

CURRICULUM VITAE

Conrad Earl Johanson

PERSONAL INFORMATION

Birth place: Brockton, Massachusetts
Citizenship: United States of America
Family: Married to Nancy L. Williams
Children: Traci, Brent, Julie, Lance, Holly
Home Address: 40 Sycamore Drive
East Greenwich, Rhode Island 02818
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BUSINESS

Address: Department of Neurosurgery
Alpert Medical School at Brown University
Rhode Island Hospital
593 Eddy Street,
Providence, Rhode Island 02903

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E-Mail Address: Conrad_Johanson@Brown.edu
www.brown.edu/Divisions/Medical_School/andera/person.php?id=860

Undergraduate: B.A., Chemistry, 1965
Eastern Nazarene College, Quincy, MA

Honors and Awards
Dieckhoff Scholarship Award

Graduate: Ph.D., Physiology, 1970
University of Kansas Medical School,
Department of Physiology, Kansas City, KS, 1965-1970

Awards
N.I.H. Predoctoral U.S.P.H.S. Traineeship

Postgraduate: Postdoctorate in Pharmacology,

University of Utah School of Medicine,
Department of Pharmacology, Salt Lake City, UT, 1970-1973

Awards

N.I.H. Postdoctoral U.S.P.H.S. Traineeship
Master of Arts *ad eundem*, Brown University

ACADEMIC AND HOSPITAL APPOINTMENTS

Professor Emeritus

Department of Neurosurgery, Program in Neurosurgery,
Brown Medical School, Providence, RI, 2010 to present

Professor Department of Neurosurgery, Program in Neurosurgery,
and Department of Physiology, Brown Medical School,
Providence, RI, 1985 to 2010

Associate Professor

Department of Pharmacology, University of Utah School of Medicine
Salt Lake City, UT, 1979 to 1985

Assistant Professor

Department of Pharmacology, University of Utah School of Medicine
Salt Lake City, UT, 1974 to 1979

Research Assistant Professor

Department of Anesthesiology, University of Utah School of Medicine
Salt Lake City, UT, 1978 to 1985

Instructor Department of Pharmacology, University of Utah School of Medicine
Salt Lake City, UT, 1973 to 1974

Director of Cerebrospinal Fluid Laboratory

Department of Neurosurgery, Rhode Island Hospital, 1985-2000

Director of Neurosurgery Research

Rhode Island Hospital, Providence, RI, 2001-2010

COMMITTEES

University of Utah:

Graduate Training Committee for Ph.D. program in Pharmacology, 1977-85

Review of Tenured Faculty Subcommittees, 1981 to 1985

Departmental Seminar Committee, Chair, 1979 to 1980

Doctoral Preliminary Examination Committees, service on 15 committees, 1975-84

Thesis Committees (12 committees, 6 as chairman), 1977 to 1985

Prahl Memorial Committee for Graduate Research, 1980 to 1984

Nominations Committee for University Senate, 1978

Brown University and Rhode Island Hospital:

Department of Neurosciences Executive and Promotions Committee, 1988-2010

Faculty Search Committees, 1986-2010

Member, Graduate Program in Physiology, Pharmacology and Artificial
Organs-Biomaterials, 1989-to present

Research Task Force (Faculty Issues), R.I. Hospital, 1992-1993

Lifespan Research Advisory Committee, 1996-2005

Annual Hospital Research Celebration Planning Committee, 1996-2010

Advisory Committee for Trauma-Sepsis-Inflammation Training Grant, 1998-present

Academic Committee, Department of Clinical Neurosciences (Neurosurgery)

Chair of Planning Committee for 2008 Meeting at Brown University, in Providence,
of the Society for Research on Hydrocephalus and Spina Bifida

Committee on Faculty Equity and Diversity, Brown University, 2008-9

Industry/Bio-Technology, Societies and Foundations:

Eunoe Inc., Palo Alto, CA and Stanford University: Advisory Committee on CSF,
2005

Omentum Project Advisory Committee, Alzheimer's Study, U. of California, Irvine

Intracranial Hypertension Research Foundation, Vancouver, WA; Advisory Board,
2005 to present

Society for Research on Hydrocephalus and Spina Bifida, Executive Committee,
2006-2010

Pudenz Award Committee for Excellence in CSF and Hydrocephalus Research
(Medtronic), 2008 to present

International Society for Hydrocephalus and CSF Disorders- Member of
International Advisory Board, 2009 to present

Hydrocephalus Association (San Francisco)- member of Research Advisory Board
and reviewer of grant applications, 2009 to present

UCB Biosciences, Neurotoxicology of the choroid plexus and CSF, Raleigh, NC,
2012

PROFESSIONAL AFFILIATIONS AND SOCIETY MEMBERSHIPS

Society for Neuroscience and American Physiological Society

American Society for Pharmacology and Experimental Therapeutics

International Society for Developmental Neuroscience

International Society for Hydrocephalus and Cerebrospinal Fluid

International Society for Cerebral Blood Flow and Metabolism

American Society for Neurochemistry

Society for Research on Hydrocephalus and Spina Bifida

Intracranial Hypertension Research Foundation

International Association of Restoratology

Global College of Neuroprotection and Neuroregeneration

OTHER PROFESSIONAL ACTIVITIES

National Institutes of Health, NINCDS Study Section Ad Hoc Reviewer for Neurological Sciences 1 and Neurology A Sections, (1983-88); and NINCDS Special Rev. Comm. (site visits). NHLBI Research Review Committee B (reverse site visit, 1994); Neurology B1, 1995; and the Cardiovascular and Renal Study Section; Consultant, National Institute on Aging, Gerontology Research Center, NIH

National Aeronautics and Space Administration (NASA): Member of Science Advisory Board, Johnson Space Center, Houston- Visual Impairment and Intracranial Pressure (VIIP), 2010; NASA Research and Clinical Advisory Panel (VIIP), 2011-16; VIIP Study Section, Chair (NASA Research & Education Support Services), March 2012; Reviewer, NASA NSBRI Study Section on Smart Medicine- Intracranial Pressure Assessments in Astronauts, Arlington, VA, March 2012

Reviewer for Grant Foundations: National Science Foundation; Veterans Administration; Amyotrophic Lateral Sclerosis Society; Hydrocephalus Research Foundation; March of Dimes; Philip Morris External Research Program; Medical Research Council of Canada; Medical Research Fund of Australia; PPP Healthcare Medical Trust (England); The Wellcome Trust (United Kingdom); Biotechnology and Biological Sciences Research Council (United Kingdom); Hydrocephalus Association (San Francisco); Alzheimer's Society (United Kingdom); Alzheimer's Association (United States)

Reviewer for University and Hospital Research Committees: University of Utah Research Committee; Rhode Island Foundation; Research Advisory Committee for Lifespan Hospitals; Brown-Tufts Center for Aids Research; Lifespan Hospital Departmental Pre-review system

Journal Referee, Field Editor or Associate Editor for:

<i>American Journal of Physiology</i>	<i>Journal of Neurochemistry</i>
<i>Aviation, Space and Environmental Medicine</i>	<i>Journal of Neurosurgery</i>
<i>Biochemical Pharmacology</i>	<i>Journal of Neuroscience</i>
<i>Biology of Reproduction</i>	<i>J. Pharmacology & Exper. Therapeutics</i>
<i>Brain Research</i>	<i>Life Sciences</i>
<i>Cancer</i>	<i>Neuroscience</i>
<i>Experimental Neurology</i>	<i>Neurosurgery</i>
<i>In Vitro Cellular & Developmental Biology</i>	<i>Peptides</i>
<i>Insect Biochemistry</i>	<i>Pharmaceutical Research</i>
<i>Journal of Applied Physiology</i>	<i>Proc. Natl. Acad. Science</i>
<i>Journal of Biological Chemistry</i>	<i>Proc. Soc. Exp. Biol. & Medicine</i>
<i>Journal of CBF and Metabolism</i>	<i>Science</i>
<i>Journal of Clinical Investigation</i>	<i>Shock</i>
<i>Journal of Experimental Zoology</i>	<i>J. Pathology & Experimental Neurology</i>
<i>Cellular and Molecular Neurobiology</i>	<i>Hypertension</i>
<i>Neuroscience Letters</i>	<i>The Anatomical Record</i>
<i>Endocrinology</i>	<i>Journal of Cell Science</i>
<i>European Journal of Neuroscience</i>	<i>Hippocampus</i>
<i>Drug Development and Ind. Pharmacy</i>	<i>Journal of Pineal Research</i>

Neuropsychopharmacology
Biochimica et Biophysica Acta
Frontiers in Bioscience
Anatomical Record
Advanced Drug Delivery Reviews
Journal of Gerontology
Acta Physiologica
Physiology
Translational Psychiatry

Diabetes
Experimental Brain Research
Comparative Biochemistry & Physiology
Neurobiology of Disease
Fluids and Barriers of the CNS
Int. J. Neuroprotection & Neuroregen.
Neuroendocrinology
Journal of Alzheimer's Disease
Journal of Neurorestoratology

Community activities related to profession:

Have conducted numerous science demonstrations for elementary and high school students; organized scientific activities for Scout groups; chaired a long-range planning committee for educational reform in a private school; have been a National Science Foundation reviewer for the National Science Scholars Program (college scholarships); and have presented talks to the Alzheimer Foundation of Rhode Island as well as regional support groups for families of hydrocephalus and dementia patients.

POSTGRADUATE HONORS AND AWARDS

Recipient of Research Career Development Award, National Institute of Neurological and Communicative Disorders and Stroke, NIH, 1977 to 1982

Recipient of Tenure Award, Department of Pharmacology, University of Utah School of Medicine, 1981

Frontiers of Science and Technology, Marquis Who's Who, Inc., 2nd ed., 1985

Distinguished Alumnus Award for Professional Achievement, E. Nazarene College, Quincy, MA 2001

Fellow, International Society for Complexity, Information and Design, Princeton, NJ, 2002

Distinguished Alumnus Award, Lexington Christian Academy, Lexington, MA 2005

Recipient of the Robert Pudenz Award for Excellence in CSF and Hydrocephalus Research, 2005

RESEARCH PRESENTATIONS: SEMINARS, LECTURES & SYMPOSIA

University of Colorado, Pfizer Symposium on Drugs and the Developing Brain, Denver, CO, 1972

Massachusetts General Hospital, Department of Anesthesia, Boston, MA, 1980

University of North Carolina, Department of Neurology, Chapel Hill, NC, 1981

Dartmouth Medical School, Department of Physiology, Hanover, NH, August 1981

Texas A & M University, Department of Medical Pharmacology and Toxicology, College Station, TX, 1983

National Institute on Aging, Laboratory of Neurosciences, Baltimore, MD, 1983

University of Texas, Southwestern Medical School, Dept. of Physiology, Dallas, TX, 1984

University of Kentucky, Department of Neurology, Lexington, KY, 1984

University of Oklahoma, Department of Surgery, Oklahoma City, OK, 1984

University of California, Department of Physiology-Anatomy, Berkeley, CA, 1985

Case Western Reserve University, Visiting Scientist in the Department of Neurology, Cleveland, OH, 1985

University of Massachusetts, Department of Pharmacology, Worcester, MA, 1987

Albany Medical College, Union University, Department of Pharmacology, Albany, NY, 1988

The George Washington University Medical Center, Department of Anatomy, Washington, DC, 1988

VIIth Symposium on Intracranial Pressure and Brain Injury, University of Michigan, Ann Arbor, MI, 1988

University of Florida College of Medicine, Department of Pharmacology and Therapeutics, Gainesville, FL, 1988

The Johns Hopkins University, Department of Environmental Health Sciences, Neurotoxicology Program, Baltimore, MD, 1988

Michigan State University, Department of Physiology, East Lansing, MI, 1988

University of Toronto, Department of Radiology, Toronto, Canada, 1988

University of Iowa, Department of Internal Medicine, Iowa City, IA, 1988

Brown University School of Medicine, Neurology Grand Rounds, 'Choroid Plexus', 1990

Harvard Medical School, Depts. of Neurosurgery and Neuropathology, Boston, MA, 1990

Pennsylvania State University, Depts. of Neurosurgery and Cellular and Molecular Biology, Hershey, PA, 1991

Brown University, Department of Physiology & Biophysics, 'Cotransport of Sodium and Chloride by Choroidal Epithelium', Providence, RI 1991

Symposium on 'Choroid Plexus as a Multifunctional Organ', American Society for Neurochemistry, Richmond, VA, 1993

Symposium on 'The Cerebrospinal Fluid', Oklahoma Center for Neurosciences, Oklahoma City, OK, 1993

Winter Conference on Brain Research, 'Choroid Plexus and Cerebrospinal Fluid: Maintaining Chemical Homeostasis', Snowbird, UT, 1994

Glaucoma Catalyst Meeting for Leading Scientists, Tucson, AZ, 1996

Brown University, Dept. of Physiology & Pharmacology, 'Neuropeptides and Growth Factors in Choroid Plexus and Cerebral Spinal Fluid', Providence, RI, 1996

Columbia University, Division of Environmental Sciences, 'Various Secretory Functions of the Choroid Plexus', New York, NY, 1996

Alzheimer's Association, Rhode Island Chapter, 'Choroid Plexus-CSF Function in Aging and Alzheimer Brains', Warwick, RI, 1996

University of South Dakota, Dept. of Physiology and Pharmacology, 'Vasopressin Effects on Choroid Plexus Transport and Epithelial Ultrastructure', Vermillion, SD, 1996

University of Iowa, Department of Anesthesia, 'Neuropeptide and Growth Factor Effects upon the Choroid Plexus-CSF System', Iowa City, IA, 1996

Albert Einstein College of Medicine, Department of Cell Biology, 'Neuropeptide Modulation of Choroidal Epithelium and CSF Secretion', Bronx, NY, 1997

Hydrocephalus-Glaucoma Catalyst Meeting, Co-organizer of Conference, Montreal, Canada, 1997

Lund University, Department of Molecular Neuroscience, 'Vasopressin and Angiotensin II Effects on the Choroid Plexus-CSF System', Lund, Sweden, 1997

University of South Carolina School of Medicine, Department of Ophthalmology, 'Fibroblast Growth Factor-2 and Blockage of Cerebrospinal Fluid Drainage Pathways'. Columbia, SC, 1997

Texas Tech University, Department of Pharmaceutical Sciences, School of Pharmacy. 'Vasopressin and Angiotensin II Effects at the Blood-CSF Barrier: Modulation of Choroid Plexus Blood Flow, Ion Transport, and CSF Secretion', Amarillo, TX, 1998

Cerebrovascular Biology 98 International Conference, Platform presentation: Recent Advances in Blood-CSF Barrier Research- Overview of the Cerebral Vasculature and the Blood-Brain Barrier, Gleneden Beach, OR, 1998

Food and Drug Administration Conference on Shunt Technology: Challenges and Emerging Directions. Platform presentation: 'Growth Factor Induction of Normal Pressure Hydrocephalus', Bethesda, MD, 1999

Summer Peptide Conference, 'Vasopressin and Fibroblast Growth Factor Modulation of CSF and Brain Fluid Dynamics', Key West, FL, 1999

Drew University, Designing Drugs to Minimize or Maximize Exposure to the Brain, Conference at the Residential School on Medicinal Chemistry, 'Overview of the Physiology of the Blood Brain and Blood-Fluid Barriers to Drug Delivery into the Central Nervous System', Princeton, NJ, 1999

Gordon Research Conference on the CNS Barriers Development of the Choroid Plexus-CSF System in the Mammalian Brain: An Overview, Tilton, NH, 1999

Graduiertenkolleg Westfälische Wilhelms-Universität Münster, Co-localization of Arginine Vasopressin and Basic Fibroblast Growth Factor in the Choroid Plexus Epithelium: Possible Role in Brain Fluid Homeostasis, Münster, Germany, 1999

Merz Company, 'The Choroid Plexus as a Drug Transport Interface and Pharmacologic Target for Modulating CSF-Brain Functions', Frankfurt, Germany, 1999

Hydrocephalus Support Group and Wade Hydrocephalus Center, Basic Research on the Cerebrospinal Fluid System: How Does It Help to Understand Clinical Problems With Hydrocephalus? Orlando, FL, 2000

Texas Tech University, Departments of Pharmacy Practice and Pharmaceutical Sciences, School of Pharmacy. Growth Factor Modulation of CSF-Brain Functions: Basic and Clinical Considerations. Amarillo, TX, 2000

Eastern Nazarene College, Department of Biology, 'Growth factor expression in the choroid plexus', Quincy, MA, 2000

Institut National de la Sante' et de la Recherche Medicale, Unite de neuro-pharmaco-nutrition, Hopital Fernand Widal, 'Specialized functions of the choroid plexus transport systems: Implications for the global economy of the CSF and brain', Paris, France, 2000

Inserm Conference- Focus on Choroid Plexus: Physiology, Pharmacology and Physiopathology. Chair of section: 'Choroid plexus and brain homeostasis'. Lyon, France, 2000

Emory University, Society for Research into Hydrocephalus & Spina Bifida, 44th Annual Meeting, 'Growth factor excess in the CNS disrupts the normal flow of CSF and brain extracellular fluid: Implications for hydrocephalus'. Atlanta, GA, 2000

Chemistry Reunion Dinner, 'Neuroscience Research 2000: Opportunities and Challenges', Eastern Nazarene College, Quincy, MA, 2000

Institute for Child Development, University College, Neurosciences & Mental Health Theme Seminar: 'The Choroid Plexus-CSF System: Developmental, Pharmacologic and Neuroendocrine Considerations', London, UK, 2001

King's College, IVth International Conference, Cerebral Vascular Biology, 'CNS Endothelial and Epithelial Barriers: Cell and Molecular Biology', Cambridge University, Cambridge, England, 2001

University of California, Davis, Department of Human Physiology, 'Fluid secretion by choroid plexus: Role of the apical NaK2Cl cotransporter', Davis, CA, 2001

University of Uppsala, 45th Annual Meeting of Society for Research into Hydrocephalus & Spina Bifida, 'Reaction of choroid plexus and pituitary to fluid imbalance: Altered expression of FGF2', Uppsala, Sweden, 2001

Massachusetts Association of Science Supervisors- 33rd Annual Meeting: Windows on the New Century. Presented lectures on: 'Teaching neuroscience to high school students', and 'Physiology of brain fluids', Worcester, MA, 2001

Brown University, Neurosurgery Grand Rounds, 'Neurosurgery Research Program at Rhode Island Hospital', Providence, RI, 2001

Rhode Island Hospital, Renal Grand Rounds, Division of Renal Diseases, 'NaK2Cl cotrans- port and CSF formation by choroid plexus, the kidney of the brain', Providence, 2002

Northwestern University Feinberg School of Medicine and Children's Memorial Hospital, Third International Hydrocephalus Conference, What's New in 2002? 'Modulation of CSF Dynamics by Growth Factors and Peptides: Implications for Hydrocephalus', Chicago, IL 2002

Brown Medical School, Neurosurgery Grand Rounds, 'Translational Research Prospects in Clinical Neurosciences', Rhode Island Hospital', Providence, RI, 2002

University Hospital Gasthuisberg, Katholieke Universiteit Leuven, 'Are there neuroendocrine-type cells in the choroid plexus?' Department of Paediatrics- Child Neurology, Leuven, Belgium, 2002

Wade Hydrocephalus Center, 'Role of Ion Transport Proteins in Brain Fluid Balance', Orlando, FL, 2002

Brown Medical School, Neurosurgery Grand Rounds, 'CSF and Hydrocephalus Models: NaK2Cl Cotransport Expression in the HTX rat', Rhode Island Hospital', Providence, RI, 2002

King's College, University of London, Second International Workshop on Choroid Plexus, 'Neuropeptides, Na-K-Cl Co-Transport and Choroid Epithelial Dark Cells: Impact on CSF and Hydrocephalus', London, UK, 2003

Texas Tech University, College of Pharmacy, Vth International Conference on Cerebral Vascular Biology, Chair of Session on 'Physiology and Pathophysiology of Specialized Barrier Components', Amarillo, TX 2003

University of Maryland School of Medicine, 47th Annual Meeting of Society for Research on Hydrocephalus & Spina Bifida, 'Physical and Biochemical Reactions of the Choroid Plexus to High-Pressure Hydrocephalus,' Baltimore, 2003

University of Dublin, Trinity College, 48th Annual Meeting of Society for Research on Hydrocephalus & Spina Bifida, 'The changing choroid plexus-CSF system in Alzheimer's disease', Dublin, Ireland, 2004

Medtronic, Inc., 'Brown Neurosurgery Research in Cerebrospinal Fluid Dynamics: Progress, Projects and Goals,' Santa Barbara, CA, 2004.

Fidelity Foundation, site visit to Brown; 'Disrupted Functions of the Blood-Brain and Blood-CSF Barriers in Alzheimer's Disease: A New Paradigm to Evaluate β -Amyloid Retention in Brain, Providence, RI, 2005

Society for Research on Hydrocephalus and Spina Bifida, Aging rat brain: A model for analyzing interactions among CSF dynamics, ventriculomegaly and the beta-amyloid retention of Alzheimer's disease. Barcelona, Spain, 2005.

The Global College of Neuroprotection and Neuroregeneration Annual Conference, Neuroprotection by the choroid plexus-CSF system: Its alteration in Alzheimer's disease. Invited platform speaker, Innsbruck, Austria, 2005.

University of Wisconsin, American Society For Neurochemistry, Linkage of FGF2 with AVP in brain fluid homeostasis: Role of the choroid plexus. Madison, WI, 2005.

Ohio State University, Biomedical Engineering and Clinical Medicine in Basic Neural Hydrodynamics Research, Keynote address: Disruption of Choroid Plexus-CSF Homeostatic Systems in Aging and Alzheimer's Disease. Columbus, OH 2005.

University of Michigan, International Symposium on Brain Edema and Tissue Injury, Is the choroid plexus involved in regulating ICP? Putative natriuretic peptide modulation of CSF formation. Ann Arbor, MI, 2005.

- 5th Annual Alzheimer's Research Forum- Enabling Technologies for Alzheimer's Research: 'Regulatory Systems at the Blood-CSF Barrier', Bar Harbor, Maine, 2005.
- University of Aarhus, Institute of Anatomy, Neuropeptides, NKCC1 cotransport and choroid epithelial neuroendocrine cells: Impact on CSF and hydrocephalus. Aarhus, Denmark, 2006.
- Twelfth Annual Neuro-Oncology and Blood-Brain Barrier Disruption Consortium Meeting: Delivery and Neurotoxicity Issues in CNS Malignancy, 'Chemotherapy Delivery to CSF,' Sun River, Oregon, March 2006.
- Society for Research into Hydrocephalus and Spina Bifida, 50th Anniversary Scientific Meeting, Expression of the Beta-Amyloid Transporter, LRP-1, in Aging Choroid Plexus: Implications for the CSF-Brain System in NPH and Alzheimer's disease, Cambridge, UK, September 2006.
- International Brain Conference, University of Central Florida: 'Aging and CSF Homeostasis: Role of Choroid Plexus'. Orlando, FL, January 2007.
- The Science of Prevention: New Insights into the Importance of Intra-CSF Prophylaxis- 'Novel strategies and targets for intra-CSF chemoprophylaxis involving the choroid plexus, vascular endothelium and growth factors', St. Thomas, Virgin Islands, February 2007.
- Fourth Annual Meeting, The Global College of Neuroprotection & Neuroregeneration, 'Normal pressure hydrocephalus: Is it part of the continuum from aging to Alzheimer's disease?' Garmisch-Partenkirchen, Germany, March 2007
- Neurology Grand Rounds. 'Disrupted Cerebrospinal Fluid Circulation and Dementia', Presented to NGR at Rhode Island Hospital, Providence RI, June 2007.
- 51st Annual Meeting of the Society for Research on Hydrocephalus and Spina Bifida, Chair of Session on *Shunts*. Heidelberg, Germany, May 2007.
- Medtronic Product Platform Meeting, 'CSF formation and reabsorption: Can CSF peptides and growth factors usefully complement shunting systems for more effective management of hydrocephalus?' San Francisco, CA, July 2007
- BrainChild Foundation Workshop- Cytopathology of Hydrocephalus: 'Injuries to, and homeostatic adjustments by, choroid plexus in hydrocephalus, aging and Alzheimer's disease: How can CSF-brain be better managed at all life stages?' University of Utah, Salt Lake City, October 2007.
- Eastern Nazarene College, Dept. of Chemistry Seminar- 'The choroid plexus-CSF system: Its impact on brain development, metabolism and repair', Quincy, MA November 2007.
- Fifth Congress of the Global College of Neuroprotection and Neuroregeneration, Chairperson of Plenary Session II, 'Neurodegeneration and Neuroregeneration', Bucharest, Romania, March 2008.
- 52nd Annual Meeting of the Society for Research on Hydrocephalus and Spina Bifida, meeting organizer, Brown University, Providence, RI, June 2008.

Gordon Research Conference, 'Differential expression of LRP-1 at the aging blood-CSF and blood-brain barrier: Implications for A-Beta peptide clearance from CNS.' Tilton, NH, June 2008

Intracranial Hypertension Research Foundation, Patient Conference, 'Cerebrospinal Fluid: The Incredible Voyage', Houston, TX June 2008

Hydrocephalus 2008, Co-Chair of Session on 'Brain Biomarkers and Brain Metabolism in Hydrocephalus', Hannover, Germany, September 2008

8th Congress of the Global College of Neuroprotection and Neuroregeneration, Co-Chair of Session 1: Blood-Brain Barrier and Brain Edema, Vienna, Austria, March 2009

University of Goteborg, Neurology Department, Sahlgrenska Institute, 'Ageing of the choroid plexus-CSF system: Implications for NPH and Alzheimer's disease', Goteborg, Sweden, March 2009

Pediatric Research Colloquium, Women and Infants Hospital, 'Functional significance of the choroid plexus and blood-brain barrier in hydrocephalus', Providence, RI, April 2009

Grand Rounds Neurology, RI Hospital, 'Choroid plexus, amyloid, aging and NPH', Providence, RI, April 2009

Memory Clinic, Lifespan, 'Dyshomeostasis of brain fluids in aging: Implications for neurodegeneration and cognitive losses', Providence, RI, May 2009

Animal Model Pre-Conference at SRHSB, 'Molecular, cognitive and epigenetic profiling for aging models: Implications for hydrocephalus and neurodegeneration', Belfast, Ireland, June 2009

Society for Research on Hydrocephalus and Spina Bifida, Co-Chair of Session #2: 'Hydrocephalus', Belfast, Ireland, June 2009

NIH-Sponsored Workshop on Hydrocephalus, moderator of breakout session: 'The Influence of Cerebrospinal Fluid Circulation on Brain Function in Hydrocephalus'. Baltimore, MD, September 2009

Hydrocephalus 2009, Chair of Sessions: 'Anatomy, Physiology, and Pathophysiology of CSF Circulation'; 'Animal Models; Biomarkers and Metabolic Monitoring'; and 'Injury and Recovery Mechanisms'. Baltimore, MD, September 2009

College of Pharmacy, University of Rhode Island, MiniNeuroscience Symposium, 'Aging of the blood-brain barrier and CSF system: Does compromised clearance of amyloid peptide lead to cognitive losses?' Kingston, RI, December 2009

Department of Neurosurgery, Barrow Neurological Institute, 'Definition and classification of hydrocephalus', Phoenix, AZ, January 2010

Universidad Austral de Chile, Institute of Anatomy, Histology and Pathology, Lectures on 'Adult normal pressure hydrocephalus: An intermediate state between aging and Alzheimer's disease?' and 'Neuropeptides, Na-K-Cl co-transport and choroid epithelial 'dark' cells: Impact on CSF and hydrocephalus', Valdivia, Chile, January 2010

Department of Neurosurgery, Grand Rounds lecture, 'Experimental Modeling of NPH vs. Aging and Alzheimer's Disease', University of Louisville Medical School, Louisville, KY, June 2012

CSF and Neurotrauma Symposium, 'Putative neuroendocrine regulation of intracranial pressure: Implications for the intracranial hypertension of spaceflight' & 'Therapeutic attempts to modulate the effects of ependymal denudation and subcommissural organ impairment and modulate trophic factor delivery in hydrocephalus', University of Birmingham, Edgbaston, United Kingdom, July 2012

Universidad Austral de Chile, Institute of Anatomy, Histology and Pathology, 'Altered choroid plexus, CSF and ependymal wall in aging and brain injury: Relations to neurogenesis, regeneration and cognition', Valdivia, Chile, March 2012

Animal Models in Hydrocephalus Research, 'Augurin, a choroid plexus-CSF hormone for restoring brain homeostasis after injury: Implications for hydrocephalus', Satellite conference at the SRHSB annual meeting, York, England, July 2012

Smart Medical Systems and Technology: Unraveling VIIP Etiology- An Exploratory Symposium- 'Neuropeptide regulation of choroid plexus-CSF dynamics: Emerging role for central atrial natriuretic peptide', Houston, TX, February 2014

VII Annual Conference of International Association of Neurorestoratology, 'Agrin expression level in the blood-brain barrier affects the content of beta-amyloid in the brain of transgenic mice', Mumbai, India, March 2014

Department of Neurology, Rhode Island Hospital, 'Breakdown of blood-brain and blood-CSF barriers disrupts the CNS in aging and Alzheimer's: Pathophysiology, diagnostics and repair potential', Providence, RI, 2014

RESEARCH GRANTS

Research Career Development Award, National Institute of Neurological and Communicative Disorders and Stroke, 1977-1982

Ontogeny of Homeostatic Transport in Choroid Plexus, NINDS R01 Research Grant, C.E. Johanson, P.I., 1977-1980

Maturation of CSF Secretory Mechanisms, NINDS R01 Research Grant, C.E. Johanson, P.I., 1980-83

Acid-Base Transporters and pH in the Immature CNS, NINDS R01 Research Grant, C.E. Johanson, P.I., 1983-86

Development of Choroid Plexus-CSF Transport Systems, NIH NINCDS RO1 Research Grant, C.E. Johanson, P.I., 1989-1995

Choroid Plexus, Growth Factors, Aging and Injury. NIH NINDS RO1 Research Grant, C.E. Johanson, P.I., 1995-1999

Peptide Regulation of the Choroid Plexus-CSF System. NIH NINDS RO1, C.E. Johanson, P.I., 1999-2004

Age-Related Decrease in A-Beta Peptide Clearance Pathways: CSF and BBB, NIH NIA R01 Research Grant, C.E. Johanson, P.I., 2007-2011.

Research Training in Pharmacological Sciences, NIH Training Grant, research supervisor, 1974-1984

Neuropharmacology and Neurochemistry Program Project, research instructor, 1973-5

Training Grant for Post-Clinical Anesthesia Training, National Institutes of Health, research advisor, 1980-85

Pathophysiological Responses to Injury, NIH, National Institute of General Medical Sciences, Institutional Postdoctoral NRSA (T32) M. Epstein, P.I.; C.E. Johanson, Co-P.I., 1990-1992

Trauma, Sepsis and Inflammation National Institute of General Medical Sciences Trauma Training Grant, I. Chaudry, P.I., C. Johanson, research supervisor, 1999-2002

Trauma and Inflammation Research Training Grant, National Institute of General Medical Sciences Trauma Training Grant, J. Albina, P.I., C. Johanson, research supervisor, 2010-14

Apolipoprotein E, amyloid-beta, and blood-brain barrier permeability in Alzheimer disease, K08, National Institutes of Health, 2006-9, J. Donahue, P.I., and C. Johanson, mentor.

Biomarkers for Drug Targeting in Alzheimer's Disease, American Health Assistance Foundation, A. Baird, P.I., and C. Johanson, Co-P.I., pending.

Aggrin, Amyloid and Alzheimer's Disease, Veterans Administration, C. Johanson, P.I. and E. Stopa, co-investigator, pending.

National Science Foundation:

Multi-User Equipment Grant, National Science Foundation, 1979-1980

Private Foundations:

Biochemical Control of CSF Production, March of Dimes Foundation, M. Epstein and C. Johanson, Co-P. I., 1985-1988

Effect of Phenytoin on the Transport and Distribution of Sodium and Potassium Between Various Compartments in the Central Nervous System, Epilepsy Foundation of America, C. Johanson, P.I., 1975-1976

Microdialysis of Cerebrospinal Fluid from the Cisterna Magna. Grass Foundation, C.E. Johanson, P.I., 1990-1993

Serotonin Effects on Chloride Transport by Choroid Plexus, Grass Foundation, C.E. Johanson, P.I., 1994

Cystatin C and TUNEL Immunostaining in Spinal Cord in Amyotrophic Lateral Sclerosis, George Robinson Foundation, C.E. Johanson, P.I., 1996-97

Growth-factor Induced Hydrocephalus in a Transgenic Alzheimer Mouse Model, Alzheimer's Association, C. Johanson and E. Stopa, co-principal investigators, 2004-7

Novel Neurobiological Interventions for the Treatment of Hydrocephalus,
Hydrocephalus Association, San Francisco, P. McAllister, P.I., E. Rodriguez and C.
Johanson, Co-P.I., 2012-13

Corporations:

Minimally-Invasive and Metabolic Models of Hydrocephalus, Medtronic Neurologic
Technologies, C. Johanson and J. Duncan, co-principal investigators, 2006-7.

Local Funding Sources:

*Protection of the pH of the Extracellular Fluid of the Brain During Systemic Metabolic
and Respiratory Acidosis: The Role of the Choroid Plexus*, C. Johanson, P.I., Dean's
Research Fund, University of Utah, 1976-1977

Physiological Characteristics of the Cerebrospinal Fluid Secretory Process,
C. Johanson, P.I., Dean's Research Fund, University of Utah, 1974-1975

Immunohistochemical Analyses of ALS Brains, Brown University UTRA collaborative
study with Jinn-Wien Teng, 1998.

RESEARCH INTERESTS AND SUPERVISION

The *Cerebrospinal Fluid Research Laboratory* is dedicated to investigating the following aspects of central nervous system physiology and biochemistry: regional analysis of developmental changes in blood-brain and blood-CSF barrier permeability and transport; neurohormonal regulation of cotransport and antiport mechanisms in the choroid plexuses; comparative pharmacology of epithelial systems that secrete transcellular fluids; functional relationships among choroid cellular physiology, blood flow and CSF formation; effects of growth factors on extracellular fluid dynamics and ventriculomegaly in the central nervous system; the pathophysiologic continuum of aging, normal pressure hydrocephalus and Alzheimer's disease; the deleterious effects of elevated intracranial pressure; and the modulation of choroidally-secreted peptides and hormones on periventricular neurogenesis and cognition.

Have served as Ph.D. thesis supervisory chairman at University of Utah to Q. Smith (1980), S. Burton (1982), R. Harbut (1983), V. Murphy (1984) and Q. Deng (1986).

Brown University Honors Thesis/ independent study project director for: A. Fowler, J. Sonnenblick, R. Yacavone, P. Budhijara, A. Linn, M. Vanorrsdall, M. Rahman, S. Moore, P. Chan, Y. Kang, M. Lebow, J. Teng, J. Andrews, J. Shin, Z. Chan, J. Oen, S. Lahajani, H. Nguyen, A. Kubal, A. Intrator, N. Sharma, T. Berzin, K. Jones, S. Soltman, J. Andreozzi, C. Deng, V. Paulino, M. Miller, L. Luo, I. Caralopoulos, C. Marcaccio, A. Juan, M. Boylan, and K. Vasudevan.

Research mentor at Brown Medical School to Neurosurgery and Neuropathology residents: D. Bairamian, M. Guglielmo, M. Mittler, C. Weaver, J. Donahue, and M. Park

University thesis examiner:

Ph.D theses- J. Melton, Dartmouth; N. Knuckey, University of Western Australia; N. Kronic, University of Toronto; J. Park, Brown University

Masters theses- S. Hasan, Kuwait University; D. Hahn, Brown University; C. Pascale, Rhode Island College, M. Miller, Brown University

TEACHING

My teaching experience has encompassed cerebral blood flow and metabolism; CSF hydrodynamics; CNS transport phenomena; blood-brain barrier techniques; extracellular fluid homeostasis; cell pH; developmental pharmacokinetics; ontogeny of transport enzymes; nutrient carrier systems; diuretics; autonomic agents; antihypertensive drugs; cardiac glycosides; local and general anesthetics; psychopharmacological agents; sulfonamide drugs; insulin/calciotropic hormones; etc.

University of Kansas (1968-1970):

Physiology 270: Graduate renal physiology

Physiology 271: Graduate cardiovascular and CNS physiology

University of Utah (1971-1985):

Pharmacology 601-602-603: Sophomore medical pharmacology

Pharmacology 791: Pharmacokinetics

Pharmacology 727: Neurochemistry

Pharmacology 721: Acid-base and electrolytes

Pharmacology Summer Courses (e.g., Food and Drug Administration pharmacology)

Brown University (1986-):

Basic Neuroscience Course (Program in Neurosurgery)

Cell Volume Regulation Seminar (Physiology Department)

Advanced Physiology BI 208: Peptides and Growth Factors

ARCHIVAL PUBLICATIONS IN REFEREED JOURNALS

Johanson, C.E. The effect of cerebrospinal fluid osmolarity on the clearance of urea and sucrose from the goat ventriculo-cisternal perfusion system. *Ph. D. Dissertation*, University of Kansas, University Microfilms, Order no. ADG71-13320, Ann Arbor, MI, 1970.

Johanson, C.E., Reed, D.J. and D.M. Woodbury. Active transport of sodium and potassium by the choroid plexus of the rat. *J. Physiol. (London)* **241**: 359-372, 1974.

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- Johanson, C.E.** and D.M. Woodbury. Penetration of C-14 barbital and C-14 antipyrine into the choroid plexus and cerebrospinal fluid of the rat. *Exper. Brain Res.* **30**: 65-74, 1977.
- Johanson, C.E.** and D.M. Woodbury. Uptake of C-14 urea by the in vivo choroid plexus-cerebrospinal fluid-brain system: Identification of sites of molecular sieving. *J. Physiol. (London)* **275**: 167-176, 1978.
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- Johanson, C.E.** Distribution of fluid between extracellular and intracellular compartments in the heart, lungs, liver and spleen of neonatal rats. *Biol. Neonate* **36**: 282-289, 1979.
- Smith, Q.R. and **C.E. Johanson**. Effect of ouabain and potassium on ion concentrations in the choroidal epithelium. *Am. J. Physiol. (Renal Fluid Elec.)* **238**: F399-F406, 1980.
- Smith, Q.R. and **C.E. Johanson**. Effect of carbonic anhydrase inhibitors and acidosis on choroid plexus epithelial cell sodium and potassium. *J. Pharmacol Exper. Ther.* **215**: 673-680, 1980.
- Johanson, C.E.** Permeability and vascularity of the developing brain: cerebellum vs. cerebral cortex. *Brain Res.* **190**: 3-16, 1980.
- Smith, Q.R., Woodbury, D.M. and **C.E. Johanson**. Uptake of Cl-36 and Na-22 by the choroid plexus-cerebrospinal fluid system: Evidence for active chloride transport by the choroidal epithelium. *J. Neurochem.* **37**: 107-116, 1981.
- Smith, Q.R., **Johanson, C.E.** and D.M. Woodbury. Uptake of Cl-36 and Na-22 by the brain-cerebrospinal fluid system: Comparison of the permeability of the blood-brain and blood-cerebrospinal fluid barriers. *J. Neurochem.* **37**: 117-124, 1981.
- Smith, Q.R., Pershing, L.K. and **C.E. Johanson**. A comparative analysis of extracellular fluid volume of several tissues as determined by six different markers. *Life Sci.* **29**: 449-456, 1981.
- Parandoosh, Z. and **C.E. Johanson**. Ontogeny of the blood-brain barrier to, and cerebrospinal fluid sink action on, C-14 urea. *Am. J. Physiol.* **243**: R400-R407, 1982.
- Smith, Q.R., Woodbury, D.M. and **C.E. Johanson**. Kinetic analysis of Cl-36, Na-22 and H-3 mannitol uptake into the in vivo choroid plexus-cerebrospinal fluid system: Ontogeny of the blood-brain and blood-CSF barriers. *Devel. Brain Res.* **3**: 181-198, 1982.
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