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PERSONAL INFORMATION

Name: Harald W. Sontheimer

Citizenship: United States of America

Foreign Languages: German

RANK/TITLE Professor

DEPARTMENT Neurobiology

Business Address: Department of Neurobiology
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HOSPITAL AND OTHER (NON ACADEMIC) APPOINTMENTS: None

PROFESSIONAL CONSULTANTSHIPS:

Co-Founder & Co-Chairman, Scientific Advisory Board: TransMolecular, Inc.

EDUCATION:

Institution	Degree	Year
University of Ulm, F.R.G.	Vordiplom (German equivalent to "B.S.")	1982
University of Ulm, F.R.G.	Biology Diploma	1986
University of Heidelberg, F.R.G	Department of Comparative Neurobiology Ph.D, Department for Neurobiology	1989

MILITARY SERVICE: None

LICENSURE: None

BOARD CERTIFICATION: N/A

POSTDOCTORAL TRAINING:

Year	Rank/Title	Institution
1989 - 1991	Postdoctoral Associate	Department for Neurology, Yale University, New Haven, Connecticut

ACADEMIC APPOINTMENTS: (In reverse chronological order)

Year	Rank/Title	Institution
2005-present	Director	Civitan International Research Center, UAB
2002-present	Director	Cellular and Molecular Biology Graduate Program, UAB
2000-present	Professor	Department of Neurobiology, UAB, <i>Primary Appointment, Secondary in Cell Biology and Physiology</i>
1997-2000	Associate Professor	Department of Neurobiology, UAB
1997-2000	Associate Professor	Department of Cell Biology, UAB <i>Secondary Appointment.</i>
1997-2000	Associate Professor	Department of Physiology & Biophysics, UAB <i>Secondary Appointment.</i>
1997-present	Associate Scientists	Comprehensive Cancer Center, UAB
1994-1996	Assistant Professor	Department of Cell Biology, UAB <i>Secondary Appointment.</i>
1994-1996	Assistant Professor	Department of Physiology and Biophysics, University of Alabama at Birmingham (UAB), Birmingham, AL
1994-1996	Associate Scientist	Neurobiology Research Center, UAB
1992-1994	Assistant Professor	Section of Neurobiology, Yale University, New Haven, Connecticut.
1991-1994	Faculty	Yale Cancer Center, Yale University, New Haven, Connecticut
1991-1994	Assistant Professor	Department of Neurology, Yale University, New Haven, Connecticut.

AWARDS/HONORS:

1986-1988	Studienstiftung des Deutschen Volkes, Promotions-Stipendium("Scholarship from the Federal Republic of Germany")
1989	Graduation with "summa cum laude", highest honors (mit Auszeichnung)
1991	RSG, NIH Fluid Research Fund
1992	Winter Conference on Brain Research (WCBR) Fellow
1992	Dean's Young Faculty Award
2004	McNulty Civitan Scientist Award

PROFESSIONAL SOCIETIES AND MEMBERSHIPS:

American Association for the Advancement of Science
European Society for Neuroscience
German Zoological Society
New York Academy of Sciences
Society for Neuroscience
Society for Developmental Neuroscience

COUNCILS AND COMMITTEES:

Outside Reviewer:

Department of Veterans Affairs	1997-1999
Human Frontier Science Program	1996
National Science Foundation	1989, 1992, 1994
National Institutes of Health	1994, 1995, 1998, 1999
National Research Council, Canada	1996, 1997
Swiss Natl. Sci. Foundation	1992, 1995
Spinal Cord Res. Foundation	1997, 1998, 1999
Paralyzed Veterans of America	
Research Foundation	1993, 1998, 1999
The Welcome Trust, U.K.	1995

Study Section:

NIH NINDS Neuro B1	1995
NIH NINDS NSPB	1995, 1996
NIH NINDS MDCN2	2000-2002
American Cancer Society	1999-2000 Cancer Drug Development
NIH Special Emphasis Panel	1999
Paralyzed Veterans of America	1999-2000
Howard Hughes Medical Institute	
Medical Student Fellowship Review Panel	1999-2002
NIH NINDS NDGB Regular Member	2003-2007

UNIVERSITY ACTIVITIES:

Director, Cellular & Molecular Biology Graduate Program 2002-present
Physiology & Biophysics Graduate Committee 1996-1997
Neuroscience Advisory Group, 1996
Neuroscience Recruitment week, 1995, 1996
Conflict of Interest Review Board, 1997-2002
University wide Promotion and Tenure committee, 2000-2003
Medical Research Advisory Council, 2000-2003
Graduate committee member for numerous UAB students enrolled in Cell Biology,
Physiology or Pharmacology

EDITORIAL BOARD MEMBERSHIPS:

Editorial Board Member: Associate Editor for Journal of Neuroscience Letters: 2003-present
Glia: 1996-present; J. Neuroscience Research: 2003-present
Deputy Editor, NeuroReport: 1997-2002

Referee: American Journal of Physiology, Annals of Neurology, Brain Research, Can. J. Physiol., European J. Physiology, Experimental Neurology, Glia, J. Physiology (London), J. Neurobiology, J. Neuroscience, J. Neurochemistry, J. Neurophysiology, J. Neuroscience Research, J. Neuropharmacology, Molecular and Cellular Neurosciences, Molecular Pharmacology, NeuroReport, Neuroscience, Neuroscience Letters, Science

MAJOR LECTURES AND VISITING PROFESSORSHIPS:

- 1991 Astrocytes, as well as neurons, express a diversity of ion channels. IBRO satellite meeting, Saskatoon, Canada, on Ions-Water-Energy in Brain Cells (Aug. 10-14).
- 1993 Winter Conference on Brain Research, Wistler, British Columbia Canada. Na⁺ channels in glial cells.
- 1994 Ion channels in glial cells. Gordon Conference on Myelin. Casa Sirena Resort, Oxnard, CA.
- 1994 Possible functional roles for glial Na⁺ channels. Human Frontier Science Program Workshop on transmitter receptors and ion channels in glial cells. Castle Eckberg, Dresden, Germany.
- 1995 Voltage-activated ion channels are expressed in glial cells in vivo: Alterations in disease, malignancy and in response to injury. Corsican Hippocampus Conferences, Corsica France.
- 1995 Ion channel expression and function in glial tumors and astrocytic scars. Cellular and molecular mechanisms of regeneration and functional repair in the CNS. Monastery Ohrbeck, Germany.
- 1996 Winter Conference on Brain Research, Snowmass Colorado, Panel presentation. Properties and Function of glial ion channels.
- 1996 The role of ion channels in cell proliferation of glia and glioma cells. International Symposium, Gap junctions in the nervous system. Seon, Germany (05/03-05/07/96).
- 1996 Ion channel function in glia and glioma cells. Symposium, International Society for Developmental Neuroscience (ISDN) Meeting, Tampere, Finland (07/30-08/3/96).
- 1997 Workshop on glial ion channels and nervous system diseases (chairman), WCBR Breckenridge, Colorado (01/25-02/01/97)
- 1997 Satellite Symposium for the 27th Annual Meeting of the Society for Neuroscience “NO and other diffusible signals in brain development, plasticity and disease”, Glial glutamate transport as a target for NO: consequences for neurotoxicity. New Orleans (10/24/97).
- 1997 Organizer and Chair of Symposium “New insights into brain tumor biology provide novel targets for diagnosis and therapy”, and seminar speaker “A novel glioma specific chloride channel: diagnostic and therapeutic potential”. 27th Annual Meeting of the Society for Neuroscience, New Orleans (10/28/97).
- 1998 Nature Biotechnology Conference “PharmacoGenesis: Postgenomic drug discovery through developmental biology”, Boston, MA (3/26-27/98) Speaker: “Glioma Chloride channels: possible target for treatment of primary brain tumors”.
- 1999 American Association for the Advancement of Science, “Scorpion toxin as a diagnostic and therapeutic tool for primary brain tumors” Anaheim CA (1/23/99)
- 1999 Advances in Ion Channel Research, Symposium “Glioma Cl⁻ channels and their potential therapeutic utility” San Francisco (3/14-3/17/99).
- 1999 Centennial Meeting of the American Physics Society, “The role of Neuroglia in brain function and disease” Atlanta (3/25/99).
- 1999 Woods Hole, MA, Marine Biological Laboratories, Course Faculty “Pathogenesis of

- Neuroimmunological Diseases (8/99)
- 1999 Neurobiology of Disease Workshop, Society for Neuroscience, Miami (10/22/99).
- 2000 American Epilepsy Soc., LA, "A possible role for astrocytes in epilepsy"(12/04/01)
- 2001 Channelopathies Conference, Sheffield England, "Role of K⁺ and Cl⁻ channels in the invasive behavior of glioma cells" (6/30-7/03/01).
- 2002 127th Annual Meeting of the American Neurological Association, New York. Keynote lecture: Glial amino acid transport contributes to neurological disorders (10/15/02).
- 2003 Gordon Conference on Glial Neuronal Interactions, "Role of Cl⁻ channels and amino acid transporters in glioma biology" (2/24-2/28/03).
- 2004 Glioma Conference, Berlin Germany, (12/03/04) Keynote speaker, "Ion channels and amino acid transporters support the growth and invasion of malignant gliomas:
- 2004 American Epilepsy Society, Symposium speaker, "Astrocytes and Epileptogenesis" New Orleans (12/07/04).
- 2005 Keynote speaker at the Glial Neuronal Interaction conference in Montreal: "role of ion channels and amino acid transport in glioma biology" (06/22/05)
- 2005 The Society for Neuroscience, Symposium Co-Chair and speaker. "Astroglial regulation of synaptic transmission and epilepsy, (11/12/05)

INVITED SEMINARS-NATIONAL, INTERNATIONAL

- 1987 Glutamate responses in cultured mammalian astrocytes are mediated by non-NMDA type channels. Department for Zoology and Neurobiology, University of Bochum, F.R.G.
- 1988 Glutamate opens Na⁺/K⁺ channels in cultured astrocytes Department for Zoology, University of Duesseldorf, F.R.G.
- 1988 Developmental regulation of ion-channel expression in oligodendrocytes. Department of Neurology, Yale University, New Haven, Connecticut.
- 1988 Channel expression correlates with differentiation stage during the development of oligodendrocytes from their precursor cells in culture. Albany Medical College, Division of Neurosurgery, Albany, New York. Host: Harold Kimelberg.
- 1988 Developmental regulation of ion-channel expression in cultured glial-precursor cells and oligodendrocytes. Department of Biology, University of California, Los Angeles, California. Host: Meyer Jackson.
- 1989 Functional chloride channels by mammalian cell expression of rat glycine receptor subunit. Neuroscience Research Center, Hoffmann-LaRoche, Basel, Switzerland.
- 1990 Na⁺-current expression in rat hippocampal astrocytes *in vitro*: Alterations during development. Department of Developmental Neurobiology, National Institute of Health, Bethesda, Maryland. Host: Phil Nelson.
- 1992 Voltage-gated Na⁺ channels in glia - New evidence regarding their function. Department of Developmental Neurobiology, National Institute of Health, Bethesda, Maryland, Host: Vittorio Gallo.
- 1993 Properties and function of glial ion channels. Department of Cellular and Molecular Pharmacology, Brown University, Providence, RI. Host: Ed Hawrot.
- 1993 Glial Na⁺ channels promote Na⁺/K⁺-ATPase function. Department of Neurophysiology, University of Wisconsin, Madison WI. Host: Bill Chiu.
- 1993 Ion channel function in glial cells. The Roche Institute, Nutley NJ.
- 1995 Ion channel expression and function in glia and glioma cells. Dept. Pharmacology, Emory University, Atlanta GA. Host, Ray Dingledine. (12/05/95)

- 1996 Ion channels in glia and glioma cells. Departments of Cellular and Structural Biology and Physiology, University of Colorado Health Sciences Center, Denver, CO. Host, John Caldwell. (01/26/96)
- 1996 Properties and function of ion channels in glia and glioma cells. Department of Medical Physiology, University of Calgary, Calgary Canada, Host, Brian MacVicar. (03/29/96)
- 1996 Ion channel expression and their role in proliferation in glia and glioma cells. Department of Physiology, The University of Michigan, Ann Arbor. Host, Don Puro (05/28/96).
- 1996 The role of ion channels in glioma cells and astrocytic scars. Neuroscience Research Center, Louisiana State University Medical Center (LSUMC) (08/12/96) Host: Nicolas Bazan.
- 1996 A novel glioma specific ion channel: A possible diagnostic or therapeutic target? University of Toronto and Toronto Western Hospital, Neuroscience Unit. (09/05/96) Host: Elizabeth Theriault.
- 1996 Ion channels in glia and glioma cells. Department of Physiology and Neuroscience, The University of Connecticut. (09/18/96)
- 1997 Ion channels in glial cells: current concepts. Albany Medical College (04/09/97)
- 1997 Properties and function of ion channels in glia and glioma cells. Park Davis Inc., Ann Arbor Michigan. (04/29/97)
- 1997 Properties of astrocytes associated with human epileptic seizure foci. WONEOP satellite symposium, Adare, Ireland. (6/25-6/29/97)
- 1997 Properties and function of ion channels in glia and glioma cells. Wyeth-Ayerst Pharmaceuticals, Princeton NJ. (7/23/97)
- 1998 Current approaches to the study of astrocytes. Winter Conference on Brain Research, Snowbird, Utah (1/24-1/31/98).
- 1998 Glioma chloride channel as diagnostic or therapeutic target. Berlex Pharmaceutical, Wayne NJ (3/6/98).
- 1998 The role of ion channel in proliferation and migration of glioma cells. National Institute of Health, Bethesda, ML, Host: Vittorio Gallo (3/11/98)
- 1998 Ion channels in glia and glioma cells. New York University, School of Medicine, Host: Margaret Rice (5/4/98).
- 1998 Ion channels provide novel targets for treatment and diagnosis of primary brain tumors. The Beckman Research Institute, City of Hope, CA, Host: Michael Barish (8/18/98).
- 1999 High grade gliomas express Ca^{2+} -activated K^+ channels. Winter Conference on Brain Research, Snowmass, CO (01/23/99-01/01/30/99)
- 2000 The role of astrocytes in glutamateric neurotransmission. IASSID World Congress, Seattle WA (8/2/00).
- 2000 The physiology of astrocytes associated with epileptic seizure foci. Dept. Neurobiology, The University of Washington, Seattle, WA, Host Phil Schwartzkroin (8/3/00).
- 2001 First Annual Dept. Neuroscience Chairs Meeting, "Properties that accompany the transition of glial cells to malignancy"
- 2001 Ion channels and amino acid transporters contribute to the invasive migration of human glioma cells. Department of Cell Biology, The University of Miami (9/14/01).
- 2001 Glial regulation of perisynaptic glutamate in health and disease. Ninth International Symposium on neural regeneration, Asilomar, CA (12/12-12/16/01).
- 2002 The role of glial glutamate transport in normal and diseased brain. Soc. Neurochemistry Annual Meeting, Palm Beach, FL (6/23/02).
- 2002 Neoplastic Astrocytes (Glioma); 2002 NIH workshop: Astrocyte Function in Health and Disease, National Institutes of Health, Bethesda MD (9/22-24/02).
- 2002 Cl^- channels and amino acid transporters contribute to the growth and invasion of primary

- brain tumors. Vanderbilt (10/11/02).
- 2003 Unique biological adaptations of invading glioma cells. Stanford University, Dept. Neurology, San Francisco. (1/7/03)
- 2003 Ion channels and amino acid transporters support the growth and invasion of human malignant gliomas. University of Colorado at Boulder (9/9/03).
- 2003 The role of Ion channels and amino acid transporters in growth control of human malignant gliomas. University of Colorado at Fort Collins (9/10/03).
- 2003 Malignant gliomas: perverting glutamate and ion homeostasis for selective advantage. University of Colorado Health Sciences Denver (9/11/03).
- 2004 The role of amino-acid transporters in growth control and invasion of human brain tumors. The University of Michigan, Minneapolis (9/10/04).
- 2004 University of Texas South Western, (Dallas) Ion channels and amino acid transporters support the growth and invasion of human malignant gliomas (12/14/04).
- 2005 Winter Conference on Brain Research, Symposium speaker, "Astrocytes and Disease", Breckenridge (01/24/05).
- 2005 Neurooncology Symposium, UAB Division of Pediatric Hematology & Oncology. "Targeting cystine transport as a novel way to treat primary brain tumors" (4/22/05).

GRANT SUPPORT (PAST AND CURRENT)

Active

- 1994-2006 NIH RO1 NS31234- "Properties and function of glial ion channels", **P.I.** (current year total \$272,650)
- 1997-2006 NIH RO1 NS36692 "Role of chloride channels in glia and glioma migration" **P.I.** (current year total \$304,500)
- 2000-2005 NIH PO1-HD38760 "The role of astrocytes in glutamatergic transmission in neonatal synapses", **P.I.** (current year total, \$151,230)
- 2002-2007 NIH P50CA97247 BRAIN SPORE "Ion channels as novel, glioma-specific targets", **P.I.** (current year total, \$244,735)
- 2004-2005 Goldhirsh Foundation. The role of amino-acid transport in the growth and invasion of astrocyte derived tumors, **P.I.** (\$100,000).
- 2003-2008 NIGMS 5T32GM008111, Predoctoral Training in Cell and Molecular Biology, **P.I.** (175,000).
- 2000-2005 P30HD38985 UAB Mental Retardation Research Center; Simultaneous Laser Scanning Imaging and Electrophysiology Core, (P.I. Friedlander)
- 2005-2010 NIH RO1-NS052634-01 "Amino-acid transport and the biology of human gliomas", **P.I.** (\$325,000).

Pending

- 2006-2011 RO1 NS31234- "Properties and function of glial ion channels", **P.I.** (competitive renewal application)

Past

- 1991-1994 NIH grant (RO1-NS27081) "Characterization and development of human seizure focus", **Co-Investigator** (P.I. N. deLanerolle)
- 1993-1994 grant (IBN-9310277) "Modulation of ion channel expression and ion channel activity in astrocytes", **P.I.**
- 1994-2000 NIH-NICHD P50 -"NO in the development of synapses and myelination in cortex", **Co-Investigator** (P.I. M. Friedlander).

- 1997-2000 American Cancer Society RPG 97-083-01CCD -"A glioma specific chlorotoxin-binding protein in primary brain tumors", **P.I.**
- 2000-2003 American Cancer Society RPG 97-083-04CCD -" The use of Chlorotoxin to treat primary brain tumors , **P.I.**
- 1994-2000 NIH-NICHD P50 -"Excitotoxic mechanisms in developing rat neocortex", **Co-Investigator** (P.I. J. Hablitz).
- 1996-2000 AL Chapter for Parkinson's Disease -"The role of glial cells in Parkinson's Disease" **P.I.**
- 1997-2002 NIH RO1 NS36692 - "Properties of a glioma specific chloride channel", **P.I.**

BIBLIOGRAPHY

MANUSCRIPTS

Manuscripts already published

1. Sontheimer, H., and Hoffmann, K.-P.: Horizontal optokinetic reflex in light reared and dark reared Israelian gerbils (*Meriones tristrami*). Exp. Brain. Res., 66:440-444 (1987).
2. Sontheimer, H., Kettenmann, H., Backus, K.H., and Schachner, M.: Glutamate opens Na^+/K^+ channels in cultured astrocytes. Glia, 1:328-363 (1988).
3. Sontheimer, H., and Kettenmann, H.: Heterogeneity of potassium currents in cultured oligodendrocytes. Glia, 1:415-420 (1988).
4. Pritchett, D.B., Sontheimer, H., Gormann, C.M., Kettenmann, H., Seeburg, P.H., and Schofield, P.R.: Transient expression shows ligand gating and allosteric potentiation of GABA_A receptor subunits. Science, 242:1306-1308 (1988).
5. Trotter, J., Boulter, C.A., Sontheimer, H., Schachner, M., and Wagner, E.F.: Expression of v-src arrests murine glial cell differentiation. Onkogene, 4:457-464 (1989).
6. Sontheimer, H., Trotter, J., Schachner, M., and Kettenmann, H.: Channel expression correlates with differentiation stage during the development of oligodendrocytes from their precursor cells in culture. Neuron, 2:1135-1145 (1989).
7. Sontheimer, H., Becker, C.-M., Pritchett, D.B., Schofield, P.R., Grenningloh, G., Kettenmann, H., Betz, H., and Seeburg, P.H.: Functional chloride channels by mammalian cell expression of rat glycine receptor subunit. Neuron, 2:1491-1497 (1989).
8. Pritchett, D.B., Sontheimer, H., Shivers, B.D., Ymer, S., Lüddens, H., Kettenmann, H., Schofield, P.R., and Seeburg, P.H.: Importance of a novel GABA_A receptor subunit for benzodiazepine pharmacology. Nature, 338:582-585 (1989).
9. Sontheimer, H., Perouansky, M., Grantyn, R., Lux, D., and Kettenmann, H.: Cells of the oligodendrocyte lineage express H^+ -activated Na^+ -channels. J. Neurosci. Res., 24:496-500 (1989).
10. Schofield, P.R., Pritchett D.B., Sontheimer H., Kettenmann H., and Seeburg, P.H.: Sequence and expression of human GABA_A receptor $\alpha 1$ and $\beta 1$ subunits. FEB's Letters, 244(2):361-364 (1989).

11. Ymer, S., Schofield, P.R., Shivers, B.D., Pritchett, D.B., Lüddens, H., Kohler, M., Werner, P., Sontheimer, H., Kettenmann, H., and Seeburg, P.H.: Molecular studies of the GABA_A receptor. J. Protein Chemistry, 8:352-355 (1989).
12. Shivers, B.D., Killisch, I., Sprengler, R., Sontheimer, H., Koehler, M., Schofield, P.R., Seeburg, P.H.: Two novel GABA_A receptor subunits exist in distinct neuronal subpopulations. Neuron 3:327-337 (1989).
13. von Blankenfeld, G., Ymer, S., Pritchett, D.B., Sontheimer, H., Ewert, M., Seeburg, P.H., and Kettenmann, H.: Differential benzodiazepine pharmacology of recombinant GABA_A receptors. J. Neurosci. Lett., 115:269-273 (1990).
14. Sontheimer, H., Minturn, J.E., Black, J.A., Waxman, S.G., and Ransom, B.R.: Specificity of cell-cell coupling in rat optic nerve astrocytes *in vitro*. Proc. Natl. Acad. Sci. USA, 87:9833-9837 (1990).
15. Sontheimer, H., Ransom, B.R., Cornell-Bell, A.H., Black, J.A., and Waxman, S.G.: Na⁺-current expression in rat hippocampal astrocytes *in vitro*: Alterations during development. J. Neurophysiol. 65:3-19 (1991).
16. Sontheimer, H., Ransom, B.R., and Waxman, S.G.: Relationship between Na⁺-current expression and cell-cell coupling in rat hippocampal astrocytes. J. Neurophysiol., 65:989-1001 (1991).
17. Sontheimer, H., Kettenmann, H., Schachner, M., and Trotter, J.: The neural cell adhesion molecule N-CAM modulates K⁺ channels in cultured glial precursor cells. Eur. J. Neurosci, 3:230-236 (1991).
18. Sontheimer, H., Minturn, J.E., Black, J.A., Ransom, B.R., and Waxman S.G.: Two types of Na⁺-currents in cultured rat optic nerve astrocytes: changes with time in culture, and with age of culture derivation. J. Neurosci. Res.,30:275-287 (1991).
19. Minturn, J.E., Sontheimer, H., Black, J.A., Angelides, K.J., Ransom, B.R., Ritchie, J.M., and Waxman, S.G.: Membrane-associated sodium channels and cytoplasmic precursors in glial cells: Immunocytochemical, electrophysiological and pharmacological studies. Ann. NY Acad. Sci., 633:255-271 (1991).
20. Sontheimer, H., Minturn, J.E., Ransom, B.R., Black, J.A., Cornell-Bell, A.H., Waxman, S.G.: Cell coupling is restricted to subpopulations of astrocytes cultured from rat hippocampus and optic nerve. Ann. NY Acad. Sci., 633:592-596 (1991).
21. Minturn, J.E., Sontheimer, H., Black, B.A., Ransom, B.R., and Waxman, S.G. : Sodium channel expression in optic nerve astrocytes chronically-deprived of axonal contact. Glia, 6:19-29 (1992).
22. Ransom, B.R. and Sontheimer H. : The neurophysiology of glial cells. J. Clinical Neurophysiol., 9:224-251 (1992).
23. Sontheimer, H. Astrocytes as well as neurons express a diversity of ion channels. Can. J. Physiol. Pharmacol., 70:S223-S238 (1992).
24. Sontheimer, H., Black, J.A., Ransom, B.R., and Waxman, S.G.: Ion channels in spinal cord astrocytes *in vitro*: I. Transient expression of high levels of Na⁺ and K⁺ channels. J. Neurophysiol., 68:985-1000, (1992).

25. Sontheimer, H. and Waxman, S.G.: Ion channels in spinal cord astrocytes *in vitro*: II. Biophysical and pharmacological analysis of Na⁺ currents. J. Neurophysiol., 68:1001-1011, (1992).
26. Sontheimer, H., Ransom, B.R., and Waxman, S.G.: Different Na⁺ currents in P0 and P7-derived hippocampal astrocytes *in vitro*: Evidence for a switch in Na⁺ channel expression *in vivo*. Brain Res., 597:24-29 (1992).
27. Black, J.A., Sontheimer, H., and Waxman, S.G.: Spinal cord astrocytes *in vitro*: Phenotypic diversity and sodium channel immunoreactivity. Glia, 7:272-285 (1993).
28. Thio, C.L., Waxman, S.G., and Sontheimer, H.: Ion channels in spinal cord astrocytes *in vitro*: III. Modulation of channel expression by co-culture with neurons and neuron-conditioned medium. J. Neurophysiol., 69:819-831 (1993).
29. Thio, C.L. and Sontheimer, H.: Differential modulation of TTX-sensitive and TTX-insensitive Na⁺ channels by protein kinase C activation. J. Neurosci., 13:4889-4897 (1993).
30. Stys, P.K., Sontheimer, H., Ransom, B.R., and Waxman, S.G.; Non-inactivating, TTX-sensitive Na⁺ conductance in rat optic nerve axons. Proc. Natl. Acad. Sci. USA, 90: 6976-6980 (1993).
31. Sontheimer, H. and Waxman, S.G. Expression of voltage-activated ion channels by identified glial cells in hippocampal brain slices. J. Neurophysiol., 70:1863-1873 (1993).
32. Utschneider, D.A., Thio, C., Sontheimer, H., Ritchie, J.M., Waxman, S.G., Kocsis, J.D.: Action potential conduction and sodium channel content in the optic nerve of the myelin-deficient rat. Proc. Roy. Soc. London B, 254:245-250 (1993).
33. Rosewater, K. and Sontheimer, H. Fibrous and Protoplasmic astrocytes express GABA_A receptors with different benzodiazepine pharmacology. Brain Res., 636:73-80 (1994).
34. Sontheimer H., Fernandez E., Ullrich N., and Waxman S.G. Astrocyte Na⁺ channel are required for maintenance of Na⁺/K⁺-ATPase activity. J Neurosci., 14: 2464-2475 (1994).
35. Black, J.A., Yokoyama, S., Waxman, S.G., Oh, Y., Zur, K.B., Sontheimer, H., Higashida, H., Ransom, B.R.: Sodium channel mRNA in cultured spinal cord astrocytes: *in situ* hybridization in identified cell types. Molec. Brain Res, 23: 235-245 (1994).
36. Sontheimer, H. Voltage-dependent ion channels in glial cells. Glia, 11: 156-172 (1994).
37. Lee, S.H., Kim, W.T., Cornell-Bell, A.H., and Sontheimer, H. Astrocytes exhibit regional specificity in gap-junction coupling. Glia, 11: 315-325 (1994).
38. O'Connor, E.R., Sontheimer, H., and Ransom, B.R. Rat hippocampal astrocytes exhibit electrogenic sodium-bicarbonate co-transport J. Neurophysiol., 72: 2580-2589 (1994).
39. Pappas, C.A., Ullrich, N., and Sontheimer, H. Reduction of glial proliferation by K⁺ channel blockers is mediated by changes in pH_i. NeuroReport, 6:193-196 (1994).
40. Ransom, C.B. and Sontheimer, H. Biophysical and pharmacological characterization of inwardly rectifying K⁺ channels in spinal cord astrocytes. J. Neurophysiol., 73: 333-345 (1995).

41. Roy, M.-L. and Sontheimer H. β -adrenergic modulation of glial inwardly rectifying potassium channels. J. Neurochem., 64:1576-1584 (1995).
42. Sontheimer, H. Ion channels in inexcitable cells. The Neuroscientist, 1:64-67 (1995).
43. Lee, S.H., Spencer, D.D., Magge, S., Sontheimer, H. and Cornell-Bell, A. H. Human epileptic astrocytes exhibit increased gap-junction coupling. Glia, 11:315-325 (1995).
44. Sontheimer, H. Glial influences on neuronal signaling. The Neuroscientist, 1:123-126 (1995).
45. Sontheimer, H. Coupling in glial cells. Who is coupled and why. The Neuroscientist, 1: 188-191 (1995).
46. Sontheimer, H. Glial neuronal interactions: a physiological perspective. The Neuroscientist 1: 328-337 (1995).
47. Ullrich, N., Gillespie, G.Y., and Sontheimer, H. Human astrocytoma cells express a unique chloride current. NeuroReport, 7: 1020-1024 (1996).
48. Ullrich, N., and Sontheimer, H. Biophysical and pharmacological characterization of chloride currents in human astrocytoma cells. Am. J. Physiol., 270: C1511-C1521 (1996).
49. Ransom, C.B., Sontheimer, H., and Janigro, D. Astrocytic inwardly-rectifying potassium currents are dependent on by extracellular sodium ions. J. Neurophysiol., 76:626-630 (1996).
50. Roy, M.-L., Saal, D., Perney, T., Sontheimer, H., Waxman, S.G., Kaczmarek, L.K. Manipulation of the delayed rectifier Kv1.5 potassium channel in glial cells by antisense oligodeoxynucleotides Glia, 18:177-184, 1996.
51. Sontheimer, H., Black, J.A., and Waxman, S.G. Voltage-gated sodium channels in glia: Properties and possible functions. Trends in Neurosciences, 19:325-331 (1996).
52. Ye., Z. and Sontheimer, H. Cytokine modulation of glial glutamate uptake: A possible involvement of nitric oxid. NeuroReport, Vol 7, 2181-2185 (1996).
53. Manning, T.J., and Sontheimer, H. Bovine serum albumin and lysophosphatidic acid stimulate calcium mobilization and reversal of cAMP-induced stellation in rat spinal cord astrocytes. GLIA, 20:163-172 (1997).
54. Bordey, A., and Sontheimer, H. Postnatal development of ionic currents in rat hippocampal astrocytes *in situ*. J. Neurophysiol., 78:461-477 (1997).
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Manuscripts in press

Ritch, P.S., Carroll, S.L., and Sontheimer, H. Neuregulin-1 enhances survival of human glioma cells. GLIA, in press (2005).

Chung W. J., Gillespie, G.Y., Hamza, H., and Sontheimer, H. Inhibition of cystine uptake arrests the growth of primary brain tumors. J. Neuroscience, in press.

Manuscripts submitted

McCoy, E. and Sontheimer, H. Water channel expression and function in normal and malignant glial cells. Am. J. Physiology, submitted.

Olsen, M.L., Campell, S., and Sontheimer, H. Molecular identification of inwardly rectifying K⁺ channels in spinal chord astrocytes. *J. Physiology*, submitted.

Other Publications (letters to the editor, book reviews, etc.)

Book Reviews

Astrocytes: Pharmacology and Function; *Molecular and Cellular Neurosciences* 4, 583 (1993)

BOOKS

Books and Book Chapters

1. Kettenmann, H., Backus, K.H., Berger, T.B., Sontheimer, H., and Schachner, M.: Neurotransmitter receptors linked to ionic channels in cultured astrocytes: An electrophysiological approach. Differentiation and Functions of Glial cells, 203-211, Alan R. Liss. (1990).
2. Ransom, B.R., Kettenmann, H., and Sontheimer, H.: Characteristics of electrical coupling between mammalian glial cells studied *in vitro*. Functions of Neuroglia, Vol.2, A. Roitbak (ed.), (1992).
3. Sontheimer, H.: The use of laser photo-bleaching to study gap-junctions. Electrophysiological Methods for In Vitro Studies in Vertebrate Neurobiology, H. Kettenmann, R. Grantyn (eds.), Wiley-Liss, New York, 343-348 (1992).
4. Ransom, B.R. and Sontheimer, H.: Cell-cell coupling demonstrated by intracellular injection of the fluorescent dye Lucifer Yellow. In: Electrophysiological Methods for In Vitro Studies in Vertebrate Neurobiology, H. Kettenmann, R. Grantyn (eds.), Wiley-Liss, New York, 336-342 (1992).
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11. Sontheimer, H. and Fernandez-Marques, E.. Ion channel expression and function in astrocytic scars. In: Molecular signalling and regulation in glial cells: A key to remyelination and

- functional repair, Jeserich, G., and Althaus, H.H. (eds.), Springer, Heidelberg, 101-113 (1996).
12. Sontheimer, H. and Ye, Z. Glial glutamate transport as target for Nitric Oxide: consequences for neurotoxicity In: Progress in Brain Research, 118: 241-251 (1998).
 13. Sontheimer, H. Chloride and Potassium channels in glial cells. in: Membrane Physiology of glial cells, Progress in Brain Research, Elsevier Publishing (1998), in press.
 14. Sontheimer, H. and Ransom, C.B. Whole cell patch-clamp recordings. In: Patch clamp techniques and protocols, Boulton, A.A., Baker, G.B., and Walz, W. (eds.), Humana Press, Totowa NJ, 35-67 (2002).
 15. Bordey, A., and Sontheimer H. Astrocytic changes associated with epileptic seizures: Neuroglia in the aging brain, J.S. deVellis (ed.), Humana Press, Totowa NJ, (2003).
 16. Parkerson, K.A. and Sontheimer H. Specialized channels in astrocytes. In: Glial ⇔ Neuronal Signaling, Hatten G.I. & Parpura V. (eds.) Kluwer Academic Pub., 215-237 (2004).
 17. Olsen M.L., and Sontheimer, H. Ion channels in glial cells. NEUROGLIA, Ransom, B.R. and Kettenmann, H. (eds), Oxford, New York (2004).

MISCELLANEOUS

Films, educational tapes, syllabi, software packages and courses developed, etc.

In 1995, I developed a graduate course entitled “Neurobiology of Disease” which intends to bridge Neuroscience and Neurology. It covers 16 of the most current neurological disorders and teaches relevant basic science pertinent to those diseases.

Reports about my work (incomplete):

written:

1. Science, 278, p. 1226: Molecules give new insights into deadliest brain cancers (1997)
2. Oncology News International, 7, p. 30: Lab studies suggest new approaches to treating gliomas (1998)
3. UAB magazine Summer (1997): Brain Tumor Updates, new tactics target gliomas
4. The Birmingham News (1997): Magic bullet found? Researchers find drug to zero in on brain tumors (1997)
5. The Birmingham News (1997) Researchers at UAB seek keys to how brain works
6. Birmingham, Best Medicine, October 97 p. 100.
7. The News Journal, New Castle, DE “Poisons provide keys to cure” 05/10/98
8. Carroll County Times, Westminster, MD “Weird substances inspire mainstream medications” 05/31/98
9. Soc. Neuroscience Brain briefings, “Glioma brain tumors” June 98
10. Courier Post, Cherry Hill, NJ “Medicines natural inspiration” 06/10/98
11. UAB Reporter, Vol22 NO 36, “Bug drug unlocks cancer cell door” 06/29/98
12. Birmingham News (1998) “The cure may crawl” 06/30/98
13. USA today 06/31/98
14. The Irish Times “Scorpion may have a role in treating brain cancer” 1/26/99
15. The Arizona Daily Star :Scorpion toxin could be fatal to brain cancer” 1/30/99
16. UAB Magazine, Winter 99 “Building blocks and breakthroughs”
17. Business Week, “Can scorpio stop cancer” 02/8/99
18. San Francisco Examiner, “Research doctors get clues from animal” 1/24/99

broadcasts:

1. CBS New York 12/28/96
2. CBS Channel 42 BH 12/16/96
3. NBC Channel 13 BH 02/13/97
4. CBS-TV Network "Scorpion venom to treat brain tumors" 12/27/96
5. Deutschlandfunk, Radio Germany 03/28/98
6. WAMC Public Radio, Albany NY, 06/23/98
7. ABC News, National 1/25/99
8. BBC International 1/23/99
9. The death stalker National Geographics, 6/2003

Teaching Responsibilities:

Course Master:

- Neurobiology of Disease, NBL 730, 1995-present Course Director
(4 credit hour advanced graduate course that familiarizes students with current knowledge in 16 of the most well studied disorders of the nervous system from both a clinical and basic science perspective).
- Laboratory Methods, NEUR 753, 07/29-08/09/96, 97, Course Director
(“Woods-Hole”-style integrative course that combines hands-on laboratory experiments with in-depth discussion of background materials. Familiarizes students with state-of-the-art electrophysiological and optical recording techniques).
- Cellular and Molecular Neurobiology-Module III, NEUR 702, 11/15-12/20/96

Lecturer:

- Cellular and Molecular Neuroscience, NEUR702, 1994-present
Current Topics in Neuroscience Research, NEUR781, 01/01-present
Medical Neuroscience Course, NBL 711, Spring 1995-present
Developmental Neuroscience, NEUR 720-00, Spring 1995-99
Integrative Biological Sciences, 2000-present

Graduate Students and Fellows Supervised:Graduate Students

- Chloe Thio, M.D. Thesis advisor, 1992-1993, Yale University School of Medicine.
Karen Rosewater, M.D. Thesis advisor, 1993-1994, Yale University School of Medicine.
Nicole Ullrich, Ph.D. 1993-1997 Ph.D. thesis advisor, Yale MSTP program
(Supervised at UAB 1994-1996)
Zucheng Ye, 1995-1999; Ph.D. thesis advisor, UAB Neurobiology
Timothy Manning, 1995-1999; Ph.D. thesis advisor, UAB Neurobiology
Liliana Soroceanu, 1997-1999, Ph.D., thesis advisor, UAB Neurobiology
Stacey MacFarlane, 1994-1999; Ph.D. thesis advisor, UAB Neurobiology
Christopher B. Ransom, 1994-2001; Ph.D. thesis advisor, UAB MSTP (MD. Ph.D.) Program
Xiaojin Liu, 1998-2002, Ph.D., thesis advisor, UAB Neurobiology
Kimberley Smitherman, 1998-2003, Ph.D. thesis advisor, Cell Biology & MSTP Program
Patricia Rich, 1998-2003, Ph.D. thesis advisor, Neurobiology & MSTP Program
Michelle Olson, 1999-2004, Ph.D. thesis advisor, Neurobiology
Amy Weaver, 2002-present, Ph.D. thesis advisor, Neurobiology

Michael McFerrin, 2003-present, Ph.D. thesis advisor, Neurobiology
Eric McCoy, 2003-present, Ph.D. thesis advisor, Neurobiology
Nola Jean Sieber, 2003-present, Ph.D. thesis advisor, Neurobiology & MSTP program
Hashir Hamza, 2004-present, Ph.D. thesis advisor, Neurobiology
Christa Wheelan, 2004-present Ph.D. thesis advisor, Neurobiology & MSTP program
Valerie Bomben, 2005-present Ph.D. thesis advisor, Neurobiology

Graduate Students (Dissertation Committees)

Jay A. Gottfried, New York University, Basic Medical Science Program, graduated 1996
Fuming Zhou, UAB, Dept. Physiology, graduated in 1995
Matthew Beckman, UAB, Medical Science Program, candidate
Mary Carwile, UAB, Department of Physiology, candidate
Susanne Reuven, UAB, Department of Cell Biology, candidate
Vijayakrishna K. Gadi, UAB, Department of Physiology, candidate
Gregory McGillem, UAB, Vision Sciences, candidate
Susan Cambell, UAB, Neurobiology
Erin Rodgers, UAB, Cell Biology
Dacia Hunton, UAB, Cell Biology
Constance Fears, UAB, Cell Biology
Kimberly Gerrick, UAB, Cell Biology

Postdoctoral Fellows:

Edward O'Connor, Ph.D. 1992-1994, Postdoctoral advisor
Mary-Louise Roy, Ph.D. 1992-1994, Postdoctoral advisor
Angelique Bordey, Ph.D., 1995-2000, Postdoctoral advisor
Natalia Zhidkova, Ph.D., 1997-1998, Postdoctoral advisor
Susan Shades, Ph.D., 1998-2000, Postdoctoral advisor
Flora Love, Ph.D., 2000-2003, Postdoctoral advisor
Joon Chung, Ph.D., 2001-present, Postdoctoral advisor
Susan Lyons, Ph.D., 2003-present, Postdoctoral advisor
Michelle Olsen, Ph.D., 2005-present. Postdoctoral advisor
Haruki Higashimori, Ph.D., 2005-present, Postdoctoral advisor

Visiting Scientist

Damir Janigro, Ph.D. Associate Professor, Department of Neurosurgery,
The University of Washington 09/95-10/95
Collaborator "Modulation of inwardly rectifying K⁺ channels"

Elizabeth Theriault, Ph.D., Assistant Professor, Playfair Neuroscience
Unit, The University of Toronto 08/96
Collaborator "Protection from spinal cord injury by activation of mGLUR"

Inventions and Patents

- 1.) "Novel method of diagnosing and treating gliomas", US# 60/009,283 U.S. patent application filed on 12/27/95, patent issued 4/01/98 docking # FY96-0021,.
- 2.) "Agonists of Metabotropic Glutamate Receptors and Uses Thereof", US#6,013,672 Application # 08/993,760, patent issued 01/11/00.

- 3.) "Uses of phenylglycine derivatives", D6177, patent issued 3,6,2001 US#6,197,820
- 4.) "Diagnosis and treatment of neuroectodermal tumors", D6218, patent application pending, filed 5/27/99
- 5.) "Chlorotoxin inhibition of cell invasion, cancer metastasis, angiogenesis and tissue remodeling", D6410, filed 06/26/2001.