, Damasio AR und Barnes CL:** Alzheimer's disease: cell-specific pathology isolates the hippocampal formation. *Science* 225: 1168-1170, 1984.
- Ibanez CF:** Neurotrophin-4: the odd one out in the neurotrophin family. *Neurochem Res* 21: 787-793, 1996.
- Inoue K:** Microglial activation by purines and pyrimidines. *Glia* 40: 156-163, 2002.
- Insausti R, Herrero MT und Witter MP:** Entorhinal cortex of the rat: Cytoarchitectonic subdivisions and the origin and distribution of cortical efferents. *Hippocampus* 7: 146-183, 1997.
- Jacobson RD, Virag I und Skene JHP:** A protein associated with axon growth, GAP-43, is widely distributed and developmentally regulated in rat CNS. *J Neurosci* 6: 1843-55, 1986.

Janeway CA und Travers P: Immunologie. 2. Auflage, Spektrum Akademischer Verlag, 1997.

Jensen MB, Gonzalez B, Castellano B und Zimmer J: Microglial and astroglial reactions to anterograde axonal degeneration: a histochemical and immunocytochemical study of the adult rat fascia dentata after entorhinal perforant path lesions. *Exp Brain Res* 98: 245-260, 1994.

Johnson KP und Baringer JR: Current therapy of multiple sclerosis. *Hosp Pract* 36: 21-22, 25-29, 2001.

Jones TB, Basso DM, Sodhi A, Pan JZ, Hart RP, MacCallum RC, Lee S, Whitacre CC und Popovich PG: Pathological CNS autoimmune disease triggered by traumatic spinal cord injury: implications for autoimmune vaccine therapy. *J Neurosci* 22: 2690-2700, 2002.

Jones TB, Ankeny DP, Guan Z, McGaughy V, Fisher LC, Basso DM und Popovich PG: Passive or active immunization with myelin basic protein impairs neurological function and exacerbates neuropathology after spinal cord injury in rats. *J Neurosci* 24: 3752-3761, 2004.

Kalb R: The protean actions of neurotrophins and their receptors on the life and death of neurons. *Trends Neurosci* 28: 5-11, 2005.

Kandel ER, Schwartz JH und Jessel TM: Neurowissenschaften. 1. deutsche Auflage, Spektrum Akademischer Verlag, 1996.

Kar S, Baccichet A, Quirion R und Poirier J: Entorhinal cortex lesion induces differential responses in [125I]insulin-like growth factor I, [125I]insulin-like growth factor II and [125I]insulin receptor binding sites in the rat hippocampal formation. *Neurosci* 55: 69-80, 1993.

Karussis D, Abramsky O, Rosenthal Y, Mizrahi KF und Ovidia H: Linomide downregulates autoimmunity through induction of Th2 cytokine production by lymphocytes. *Immunol Lett* 67: 203-208, 1999.

Kerschensteiner M, Gallmeier E, Behrens L, Leal VV, Misgeld T, Klinkert WE, Kolbeck R, Hoppe E, Oropeza-Wekerle RL, Bartke I, Stadelmann C, Lassmann H, Wekerle H und Hohlfeld R: Activated human T cells, B cells, and monocytes produce brain-derived neurotrophic factor in vitro and in inflammatory brain lesions: a neuroprotective role of inflammation? *J Exp Med* 189: 865-870, 1999.

Khoruts A, Miller SD und Jenkins MK: Neuroantigen-specific Th2 cells are inefficient suppressors of experimental autoimmune encephalomyelitis induced by effector Th1 cells. *J Immunol* 155: 5011-5017, 1995.

Kipnis J, Yoles E, Porat Z, Cohen A, Mor F, Sela M, Cohen IR und Schwartz M: T cell immunity to copolymer 1 confers neuroprotection on the damaged optic nerve: possible therapy for optic neuropathies. *Proc Natl Acad Sci USA* 97: 7446-7451, 2000.

Kipnis J, Mizrahi T, Hauben E, Shaked I, Shevach E und Schwartz M: Neuroprotective autoimmunity: naturally occurring CD4+CD25+ regulatory T cells suppress the ability to withstand injury to the central nervous system. *Proc Natl Acad Sci USA* 99: 15620-15625, 2002a.

Kipnis J, Mizrahi T, Yoles E, Ben-Nun A und Schwartz M: Myelin specific Th1 cells are necessary for post-traumatic protective autoimmunity. *J Neuroimmunol* 130: 78-85, 2002b.

Kipnis J, Nevo U, Panikashvili D, Alexandrovich A, Yoles E, Akselrod S, Shohami E und Schwartz M: Therapeutic vaccination for closed head injury. *J Neurotrauma* 20: 559-569, 2003.

Klein R, Conway D, Parada LF und Barbacid M: The trkB tyrosin protein kinase gene codes for a second neurogenic receptor that lacks the catalytic kinase domain. *Cell* 61: 647-656, 1990.

Koizumi S, Contreras ML, Matsuda Y, Hama T, Lazarovici P und Guroff G: K-252a: a specific inhibitor of the action of nerve growth factor on PC12 cells. *J Neurosci* 8: 715-721, 1988.

Konno H, Yamamoto T, Iwasaki Y, Suzuki H, Saito T und Terunuma H: Wallerian degeneration induces Ia-antigen expression in the rat brain. *J Neuroimmunol* 25: 151-159, 1989.

Koutsilieris E, Scheller C, Tribl F und Riederer P: Degeneration of neuronal cells due to oxidative stress-microglial contribution. *Parkinsonism and Related Disorders* 8: 401-406, 2002.

Kreutzberg GW: Microglia, the first line of defence in brain pathologies. *Arzneimittelforschung* 45: 357-360, 1995.

Kreutzberg GW: Microglia: a sensor for pathological events in the CNS. *Trends Neurosci* 19: 312-318, 1996.

Kroemer G, Hirsch F, Gonzalez-Garcia A und Martinez C: Differential involvement of Th1 and Th2 cytokines in autoimmune diseases. *Autoimmunity* 24: 25-33, 1996.

Kruttgen A, Moller JC, Heymach JV Jr und Shooter EM: Neurotrophins induce release of neurotrophins by the regulated secretory pathway. *Proc Natl Acad Sci USA* 95: 9614-9619, 1998.

Kuchroo VK, Das MP, Brown JA, Ranger AM, Zamvil SS, Sobel RA, Weiner HL, Nabavi N und Glimcher LH: B7-1 and B7-2 costimulatory molecules activate differentially the Th1/Th2 developmental pathways: application to autoimmune disease therapy. *Cell* 80: 707-718, 1995.

Kwidzinski E, Mutlu LK, Kovac AD, Bunse J, Goldmann J, Mahlo J, Aktas O, Zipp F, Kamradt T, Nitsch R und Bechmann I: Self-tolerance in the immune privileged CNS: lessons from the entorhinal cortex lesion model. *J Neural Transm* 65: 29-49, 2002.

- Lafaille JJ:** The role of T helper cell subsets in autoimmune diseases. *Cytokine Growth factor Rev* 9: 139-151, 1998.
- Lapchak PA, Araujo DM und Hefti F:** BDNF and trkB mRNA expression in the rat hippocampus following entorhinal cortex lesion. *Neuroreport* 4: 191-194, 1993.
- Lassmann H, Zimprich F, Rossler K und Vass K:** Inflammation in the nervous system. Basic mechanism and immunological concepts. *Rev Neurol Paris* 147: 763-781, 1991.
- Lassmann H:** Basic mechanisms of brain inflammation. *J Neural Transm Suppl* 50: 183-190, 1997.
- Lazarov-Spiegler O, Solomon AS, Zeev-Brann AB, Hirschberg DL, Lavie V und Schwartz M:** Transplantation of activated macrophages overcomes central nervous system regrowth failure. *FASEB J* 10: 1296-1302, 1996.
- Lee R, Kermani P, Teng KK und Hempstead BL:** Regulation of cell survival by secreted proneurotrophins. *Science* 294: 1945-1948, 2001.
- Leibrock J, Lottspeich F, Hohn A, Hofer M, Hengerer B, Masiakowski P, Thoenen H und Barde YA:** Molecular cloning and expression of brain-derived neurotrophic factor. *Nature* 341: 149-152, 1982.
- Lentz SI, Knudson CM, Korsmeyer SJ und Snider WD:** Neurotrophins support the development of diverse sensory axon morphologies. *J Neurosci* 19: 1038-1048, 1999.
- Levi-Montalcini R:** The nerve growth factor 35 years later. *Science* 237: 1154-1162, 1987.
- Levi-Monalcini R:** The saga of the nerve growth factor. *Neuroreport* 9: R71-83, 1998.
- Levi-Montalcini R:** The nerve growth factor and the neuroscience chess board. *Prog Brain Res* 146: 525-527, 2004.
- Lewin GR und Barde YA:** Physiology of the neurotrophins. *Annu Rev Neurosci* 19: 289-317, 1996.
- Liblau RS, Singer SM und McDevitt HO:** Th1 and Th2 CD4+ T cells in the pathogenesis of organ-specific autoimmune diseases. *Immunol Today* 16: 34-38, 1995.
- Lin LH, Bock S, Carpenter K, Rose M und Norden JJ:** Synthesis and transport of GAP-43 in entorhinal cortex neurons and perforant pathway during lesion-induced sprouting and reactive synaptogenesis. *Brain Res Mol Brain Res* 14: 147-53, 1992.
- Lindsay RM, Wiegand SJ, Altar CA und DiStefano PS:** Neurotrophic factors: from molecule to man. *Trends Neurosci* 17: 182-190, 1994.
- Liu B, Gao HM, Wang JY, Jeohn GH, Cooper CL und Hong JS:** Role of nitric oxide in inflammation-mediated neurodegeneration. *Ann NY Acad Sci* 962: 318-331, 2002.

Lohning M, Stroehmann A, Coyle AJ, Grogan JL, Lin S, Gutierrez-Ramos JC, Levinson D, Radbruch A und Kamradt T: T1/ST2 is preferentially expressed on murine Th2 cells, independent of interleukin 4, interleukin 5, and interleukin 10, and important for Th2 effector function. *Proc Natl Acad Sci USA* 95: 6930-6935, 1998.

Lui GY, Fairchild PJ, Smith RM, Prowle JR, Kioussis D und Wraith DC: Low avidity recognition of self-antigen by T cells permits escape from central tolerance. *Immunity* 3: 407-415, 1995.

Lynch G, Rose G, Gall C und Cotman CW: The response of the dentate gyrus to partial deafferentiation. In: *Golgi Centennial Symposium Proceedings* (ed. Santini, M.), Raven Press, New York, 305-317, 1975.

Ma N und Streilein JW: The cell immunity induced by allogeneic microglia in relation to neuronal retina transplantation. *J Immunol* 162: 4482-4489, 1999.

Madjan M und Miller FD: Neuronal life and death decisions functional antagonism between the Trk and p75 neurotrophin receptors. *Int J Dev Neurosci* 17: 153-161, 1999.

Maisonpierre PC: Neurotrophin-3: a neurotrophic factor related to NGF and BDNF. *Science* 247: 1446-1451, 1990a.

Maisonpierre PC, Belluscio L, Friedmann B, Alderson RF, Wiegand SJ, Furth ME, Lindsay RM und Yancopoulos GD: NT-3, BDNF, and NGF in the developing rat nervous system: parallel as well as reciprocal patterns of expression. *Neuron* 5: 501-509, 1990b.

Maness LM, Kastin AJ, Weber JT, Banks WA, Beckmann BS und Zadina JE: The neurotrophins and their receptors: structure, function, and neuropathology. *Neurosci Biobehav Rev* 18: 143-159, 1994.

Markus A, Patel TD und Snider WD: Neurotrophic factors and axonal growth. *Neur Glial Cell Biol* 12: 523-531, 2002.

Martin R: Immunological aspects of experimental allergic encephalomyelitis and multiple sclerosis and their application for new therapeutic strategies. *J Neurol Transm Suppl* 49: 53-67, 1997.

Matsumoto Y, Ohmori K und Fujiwara M: Immune regulation by brain cells in the central nervous system: microglia but not astrocytes present myelin basic protein to encephalitogenic T cells under in vivo-mimicking conditions. *Immunology* 76: 209-216, 1992.

McAllister AK, Katz LC und Lo DC: Neurotrophins and synaptic plasticity. *Annu Rev Neurosci* 22: 295-318, 1999.

McDonald NQ und Chao MV: Structural determinants of neurotrophin action. *J Biol Chem* 270: 19669-19672, 1995.

McGuire CB, Snipes GJ und Norden JJ: Light-microscopic immunolocalization of the growth- and plasticity-associated protein GAP-43 in the developing rat brain. *Brain Res* 469: 277-291, 1988.

- McHugh RS, Shevach EM, Margulies DH und Natarajan K:** A T cell receptor transgenic model of severe, spontaneous organ-specific autoimmunity. *Eur J Immunol* 31: 2094-2103, 2001.
- McIntosh TK:** Novel pharmacological therapies in the treatment of experimental traumatic brain injury: a review. *J Neurotrauma* 10: 215-261, 1993.
- Meberg PJ und Routtenberg A:** Selective expression of protein F1/(GAP-43) mRNA in pyramidal but not granule cells of the hippocampus. *Neuroscience* 45: 721-33, 1991.
- Meberg PJ, Gall CM und Routtenberg A:** Induction of F1/GAP-43 gene expression in hippocampal granule cells after seizures [corrected]. *Brain Res Mol Brain Res* 17: 295-299, 1993.
- Medawar PF:** Immunity to homologous grafted skin. III. The fate of skin homografts transplanted to the brain, to subcutaneous tissue, and to the anterior chamber of the eye. *British J Exp Pathol* 29: 58-69, 1948.
- Meinl E, Aloisi F, Ertl B, Weber F, de Waal MR, Wekerle H und Hohlfeld R:** Multiple sclerosis. Immunomodulatory effects of human astrocytes on T cells. *Brain* 117: 1323-1332, 1994.
- Menendez Iglesias B, Cerase J, Ceracchini C, Levi G und Aloisi F:** Analysis of B7-1 and B7-2 costimulatory ligands in cultured mouse microglia: up regulation by interferon-gamma and lipopolysaccharide and down regulation by interleukin-10, prostaglandin E2 and cyclic AMP-elevating agents. *J Neuroimmunol* 72: 83-93, 1997.
- Merkler D, Oertle T, Buss A, Pinschewer DD, Schnell L, Bareyre FM, Kerschensteiner M, Buddeberg BS und Schwab ME:** Rapid induction of autoantibodies against Nogo-A and MOG in the absence of an encephalitogenic T cell response: implication for immunotherapeutic approaches in neurological diseases. *FASEB J* 17: 2275-2277, 2003.
- Merrill JE und Benveniste EN:** Cytokines in inflammatory brain lesions: helpful and harmful. *Trends Neurosci* 19: 331-338, 1996.
- Miller FD:** Neuronal life or death: How do neurotrophins decide? *Neuronal Notes* 111: 3-7, 1998.
- Minghetti L und Levi G:** Microglia as effector cells in brain damage and repair: focus on prostanoids and nitric oxide. *Prog Neurobiol* 54: 99-125, 1998.
- Moalem G, Leibowitz-Amit R, Yoles E, Mor F, Cohen IR und Schwartz M:** Autoimmune T cells protect neurons from secondary degeneration after central nervous system axotomy. *Nat Med* 5: 49-55, 1999.
- Moalem G, Gdalyahu A, Shani Y, Otten U, Lazarovici P, Cohen IR und Schwartz M:** Production of neurotrophins by activated T cells: implications for neuroprotective autoimmunity. *J Autoimmun* 15: 331-345, 2000.
- Monsonogo A und Weiner HL:** Immunotherapeutic approaches to Alzheimer's disease. *Science* 302: 834-838, 2003.

- Monsonogo A, Beserman ZP, Kipnis J, Yoles E, Weiner HL und Schwartz M:** Beneficial effect of orally administered myelin basic protein in EAE-susceptible Lewis rats in a model of acute CNS degeneration. *J Autoimmun* 21: 131-138, 2003.
- Moore GR, Traugott U, Stone SH und Raine CS:** Dose-dependency of MBP-induced demyelination in the guinea pig. *J Neurol Sci* 70: 197-205, 1985.
- Moore GR, McCarron RM, Traugott U, McFarlin DE und Raine CS :** Critical threshold for dose of myelin basic protein in murine autoimmune encephalomyelitis. *J Neurol Sci* 77: 173-184, 1987.
- Moore KW, O'Garra A, De Waal Malefyt R, Vieira P und Mosmann TR:** Interleukin-10. *Annu Rev Immunol* 11: 165-190, 1993.
- Morgan TE, Nichols NR, Pasinetti GM und Finch CE:** TGF-beta 1 mRNA increases in macrophage/microglial cells of the hippocampus in response to deafferentation and kainic acid-induced neurodegeneration. *Exp Neurol* 120: 291-301, 1993.
- Morganti-Kossmann MC, Rancan M, Stahel PF und Kossmann T:** Inflammatory response in acute traumatic brain injury: a double-edged sword. *Curr Opin Crit Care* 8: 101-105, 2002.
- Mosmann TR, Cherwinski H, Bond MW, Giedlin MA und Coffman RL:** Two types of murine T helper cell clone. I. Definition according to profiles of lymphokine activities and secreted proteins. *J Immunol* 136: 2348-2357, 1986.
- Muhallab S, Lundberg C, Gielen AW, Lidman O, Svenningsson A, Piehl F und Olsson T:** Differential expression of neurotrophic factors and inflammatory cytokines by myelin basic protein-specific and other recruited T cells infiltrating the central nervous system during experimental autoimmune encephalomyelitis. *Scand J Immunol* 55: 264-273, 2002.
- Murphy KM, Heimberger AB und Loh DY:** T1/ST2 is preferentially expressed on murine Th2 cells, independent of interleukin 4. *Science* 250: 1720-1723, 1990.
- Neuhaus O, Farina C, Wekerle H und Hohlfeld R:** Mechanisms of action of glutamate acetate in multiple sclerosis. *Neurology* 56: 702-708, 2001.
- Neumann S und Woolf CJ:** Regeneration of dorsal column fibers into and beyond the lesion site following adult spinal cord injury. *Neuron* 23: 83-91, 1999.
- Nicholson LB und Kuchroo VK:** Manipulation of the Th1/Th2 balance in autoimmune disease. *Curr Opin Immunol* 8: 837-842, 1996.
- Nitsch R und Frotscher M:** Reduction of posttraumatic transneuronal "early gene" activation and dendritic atrophy by the N-methyl-D-aspartate receptor antagonist MK-801. *Proc Natl Acad Sci USA* 89: 5197-5200, 1992.
- Noraberg J, Poulsen FR, Blaabjerg M, Kristensen BW, Bonde C, Montero M, Meyer M, Gramsbergen JB und Zimmer J:** Organotypic hippocampal slice cultures for studies of brain damage, neuroprotection and neurorepair. *Curr Drug Targets CNS Neurol Disord* 4: 435-452, 2005.

- Nye SH, Squinto SP, Glass DJ, Stitt TN, Hantzopoulos P, Macchi MJ, Lindsay NS, Ip NY und Yancopoulos GD:** K-252a and staurosporine selectively block autophosphorylation of neurotrophin receptors and neurotrophin-mediated responses. *Mol Biol Cell* 3: 677-686, 1992.
- Nykjaer A, Lee R, Teng KK, Jansen P, Madsen P, Nielsen MS, Jacobsen C, Kliemannel M, Schwarz E, Willnow TE, Hempstead BL und Petersen CM:** Sortilin is essential for proNGF-induced neuronal cell death. *Nature* 427: 843-848, 2004.
- Oestreicher AB und Gipsen WH:** Comparison of the immunocytochemical distribution of the phosphoprotein B-50 in the cerebellum and hippocampus of immature and adult rat brain. *Brain Res* 375: 267-279, 1986.
- Olson JK, Girvin AM und Miller SD:** Direct activation of innate and antigen-presenting functions of microglia following infection with Theiler's virus. *J Virol* 75: 9780-9789, 2001.
- Oppenheim RW:** Cell death during development of the nervous system. *Annu Rev Neurosci* 14: 453-501, 1991.
- Øren A, Falk K, Röttschke O, Bechmann I, Nitsch R und Gimsa U:** Production of neuroprotective NGF in astrocyte – T helper cell cocultures is upregulated following antigen recognition. *J Neuroimmunol* 149: 59-65, 2004.
- Ota K:** T-cell recognition of an immunodominant myelin basic protein epitope in multiple sclerosis. *Nature* 346: 183-187, 1990.
- Ouyang W, Lohning M, Gao Z, Assenmacher M, Ranganath S, Radbruch A und Murphy KM:** Stat6-independent GATA-3 autoactivation directs IL-4-dependent Th2 development and commitment. *Immunity* 12: 27-37, 2000.
- Panek RB und Benveniste EN:** Class II MHC gene expression in microglia. Regulation by the cytokines IFN-gamma, TNF-alpha, and TGF-beta. *J Immunol* 154: 2846-2854, 1995.
- Perez VL, Van Parijs L, Biuckians A, Zheng XX, Strom TB und Abbas AK:** Induction of peripheral T cell tolerance in vivo requires CTLA-4 engagement. *Immunity* 6: 411-417, 1997.
- Perry VH:** A revised view of the central nervous system microenvironment and major histocompatibility complex class II antigen presentation. *J Neuroimmunol* 90: 113-121, 1998.
- Piehl F und Lindman O:** Neuroinflammation in the rat-CNS cells and their role in regulation of immune reactions. *Immunol Rev* 184: 212-225, 2001.
- Popovich PG, Stokes BT und Whitacre CC:** Concept of autoimmunity following spinal cord injury: possible roles for T lymphocytes in the traumatized central nervous system. *J Neurosci Res* 45: 349-363, 1996.
- Popovich PG, Wie P und Stokes BT:** Cellular inflammatory response after spinal cord injury in Sprague-Dawley and Lewis rats. *J Comp Neurol* 377: 443-464, 1997.
- Povlishock JT und Jenkins LW :** Are the pathological changes evoked by traumatic brain injury immediate and irreversible? *Brain Pathol* 5: 415-426, 1995.

Prang P, Del Turco D und Kapfhammer JP: Regeneration of entorhinal fibers in mouse slice cultures is age dependent and can be stimulated by NT-4, GDNF, and modulators of G-proteins and protein kinase C. *Exp Neurology* 169: 135-147, 2001.

Racke MK, Bonomo A, Scott DE, Cannella B, Levine A, Raine CS, Shevach EM und Röcken M: Cytokine-induced immune deviation as a therapy for inflammatory autoimmune disease. *J Exp Med* 180: 1961-1966, 1994.

Raine CS: Multiple sclerosis: a pivotal role for the T cell in lesion development. *Neuropathol Appl Neurobiol* 17: 265-274, 1991.

Raine CS: The Dale E. McFarlin Memorial Lecture: the immunology of the multiple sclerosis lesion. *Ann Neurol* 36: 61-72, 1994.

Raivich G, Jones LL, Kloss CU, Werner A, Neumann H und Kreutzberg G: Immune surveillance in the injured nervous system: T-lymphocytes invade the axotomized mouse facial motor nucleus and aggregate around sites of neuronal degeneration. *J Neurosci* 18: 5804-5816, 1998.

Raivich G, Bohatschek M, Kloss CUA, Werner A, Jones LL und Kreutzberg GW: Neurological activation repertoire in the injured brain: graded response, molecular mechanisms and cues to physiological function. *Brain Res Rev* 30: 77-105, 1999.

Ramón y Cajal S: Estudios sobre la corteza cerebral humana. IV. Estructura de la corteza cerebral olfativa del hombre y maníferos. *Trab Lab Invest Biol Univ Madrid* 1: 1-140, 1901.

Ransohoff RM: Chemokines in neurological disease models: correlation between chemokine expression patterns and inflammatory pathology. *J Leukoc Biol* 62: 645-652, 1997.

Ransohoff RM: The chemokine system in neuroinflammation: an update. *J Infect Dis* 186: 152-156, 2002.

Rapalino O: Implantation of stimulated homologous macrophages results in partial recovery of paraplegic rats. *Nature Med* 4: 814-821, 1993.

Rincon N, Anguita T, Nakamura T, Fikrig E und Flavell RA: Interleukin (IL)-6 directs the differentiation of IL-4-producing CD4⁺ T cells. *J Exp Med* 185: 461-469, 1997.

Romagnani S: Th1 and Th2 in human diseases. *Clin Immunol Immunopathol* 80: 225-235, 1996.

Romagnani S: The Th1/Th2 paradigm. *Immunol Today* 18: 263-26, 1997.

Rose G, Lynch G und Cotman CW: Hypertrophy and redistribution of astrocytes in the deafferented dentate gyrus. *Brain Res Bull* 1: 87-92, 1976.

Rosenthal A, Goeddel DV, Nguyen T, Lewis M, Shih A, Laramee GR, Nikolics K und Winslow JW: Primary structure and biological activity of a novel human neurotrophic factor. *Neuron* 4: 767-773, 1990.

Rosenthal A, Goeddel DV, Nguyen T, Martin E, Burton LE, Shih A, Laramee GR, Wurm F, Mason A und Nikolics K: Primary structure and biological activity of human brain-derived neurotrophic factor. *Endocrinology* 129: 1289-1294, 1991.

Ross AH, McKinnon CA, Daou MC, Ratcliff K und Wolf DE: Differential biological effects of K252 kinase inhibitors are related to membrane solubility but not to permeability. *J Neurochem* 65: 2748-2756, 1995.

Rothwell NJ und Strijbos PJLM: Cytokines in neurodegeneration and repair. *Int J Devl Neurosci* 13 (3-4): 179-185, 1995.

Santambrogio L, Bendetti M, Chao MV, Muzaffar R, Kulig K, Gabellini N und Hochwald G: Nerve growth factor production by lymphocytes. *J Immunol* 153: 4488-4495, 1994.

Santambrogio L, Crisi GM, Leu J, Hochwald GM, Ryan T und Thorbecke GJ: Tolerogenic forms of auto-antigens and cytokins in the induction of resistance to experimental allergic encephalomyelitis. *J Neuroimmunol* 58: 211-222, 1995.

Savaskan NE und Nitsch R: Molecules involved in reactive sprouting in the hippocampus. *Rev Neurosci* 12: 195-215, 2001.

Sawai H, Clarke DB, Kittlerova P, Bray GM und Aguayo AJ: Brain-derived neurotrophic factor and neurotrophin-4/5 stimulate growth of axonal branches from regenerating retinal ganglion cells. *J Neurosci* 16: 3887-3894, 1996.

Schaden H, Stürmer CAO und Bähr M: GAP-43 immunoreactivity and axon regeneration in retinal ganglion cells of the rat. *J Neurobiol* 25: 1570-1578, 1994.

Schlüsener H und Wekerle H: Autoaggressive T lymphocyte lines recognize the encephalogenetic region of myelin basic protein: in vitro selection from unprimed T cell populations. *J Immunol* 135: 3128-3133, 1985.

Schumm M, Lang P, Taylor G, Kuci S, Klinbiel T, Buhning HJ, Geiselhart A, Niethammer D und Handgretinger R: Isolation of highly purified autologous and allogeneic peripheral CD34+ cells using the CliniMACS device. *J Hematother* 8: 209-218, 1999.

Schwab ME und Bartholdi D: Degeneration and regeneration of axons in the lesioned spinal cord. *Physiol Rev* 76: 319-370, 1996.

Schwartz M und Cohen IR: Autoimmunity can benefit self-maintenance. *Immunol Today* 21: 265-268, 2000.

Schwartz M und Yoles E: Neuroprotection: a new treatment modality for glaucoma? *Curr Opin Ophthalmol* 11: 107-111, 2000.

Schwartz M: Harnessing the immune system for neuroprotection: therapeutic vaccines for acute and chronic neurodegenerative disorders. *Cell Mol Neurobiol* 21: 617-627, 2001.

Schwartz M: Macrophages and microglia in central nervous system injury: Are they helpful or harmful? *J Cereb Blood Flow Metab* 23: 385-394, 2003.

Schwartz M und Kipnis J: A common vaccine for fighting neurodegenerative disorders: recharging immunity for homeostasis. *Trends Pharmacol Sci* 25: 407-412, 2004.

Sedgwick JD, Mossner R, Schwender S und ter Meulen V: Major histocompatibility complex-expressing nonhematopoietic astroglial cells prime only CD8⁺ T lymphocytes: astroglial cells as perpetuators but not initiators of CD4⁺ T cell responses in the central nervous system. *J Exp Med* 173: 1235-1246, 1991.

Sela M: Specific vaccines against autoimmune diseases. *CR Acad Sci III* 322: 933-938, 1999.

Shannon MF, Himes SR und Coles LS: GM-CSF and IL-2 share common control mechanisms in response to costimulatory signals in T cells. *J Leukoc Biol* 57: 767-773, 1995.

Shaw MK, Lorens JB, Dhawan A, DalCanto R, Tse HY, Tran AB, Bonpane C, Eswaran SL, Brocke S, Sarvetnick N, Steinmann L, Nolan G und Fathman CG: Local delivery of interleukin 4 by retrovirus-transduced T lymphocytes ameliorates experimental autoimmune encephalomyelitis. *J Exp Med* 185: 1711-1714, 1997.

Shrikant P und Benveniste EN: The central nervous system as an immunocompetent organ: role of glial cells in antigen presentation. *J Immunol* 157: 1819-1822, 1996.

Sicotte M, Tsatas O, Jeong SY, Cai CQ, He Z und David S: Immunization with myelin or recombinant Nogo-66/MAG in alum promotes axon regeneration and sprouting after corticospinal tract lesions in the spinal cord. *Mol Cell Neurosci* 23: 251-263, 2003.

Song XY, Zhong JH, Wang X und Zhou XF: Suppression of p75^{NTR} does not promote regeneration of injured spinal cord in mice. *J Neurosci* 24: 542-546, 2004.

Stein E und Tessier-Lavigne M: Hierarchical organization of guidance receptors: silencing of netrin attraction by slit through a Robo/DCC receptor complex. *Science* 291: 1928-1938, 2001.

Steup A, Ninnemann O, Savaskan NE, Nitsch R, Püschel AW und Skutella T: Semaphorin D acts as a repulsive factor for entorhinal and hippocampal neurons. *Eur J Neurosci* 11: 729-734, 1999.

Steup A, Lohrum M, Hamscho N, Savaskan NE, Ninnemann O, Nitsch R, Fujisawa H, Püschel AW und Skutella T: Sema3C and Netrin-1 differentially affect axon growth in the hippocampal formation. *Mol Cell Neurosci* 15: 141-155, 2000.

Steward O und Vinsant SL: The process of reinnervation in the dentate gyrus of the adult rat: a quantitative electron microscopic analysis of terminal proliferation and reactive synaptogenesis. *J Comp Neurol* 214: 370-386, 1983.

Steward O: Synapse replacement on cortical neurons following denervation. *Cereb Cortex* 9: 81-132, 1991.

Steward O, Kelley MS und Torre ER: The process of reinnervation in the dentate gyrus of adult rats: Temporal relationship between changes in the level of glial fibrillary acidic protein (GFAP) and GFAP mRNA in reactive astrocytes. *Exp Neurol* 124: 167-183, 1993.

Stoll G, Trapp BD und Griffin JW: Macrophage function during Wallerian degeneration of rat optic nerve: clearance of degenerating myelin and Ia expression. *J Neurosci* 9: 2327-2335, 1989.

Stoppini L, Buchs PA und Muller D: A simple method for organotypic cultures of nervous tissue. *J Neurosci Methods* 37: 173-182, 1991.

Stoppini L, Parisi L, Oropesa C und Muller D: Sprouting and functional recovery in co-cultures between old and young hippocampal organotypic slices. *J Neurosci* 80: 1127-1136, 1997.

Streilein JW: Immune privilege as the result of local tissue barriers and immuno-suppressive microenvironments. *Curr Opin Immunol* 5: 428-432, 1993.

Streilein JW: Unraveling immune privilege. *Science* 270: 1158-1159, 1995.

Streit WJ, Walter SA und Pennel NA: Reactive microgliosis. *Prog Neurobiol* 57: 563-581, 1999.

Streit WJ: Microglia as neuroprotective, immunocompetent cells of the CNS. *Glia* 40: 133-139, 2002.

Super H und Soriano E: The organization of the embryonic and early postnatal murine hippocampus. II. Development of entorhinal, commissural, and septal connections studied with the lipophilic tracer DiI. *J Comp Neurol* 344: 101-120, 1994.

Swain SL, Weinberg AD, English M und Huston G: IL-4 directs the development of Th2-like helper effectors. *J Immunol* 145: 3796-3806, 1990.

Tabakman R, Lecht S, Sephanova S, Arien-Zakay H und Lazarovici P: Interactions between the cells of the immune and nervous system: neurotrophins as neuroprotection mediators in CNS injury. *Prog Brain Res* 146: 387-401, 2004.

Takumida M und Anniko M: Brain-derived neurotrophic factor and nitric oxide synthase inhibitor protect the vestibular organ against gentamicin ototoxicity. *Acta Otolaryngol* 122: 10-15, 2002.

Tapley P, Lamballe F und Barbacid M: K252a is a selective inhibitor of tyrosine protein kinase activity of the trk family of oncogenes and neurotrophin receptors. *Oncogene* 7: 371-381, 1992.

Tessier-Lavigne M und Goodman CS: The molecular biology of axon guidance. *Science* 274: 1123-1133, 1996.

Thoenen H: Neurotrophins and neuronal plasticity. *Science* 270: 593-598, 1995.

Trapp B, Peterson J, Ransohoff RM, Rudick R, Mork S und Bo L: Axonal transection in the lesions of multiple sclerosis. *N Engl J Med* 338: 278-285, 1998.

Trepel M: Neuroanatomie. 3. Auflage, Urban & Fischer Verlag, 2003.

Tucker KL, Meyer M und Barde YA: Neurotrophins are required for nerve growth during development. *Nat Neurosci* 4: 29-37, 2001.

Ullrich O, Diestel A, Bechmann I, Homberg M, Grune T, Hass R und Nitsch R: Turnover of oxidatively-damaged proteins in BV-2 microglia cells is linked to their activation state by poly(ADP-ribose)polymerase. *FASEB J* 15: 1460-1462, 2001a.

Ullrich O, Diestel A, Eyüpoğlu IY und Nitsch R: Regulation of microglial expression of integrins by poly(ADP-ribose)polymerase-1. *Nat Cell Biol* 3: 1035-1042, 2001b.

Ulvestad E, Williams K, Vedeler C, Antel J, Nyland H, Mork S und Matre R: Reactive microglia in multiple sclerosis lesions have an increased expression of receptors for the Fc part of IgG. *J Neurol Sci* 121: 125-131, 1994.

Valenzuela DM, Maisonpierre PC, Glass DJ, Rojas E, Nunez L, Kong Y, Gies DR, Stitt TN, Ip NY und Yancopoulos GD: Alternativ forms of rat TrkC with different functional capabilities. *Neuron* 10: 963-974, 1993.

Van den Beemd R, Boor PP, Van Lochem EG, Hop WC, Langerak AW, Wolvers-Tettero IL, Hooijkaas H und Van Dongen JJ: Flow cytometric analysis of the Vbeta repertoire in healthy controls. *Cytometry* 40: 336-345, 2000.

Vinogradova OS: Hippocampus as comparator: role of the two input and two output systems of the hippocampus in selection and registration of information. *Hippocampus* 11: 578-598, 2001.

Vogelstein B und Gillespie D: Preparative and analytical purification of DNA from agarose. *Proc Natl Acad Sci USA* 76: 615-619, 1979.

Waldmann TA: The IL-2/IL-2 receptor system: a target for rational immune intervention. *Trends Pharmacol Sci* 14: 159-164, 1993.

Weber F, Meinel E, Aloisi F, Nevinny-Stickel C, Albert E, Wekerle H und Hohlfeld R: Human astrocytes are only partially competent antigen presenting cells. Possible implications for lesion development in multiple sclerosis. *Brain* 117: 59-69, 1994.

Wehner R und Gehring W: Zoologie. 22. Auflage, Thieme Verlag, 1990.

Weinreb RN und Levin LA: Is neuroprotection a viable therapy for glaucoma? *Arch Ophthalmol* 117: 1540-1544, 1999.

Wekerle H, Linington C, Lassmann H und Meyermann R: Cellular immune reactivity within the CNS. *Trends Neurosci* 9: 271-277, 1986.

Wetmore C, Ernfors P, Persson H und Olson L: Localization of brain-derived neurotrophic factor mRNA to neurons in the brain by in situ hybridisation. *Exp Neurol* 109: 141-152, 1990.

Williams KC, Dooley NP, Ulvestad E, Waage A, Blain M, Yong VW und Antel JP: Antigen presentation by human fetal astrocytes with the cooperative effect of microglia or the microglial-derived cytokine IL-1. *J Neurosci* 15: 1869-1878, 1995.

Wolf SA, Gimsa U, Bechmann I und Nitsch R: Differential expression of costimulatory molecules B7-1 and B7-2 on microglial cells induced by Th1 and Th2 cells in organotypic brain tissue. *Glia* 36: 414-420, 2001.

Wolf SA, Fisher J, Bechmann I, Steiner B, Kwidzinski E und Nitsch R: Neuroprotection by T cells depends on their subtype and activation state. *J Neuroimmunol* 133: 72-80, 2002.

Yoles E und Schwartz M: Degeneration of spared axons following partial white matter lesion: implications for optic nerve neuropathies. *Exp Neurol* 153: 1-7, 1998.

Yoon SO, Casaccia-Bonnel P, Carter B und Chao MV: Competitive signaling between TrkA and p75 nerve growth factor receptors determines cell survival. *J Neurosci* 18: 3273-3281, 1998.

Zilles K und Rehkämper G: Funktionelle Neuroanatomie. 3. Auflage, Springer Verlag, 1998.