

CURRICULUM VITAE

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DATE OF BIRTH: April 30, 1942

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LANGUAGES: Fluently bilingual in French and English

EDUCATION:

1975 **M.D.**
Albany Medical College, Albany, New York, USA.

1971 **PhD Biomedical Engineering**
Rensselaer Polytechnic Institute, Troy, New York, USA
Supervisor: Dr. Gerald Moss, Professor of Biomedical Engineering
Thesis: "Quantitation of the contribution of the pentose phosphate pathway to brain glucose metabolism"

1967 **MSc Chemical Engineering**
University of Alberta, Edmonton, Alberta.

1964 **BSc Chemical Engineering**
Washington State University, Pullman, WA, USA

POSTGRADUATE AND OTHER EXPERIENCE

1979-1980 Postdoctoral Fellowship, Cerebral Metabolism
Montreal Neurological Institute and Hospital
Montreal, Quebec
Supervisor: Dr. H. Pappius

1976-1979 Resident in Neurology
Montreal Neurological Institute and Hospital
Montreal, Quebec.

1975-1976 Categorical Intern in Internal Medicine
Albany Medical Center Hospital, Albany, New York.

1967-1968 Instructor of Physics, grades XI and XII, Commission des Écoles
Catholiques de Montréal.

1965-1967 Research Engineer, Syncrude Canada Ltd., Edmonton.

CERTIFICATION

1984 Fellow of the American Board of Psychiatry and Neurology

1980 Fellow of the Royal College of Physicians & Surgeons of Canada Neurology
1979 Specialist Certificate, Neurology,
Corporation Professionnelle des Médecins du Québec

APPOINTMENTS

University and Institute

2001-present Co-Director
Heart & Stroke Foundation Centre for Stroke Recovery

2005-2008 Scientific Director
Heart & Stroke foundation Centre for Stroke Recovery

2001-present Director, Neuroscience Research Program,
Ottawa Health Research Institute
University of Ottawa

2000-present CEO and Scientific Director, Canadian Stroke Network

1992-present Cross appointment - Cellular and Molecular Medicine, University of Ottawa

1992-present Cross appointment to Graduate & Post Doctoral Studies,
Professor and Chair, Neurology, University of Ottawa

1992–2001 Director, Neuroscience Research Institute, University of Ottawa

1991-1992 Professor, Department of Neurology and Neurosurgery, McGill University

1984-1991 Associate Professor, Department of Neurology and Neurosurgery
McGill University

1982-1983 Assistant Professor, Department of Neurology and Neurosurgery
McGill University

1979-1982 Lecturer, Department of Neurology and Neurosurgery, McGill University

1975-1976 Adjunct Assistant Professor, Department of Biomedical Engineering
Rensselaer Polytechnic Institute, Troy, New York

Hospital

2001-present Senior Neurologist, The Ottawa Hospital

1992-2001 Division Head, Division of Neurology, The Ottawa Hospital

1987-1992 Consulting Neurologist, Jewish General Hospital, Montreal

1986-1992 Coordinator, Cerebrovascular Disease Research,
Montreal Neurological Institute

1986-1991 Coordinator, McConnell Brain Imaging Centre,
Montreal Neurological Institute

1985-1986 Associate Coordinator, McConnell Brain Imaging Centre
Montreal Neurological Institute

1984-1992 Associate Neurologist, Royal Victoria Hospital, Montreal

1984-1992 Associate Neurologist, Montreal Neurological Hospital

1979-1992 Consulting Neurologist, Montreal Chest Hospital, Montreal

1979-1983 Assistant Neurologist, Royal Victoria Hospital, Montreal

1979-1983 Assistant Neurologist, Montreal Neurological Hospital

RESEARCH

1. Research Activities

A. Laboratory Studies

My laboratory-based research activities were frequently guided by my clinical exposure to patients with neurological problems. During my neurology residency I was intrigued with Wernicke-Korsakoff patients who exhibit severe memory deficits in association with alcoholism and thiamine deficiency but show only very limited brain lesions. I began to study how systemic conditions result in focal brain damage. This led to an interest in stroke

because of the selective nature of the damage caused by ischemic deprivation. Specifically, my fundamental research activities have included:

Investigation of the biochemical, ionic, molecular and receptor events that determine cerebral vulnerability in metabolic deficiencies and in stroke.

My laboratory described the focal cerebral events that precede the appearance of pathological damage during prolonged deficiency of thiamine and B12. In these settings, and subsequently in focal ischemia, we correlated in time and space the glucose utilization and acidosis that precede the focal appearance of histologically evident damage, and showed how reversing the metabolic or vascular deficiency resulted in a specific sequence of reversal of these metabolic abnormalities, e.g. the appearance of alkalosis. The simultaneous measurement of pH and glucose utilization or blood flow was made possible by an innovation to autoradiography we developed involving sublimation of the pH marker after we had measured its radioactivity in brain.

Subsequently, I focused on cerebral ischemia and correlated hyperglycemia with the severity of focal acidosis in that setting. The association of hyperglycemia with worsened outcome in stroke was subsequently shown in stroke patients. Concepts derived from our animal studies guided studies we performed in stroke patients in the acute phase, using Positron Emission Tomography (PET). We correlated in these patients the anatomic-metabolic-functional parameters with focal cerebral blood flow changes and radiological/clinical outcomes. These studies allowed us to describe the ischemic penumbra in patients and show its progression in time and space. We went back to the animals and showed that cells in the penumbra region die by apoptosis while those in the ischemic core die by necrosis, and verified that as the ischemia becomes more prolonged necrosis sweeps over regions of apoptosis. This led us to investigate the molecular determinants of apoptotic cell death, and we showed that cyclin-dependent kinases trigger apoptosis and that inhibiting them leads to neuroprotection. We also reported that activating neuronal-apoptosis-inhibitory-protein (NAIP) provides neuroprotection in the setting of apoptotic cell death.

My laboratory also reported the dependence of calcium channel activity on focal blood flow changes, and in an ischemia-reperfusion model, showed the reversibility of calcium channel activation with associated tissue survival. In the stroke patients, we used PET to study the effect of administering nimodipine on metabolic function. Because clinical trials were contemplated with nimodipine, we studied and reported the kinetics of binding of nimodipine *in vivo*, which allowed us to suggest in various forums the enormous challenge this agent would face as a therapeutic modality.

Determination of conditions for neuroprotection against ischemic damage.

We first studied the relevance of interstitial glutamate levels on selective vulnerability in ischemia by correlating glutamate levels with activity of the calcium channels and histological outcome. This led us to investigate the concept of preconditioning, whereby short-duration ischemia, cortical depolarization, exposure to excitatory amino-acids or activation of calcium channels can improve the brain's resistance to subsequent ischemic damage. First, we described how short term global ischemia protects against subsequent focal ischemic damage, and then more thoroughly studied cortical spreading depression (CSD) as a laboratory tool to explain the preconditioning phenomenon and potentially use it therapeutically. We showed that CSD activated neurotrophic factors, decreased intra-ischemic glutamate levels, and down-regulated the transporters of the excitatory amino acids.

More recently, we showed a number of molecular correlates of CSD, including a recent submission describing the changes in inflammatory cytokine protein levels in brain and plasma following CSD. My research colleagues and I are currently directing our attention to the modulation of a limited number of factors thought to play a role in the neuroprotective cascade.

Investigation of post-stroke plasticity and means of enhancing it.

My laboratory showed the regulation of nestin expression in focal brain injury. This is one of several developmental proteins activated in focal ischemia. Our special attention to this protein arose from our correlation of its activation with the mobilization of stem cells following focal ischemia, confirming that nestin is an essential protein in stem cell guidance. We have also published on the effect of low-dose amphetamine in patients recovering from stroke. This work has implications for our understanding of recovery and therapy after stroke.

B. Clinical Research Activity

My clinical studies focused on understanding the cerebral vulnerability to ischemia. I used PET in stroke patients to distinguish brain regions where cells are committed to die from those where they are still alive but not functioning, and tested the effect of various therapies administered in the acute phase on brain metabolic and perfusion parameters and correlated these with clinical and radiologic outcomes. I also contributed to studies which confirmed that, in stroke associated with atrial fibrillation, Coumadin was the appropriate therapy to prevent stroke recurrence. More recently we reviewed the lessons learned from negative stroke trials in an article titled: "Toward Wisdom from Failure: Lessons Learned from Negative Stroke Treatment Trials and New Therapeutic Frontiers". In this article, we outlined the shortcomings shared by previous stroke trials and described the experiments needed to increase the likelihood of success in translational stroke studies, a theme subsequently confirmed by the STAIR group. More recently, using data from the Registry of the Canadian Stroke Network, we reported the effect of calcium channel blockers on the outcome from stroke and showed that they could be beneficial. We are currently studying, using the data set in the Registry, the influence of statins on vulnerability to bleeding in response to t-PA in stroke patients. Earlier this year, we submitted a proposal to our Institutional Review Board to evaluate the response of stroke patients to Granulocyte Colony Stimulating Factor, an agent which releases bone marrow stem cells into the circulation and which may accelerate recovery from stroke.

2. Changing the Approach to Stroke Research and Care in Canada and Beyond

In 1999 a number of my colleagues, both scientists and clinicians, asked me to lead an application to establish the Canadian Stroke Network (CSN). Although this was a very competitive process, we were successful and were awarded a term of seven years, at \$4.5M per year. I am the CEO and Scientific Director of the CSN. This organization brought together more than 100 scientists and clinicians to work collaboratively within a broad partnership that includes the academic research centres, the Heart and Stroke Foundation, industry and government. CSN's research falls within four themes: "Better Stroke Prevention", "Optimizing Acute Stroke Care", "Reducing Cell Death and Minimizing Stroke Damage", and "Enhancing Brain Repair and Functional Recovery Post-Stroke". In addition to research and partnership development around stroke, the CSN accepted the mandate of preparing the future generation of stroke researchers and care givers. The CSN's ultimate goal is the alleviation of the burden of stroke to the individual, their family, and to the nation.

In its first term the CSN has established a new approach to stroke research. Multi-disciplinary, inter-institutional collaborations were formed to address major research challenges in the field of stroke and to ensure that the results of this research are translated into health and economic benefits. This approach produced a number of important research contributions. CSN scientists evaluated a potential role for stem cells in stroke, described the role of TRPM7 channels in imparting ischemic vulnerability and developed a blocker for them which is now being tested in phase I-II trials. CSN scientists also showed calcium movement in previously-unknown hemichannels which may activate inflammatory pathways. Based on a thorough review of the world literature, experts within CSN have also determined the best practices in stroke rehabilitation, and these are currently being tested in trial settings. The Registry of stroke patients has allowed a number of correlations between premorbid physiological and social

characteristics of patients and stroke outcomes. Finally, in its first term the CSN put together a broad financial partnership which contributed to training 45 stroke scientists and clinicians. The CSN has just been awarded a second seven year term, with an unprecedented 35% budget increase, to continue its research and to establish and promote a Canadian Stroke Strategy (CSS). The Strategy, devised by the CSN in partnership with the Heart and Stroke Foundation of Canada, is a plan that starts with the premise that the best stroke research must be moved into practice. This strategy builds on the interactions developed by the CSN between basic researchers, clinicians and partner organizations and has been gaining momentum over the last three years. Working with health-care providers, patients, stroke champions, local partners and dedicated politicians, the CSN is committed to change the delivery of stroke care by ensuring the most recent stroke knowledge is transferred to health-care providers and implemented with patients. In prevention, the CSS proposed a broad coalition aimed at setting up stroke prevention clinics across the country. In acute therapy, the CSS instituted a program of national education not only of the public, but also of health care providers, thus bringing about a change in the delivery of acute stroke care through coordination of services and implementation of best practice. This has resulted in very substantial improvement (sometimes ten-fold increases) in rate of t-PA administration in several Canadian sites. In rehabilitation, the CSS has identified what works and proposes a substantial increase in the services available to improve functional recovery after stroke. Most recently, an economic analysis of the Canadian Stroke Strategy showed that applying these principles would not only result in fewer strokes and better outcomes, but also result in substantial savings to the treasury after all costs are covered. Across Canada provinces are implementing stroke strategies using the models we have developed. As the Strategy becomes established the CSN looks forward to increasing further the coordination between stroke research and stroke prevention and care. This will both accelerate the translation of stroke knowledge and facilitate the creation of new stroke knowledge in response to “gaps” identified by the Strategy.

It has been a particular source of pride to the CSN to be advised that a coalition of European countries has proposed the establishment of a European Stroke Network patterned on the CSN. Closer to home, NINDS and CSN are exploring a partnership in translational stroke research.

3. Other Responsibilities for Research Administration

In 2005, I accepted the Directorship of the Centre for Stroke Recovery, formed in 2002 as a partnership between the Heart and Stroke Foundation of Ontario, the Ottawa Health Research Institute, Baycrest Centre for Geriatric Care, and Sunnybrook Health Sciences Centre. The Centre for Stroke Recovery, with an annual budget of \$1.2M supports an integrated approach to identifying, through multi-disciplinary research, the most effective means of promoting and sustaining stroke recovery. It links knowledge, skills, expertise and advanced technologies from the prominent research groups in the areas of brain recovery and stroke rehabilitation located at the three sites. Recently, the Heart and Stroke Foundation made a commitment to raise \$25M for the Centre because of its conviction that this virtual Centre maximizes research efficiency.

In addition to the national leadership responsibility implied by the Canadian Stroke Network, Canadian Stroke Strategy and the Heart and Stroke Foundation Centre for Stroke Recovery, I have been the Chair of Neurology and the Director of Neuroscience Research at the University of Ottawa since 1992, and the Director of the Neuroscience Research Program of the Ottawa Health Research Institute since 2001. A 2005 Survey by “Science Watch”, an organization that evaluates research effectiveness, identified the Neuroscience Research Program at the University of Ottawa as the group publishing neuroscience manuscripts with the highest per capita impact in Canada. This level of excellence was achieved through a three-fold approach: 1) a demanding selection and evaluation process that precedes recruitment; 2) the ability to put together recruitment packages that are competitive with other institutions; and 3) selection of excellent individuals who value collaboration as well as personal success. This was made possible by nurturing a strong relationship with private donors and foundations, and developing well-conceived partnerships that lead to synergies with the private sector

HONOURS RECEIVED

1. Consultant to select Director of the Florey Neuroscience Institute, Australia. Florey is an amalgamation of three existing institutes (National Stroke Research Institute, Brain Research Institute, Howard Florey Institute) - January 2008.
2. Personality of the Year - presented by Droit Newspaper and CBC Radio
3. Chair, Scientific Advisory Committee, the European Stroke Network, 2007 - present.
4. Member of the Board of Directors, Fonds de la Recherche en Santé du Québec, 2007 - present.
5. Received the MEDEC Award for Medical Achievement from Canada's Medical Device Technology Companies, 2007.
6. Received the Thomas Willis Award, a Lifetime Achievement Award from the American Stroke Association and delivered the Thomas Willis Lecture at the International Stroke Conference in San Francisco on February 7, 2007.
7. Appointed Officer of Order of Canada, announced in February 2007.
8. Admitted as a Fellow to the Canadian Academy of Health Sciences, September, 2005
9. Ottawa Life Sciences Council Career Achievement Award for raising the profile of stroke in Canada and putting it on the national agenda. November, 2004.
10. Canadian Stroke Consortium Award of Excellence, 2000
11. Selected CEO and Scientific Director - Canadian Stroke Network, a Network of Centres of Excellence, 1999 - 2006. Network renewed for another 7-year term in 2005.
12. Selected Scientific Director, the Heart and Stroke Foundation Centre for Stroke Recovery, 2005.
13. Selected Program Leader - Ottawa Stroke Consortium for Applied Research - a Program Grant funded by the Heart and Stroke Foundation of Ontario, 1995 - 2000
14. Member, Advisory Board - Institute for Biological Sciences, NRC, 1995 - 2000
15. Member, Scientific Advisory Board - Allelix Biopharmaceuticals, 1994 - 1997
16. Member, Registry of world thought leaders in stroke, Health Science Communications.1997
17. Elected member of the International Committee - International Stroke Society, 1996.
18. Invited to join Research Policy Committee, Heart & Stroke Foundation of Ontario, 1996.
19. Recipient, Heart and Stroke Foundation of Ontario's "Stroke Award", 1995.
20. Named "Researcher of the Year", Ottawa General Hospital, 1995.
21. Chair -Neuroscience Council, University of Ottawa, 1994-present.
22. Elected member of Board, Heart and Stroke Foundation of Ontario, 1994.
23. Elected to Health Science Policy Council of the Heart & Stroke Foundation of Canada, 1994.
24. Elected Councillor - Canadian Neurological Society, 1991.
25. Elected member of the Board of Governors of the Low-Beer Family Foundation, 1988-1990.
26. Elected to the Advisory Board of the Montreal Neurological Institute as a Staff Representative, 1988-1991
27. Selected as the Aitken Lecturer, Univ. of Western Ontario, London, ON, 1988.
28. Chairman of Scientific Committee - XIII International Symposium on Cerebral Blood Flow and Metabolism, Montreal, Quebec, June 1987.
29. Elected to the American Neurological Association, 1984.
30. Recipient of the "Jonathan Ballon Award" - The Quebec Heart Foundation's award for the most promising applicant for grant-in-aid in 1984. Title of Application: Investigation of Cerebral Acidosis in Ischemia.

GRANT REVIEWS AND SITE VISITS

1. Invited reviewer, the UK Stroke Research Network - January 2009.
2. Invited and participated in the second round of the German Excellence Initiative -review panel of "Neuroscience" - Bonn Germany - July 2007
3. Invited and participated in the Michael Smith Foundation for Health Research review panel for Technology/Methodology Platform. February 5, 6, 2007 in Vancouver.
4. Invited and participated in the review of Centres of Excellence set-up by Fonds de la Recherche en Santé du Québec (FRSQ), Réseau Sante Cardiovasculaire sante respiratoire (January 24, 2007)

5. Invited and participated in the review of Centres of Excellence set-up by Fonds de la Recherche en Santé du Québec (FRSQ), Réseau Santé Cardiovasculaire santé respiratoire (February 2006)
6. Member, Scientific Review Committee for Chercheurs Nationaux, FRSQ, 1999-2000
7. Member, Scientific Review Committee for Chercheurs Boursiers, FRSQ, 1985-1988
8. Participation in NIH-conducted site visit to the imaging program proposed by the Massachusetts General Hospital, Harvard University, 1987.
9. Chairman, Scientific Review Committee and Member of Executive of the Heart and Stroke Foundation of Canada, Committee III: Stroke, neurophysiology and neuroregulation 1989-1992.
10. Member, MNI Collaborative Industry Academic Research Committee, 1990.
11. Member, Medical Research Council, Neurosciences "B" Panel, 1993-1996.
12. Reviewer for International Human Frontier Science Organization.

RESEARCH TRAINEES SUPERVISED

Currently in Laboratory of Cerebral Ischemia (*Country identified if student/fellow not from Canada*)

• Wafa Juma	2006-Present	masters student
• Rema Kamal	2005-Present	honour student
• Nzau Munyao	2005-Present	MD, collaborator

Previously in Laboratory of Cerebral Ischemia

• Sarah Schock	2002-2008	PhD. Student
• Hale Sayan - <i>Turkey</i>	2004	Post Doctoral Fellow
• David Banner	2000	M.Sc. Student
• Isabella Moroz	2002	Post Doctoral Fellow
• Ava Chow	2000-2002	PhD. Student
• Nobuaki Shinohara, M.D. - <i>Japan</i>	1999-2001	Research Fellow
• Andre G. Douen, M.D., Ph.D., FRCPC	1997-1999	Fellowship
• Yutaka Kametsu, M.D. - <i>Japan</i>	1997-1999	Fellowship
• Joseph P. Tauskela, Ph.D.	1997-1999	Fellowship
• Sachiko Osuga, M.D. - <i>Japan</i>	1997-1998	Fellowship
• Vladimir Skljarevski, M.D.	1996-1997	Fellowship
• Katsunori Akiyama, M.D. - <i>Japan</i>	1995-1997	Fellowship
• Lynda McGahan, M.Sc.	1994-1996	M.Sc. Student
• Kazushi Matsushima, M.D - <i>Japan</i> .	1993-1996	Fellowship
• Hitoshi Osuga, M.D., Ph.D - <i>Japan</i> .	1992-1993	Fellowship
• Ben Guiot, M.D.	1992-1993	Fellowship
• Mukul Sharma, M.D.	1991-1992	Fellowship
• Dale Corbett, Ph.D.	1991-1992	Visiting Scientist
• Alan Hazell, Ph.D.	1990-1994	Ph.D. Student
• Shunya Takizawa, M.D., Ph.D. - <i>Japan</i>	1989-1991	Fellowship
• Matthew Hogan, M.D., Ph.D., FRCPC	1988-1991	Fellowship
• Steven Vogel, M.Sc.	1986-1989	M.Sc. Student
• Leo Berger, M.D., FRCPC	1986-1988	Fellowship
• Marie Arrieta	1985-1986	Special Project

Previously in McConnell Brain Imaging Unit, with Direct Supervision by Dr. Hakim

• Curt Beil, M.D. - <i>Germany</i>	1986-1987	Fellowship
• Suzanne Dyve, M.D. - <i>Denmark</i>	1986-1987	Fellowship
• Gilles Marchal, M.D. - <i>France</i>	1986-1988	Fellowship
• Jose Villanueva, M.D. - <i>Spain</i>	1985-1986	Fellowship
• Ronald Pokrupa, MD, FRCSC	1983-1984	Fellowship

ORGANIZATION OF STROKE EVENTS, INVITATIONS TO SPEAK AND PARTICIPATION IN CONFERENCES, SYMPOSIA AND WORKSHOPS

1. Invited Speaker – Title: The Experience of the Canadian Stroke Network – Bringing Knowledge to Practice – 6th World Stroke Congress, Vienna, Austria – September 27, 2008
2. Invited Speaker – Stroke Care in Canada - 2nd National Stroke Rehabilitation Conference, Winnipeg, Manitoba – September 18, 2008
3. Invited Speaker – Title: Neurovascular Disease: Impact in the 21st Century, Canadian Neurological Sciences Federation Conference, Victoria, BC – June 18, 2008.
4. Keynote Speaker - Title: The Canadian Stroke Network - Eurostroke Kick-off Meeting - Berlin, Germany - March 9, 2008.
5. Keynote Speaker - Title: Expanding the Universe of stroke, Kiwanis Medical Foundation Luncheon Meeting - Ottawa, Ontario - February 22, 2008.
6. Invited Speaker - Title: Changing Stroke Care Systems: The Canadian Experience, 2nd Russian International Congress Cerebrovascular Pathology and Stroke, St. Petersburg, Russia - September 19, 2007.
7. Chair Symposium - Interventional technologies of stroke treatment, 2nd Russian International Congress Cerebrovascular Pathology and Stroke, St. Petersburg, Russia - September 19, 2007.
8. Delivered the Thomas Willis Lecture at the American Stroke Association, 2007 International Stroke Conference in San Francisco, US on February 7, 2007.
9. Participated in a Platform Award Program Full Application Review Panel for the Michael Smith Foundation for Health Research in Vancouver on February 4th, 5th & 6th, 2007.
10. Chair, of the Assessment Committee 2007 Thematic Networks Centre of Research of the FRSQ January 24th & 25th, 2007.
11. Invited to give a Workshop entitled Cerebrovascular Risk Management at the Heart and Stroke Foundation Clinical Update 2006 at the Toronto Convention Centre December 9, 2006.
12. Participated in the fourth meeting of the Project of Development of a continuum of services for the people Victims of a Cerebral Vascular Accident or at Risk to become to the Ministry of Health and Welfare departments of Quebec, November 1, 2006.
13. Developed and participated at an AllerGen and Canadian Stroke Network Workshop to Discuss Research Opportunities in Inflammation and Stroke - Delivered a Presentation regarding Vascular Risk Factors, Montreal - October 24, 2006.
14. Invited Speaker - Rounds - Title of Talk: Clinical Challenges of Stroke, Winnipeg, Manitoba - September 29, 2006.
15. Participated in the 2nd Foundation Roundtable on Healing and the Arts - Mental Health and the Arts in Ottawa – National Arts Centre, September 27, 2006
16. Participated and developed in NINDS Stroke PRG Meeting/Workshop in Washington, US - September 19, 2006.
17. Participated in 2nd National Stroke Conference in Ottawa - September 16th and 17th, 2006.
18. Met with Saskatchewan Health Authorities to engage in Stroke policy planning for the Province of Saskatchewan - September 6th and 7th, 2006.
19. University of Ottawa Eye Institute, Scientific Advisory Committee, Potential Chair in Clinical/Translational Research in the Prevention of Blindness from Age Related Macular Degeneration. Delivered a presentation entitled Vascular Disease Research in Ottawa - August 29, 2006.
20. Participated in a nationally televised media conference at the National Press Theatre in Ottawa to announce the results of an economic analysis on the cost of stroke disease in Canada and the need for a Canadian Stroke Strategy. Conducted extensive media interviews and the event received coverage in more than 140 media outlets in June 2006.
21. Met with Ministries of Health to engage in stroke policy planning: Quebec February 2006, Newfoundland May 2006, Manitoba April 2006. The visit in Manitoba included meeting the Minister of Health who was convinced of the need to establish an integrated stroke strategy in his province.
22. Organized the Annual General Meeting of the Canadian Stroke Network. This has become the largest annual forum for stroke research and care in Canada 2000-2006.

23. Invited participant. 25th Princeton Conference. Portland, Oregon, May 2006
24. Invited Speaker - Society of Rural Physicians of Canada - "The Challenges of Modern Stroke Care in the Rural Setting", Winnipeg, Manitoba, April 21, 2006.
25. Invited Speaker – Heart & Stroke Clinical Update – “Cerebrovascular Disease: Hypertension As a Risk Factor”, Toronto, Ontario, December 10, 2005
26. Invited Speaker - Academic Health Sciences Leadership Program – “How to be politically Savvy”, Ottawa, Ontario, November 11, 2005.
27. Participated in Roundtable on Music and Medicine, “Music, Stroke and Recovery”, Ottawa, October 1, 2005.
28. Invited speaker, “Cardiovascular Diseases: Regional and Ethnic Profiles”, The 6th International Conference on Preventive Cardiology, Brazil, May 22, 2005.
29. Lecture “The Canadian Stroke Network, Goals, Function, Impact” to the NINDS/CSN/NHLBI Workshop, Washington DC, March 10-11, 2005
30. Co-Chair, NINDS/CSN/NHLBI Workshop, Washington DC, March 10-11, 2005
31. Invited speaker to the Canadian Stroke Research Innovation 7th Annual Stroke Collaborative, October 18, 2004.
32. Invited speaker, Presentation to the Board of the Canadian Stroke Consortium, Calgary, AB. October 16, 2004.
33. Invited speaker, Centre for Stroke Recovery. Presentation to Board Members of the Heart & Stroke Foundation of Ontario, Toronto, September 23, 2004.
34. Invited speaker, “Managing Strokes Everyday”, Cornwall, ON, September 22, 2004.
35. Invited speaker, Atlantic Research Symposium, Halifax “Opportunities for Stroke Research within the Canadian Stroke Network”, September 16, 2004,
36. "Go Home and Go Big" - National Strategies for Stroke" Symposium presented at World Stroke Congress - Vancouver - June 2004.
37. Invited speaker to European Stroke Conference, “Canadian Stroke Strategy” Mannheim, Germany, May 15, 2004.
38. Invited speaker to European Stroke Conference, “Gene Therapy in Stroke: Lessons from Past Trials”: Mannheim, Germany, May 13, 2004
39. Invited speaker to the Canadian Institutes of Health Research, “Toward a Canadian Stroke Strategy”, Ottawa, ON, April 14, 2004.
40. Invited speaker to the 24th Princeton Conference on Cerebrovascular Disease, “Conditioning the Brain. A Useful Paradigm for Neuroprotection?” and Moderator of session on “Ischemic Preconditioning”, Baltimore, MD, April 2 – 4, 2004.
41. Invited speaker to the Leon Wolfe Symposium, Montreal Neurological Institute, Montreal, QC, on “Conditioning the Brain” March 25, 2004.
42. Invited speaker to the MS Forum 2004, Lake Como, Italy “Neuroprotection in Acute and Chronic Disease. Lessons from Clinical Trials in Stroke”. March 20, 2004.
43. Announced the results of a National Stroke Survey, conducted in partnership with Merck Frosst, to determine awareness levels in Canada about stroke risk factors. Conducted extensive media interviews and findings received coverage in more than 120 media outlets in December 2003 and January 2004.
44. Moderator of Session at BioNorth on “Neurosciences: Degeneration and Regeneration”. Ottawa ON, November 18, 2003.
45. Invited speaker on Stroke Strategy, Atlantic Stroke Summit, Halifax, NS, October 15, 2003.
46. Invited speaker - Pfizer / CSN and Aventis/CSN – Partnerships, September 30, 2003.
47. Invited speaker on Stroke Recovery - March of Dimes – Annual General Meeting, Toronto, September 18, 2003.
48. Invited speaker on “Conditioning the Brain - Mechanisms of Increased Brain Resistance to Ischemic Damage”, BRAIN 03, Calgary, July 3, 2003.
49. Invited speaker to CSN Partnerships Merck Frosst – Montreal, September 2, 2003.
50. Invited speaker for the Canadian Stroke Network Overview Presentation to Ministry of Health, June 11, 2003.
51. Invited speaker, Queens University, Kingston, Ontario “Conditioning the Brain, Mechanisms of Increased Brain Resistance to Ischemic Damage” May 1, 2003.

52. Invited speaker, Boehringer Ingelheim "Canadian Stroke Network/Partnerships" February 18, 2003.
53. Invited speaker, Institute of Neurology, Mental Health and Addiction, February 6, 2003.
54. Invited speaker, Neuroscience Canada Board Meeting, Montreal, Quebec. "Brain Recovery". October 1, 2002.
55. Invited speaker, Institute Advisory Board meeting of the Institute of Circulatory and Respiratory Health, Toronto, ON. September 19, 2002.
56. Invited speaker, Yarmouth Stroke Forum, Yarmouth, NS. "Stroke" September 4, 2002.
57. Invited speaker, Canadian Stroke Network Theme IVB meeting, London, ON, "Update on the CSN", May 31, 2002.
58. Invited speaker, for Eli Lilly Pharmaceutical, Indianapolis, Indiana, "The Challenges of Recovery After Stroke", May 22, 2002.
59. Keynote speaker for the Heart and Stroke Foundation of Ontario – 50 Years of Success "Stroke Happens to Families" Ottawa, May 9, 2002
60. Annual General Meeting of the Canadian Stroke Consortium, "Update on the Canadian Stroke Network", Toronto, May 3, 2002
61. Presentation to the Heart and Stroke Foundation of Ontario, Ottawa, February. 14, 2002
62. International Stroke Liaison Committee, San Antonio, Texas, "Canadian Stroke Network", February. 7, 2002
63. Lecture to the New Frontiers Meeting, San Antonio, Texas "Development of a rodent stroke recovery model". February 6, 2002
64. Lecture to the Stem Cell Network "Plasticity Workshop" - Vancouver, BC, January. 19, 2002
65. Presentation to the Research & Policy Committee of Heart & Stroke Foundation of Ontario, December 17, 2001
66. Lecture, Neurology Day, McGill University, Dept. of Neurology and Neurosurgery, "Research and Management in Stroke: Painful Realities and Great Hopes" April 5, 2001
67. Presentation to the Heart & Stroke Foundation of Ontario Board – Canadian Stroke Network, Toronto, Ontario August 23, 2001
68. Lecture to special group from Taiwan, and the NRC Conference on Mitochondrial Disease "Clinical Challenges in Stroke", Hull, Quebec, July 9, 2001.
69. Lecture - Ottawa Life Sciences - Lunch Time at the Park series: "The Canadian Stroke Network", May 4, 2001.
70. Lecture - Stroke symposium, "What does pathophysiology tell us about repair in cerebral ischemia?" Niagara-on-the-Lake, Ontario, April 6, 2001.
71. Lecture - Queens University, Kingston, Ontario, "Changing Perspectives", November 15, 2000.
72. Lecture to the Heart & Stroke Foundation of New Brunswick Provincial Stroke Conference, Saint John, NB, "Emerging Acute Stroke Therapies", September 22, 2000.
73. Lecture at the Institute for Clinical Evaluative Sciences, - Toronto, Ontario, "The Canadian Stroke Network", June 15, 2000
74. Lecture - Canadian Congress of Neurological Sciences, "Cerebral Ischemia: Pathophysiology", June 13, 2000
75. Invited lecturer as the Canadian representative - International Congress of the French Neurological Society, Paris, France, June 17, 18, 1999.
76. Participated in the 2nd Collaborative Forum on "Coordinated Stroke Strategy", Toronto, May 31, 1999.
77. Invited lecturer - Symposium on "Treatment of Acute Stroke and Secondary Prevention" 3rd Congress of the European Federation of the Neurological Societies, Seville, Spain, September 1998.
78. Invited to address the Hungarian Stroke Society, 1997 and 1998 - declined
79. Invited speaker - Jerzy Olszewski lecturer - "Current Concepts and Future Prospects in Cerebral Ischemia and Stroke", Canadian Association of Neuropathologists, October 25, 1997.
80. Invited speaker - "Ischemic Penumbra: The Therapeutic Window", 2nd Annual Advances in Stroke Management, Cancun, Mexico, September 21, 1997.
81. Invited speaker - "Neuroprotection in ischemia", Neuroscience Rounds, Queen's University, May 15, 1997.

82. Invited speaker - "The stroke patient: Opportunities and challenges", Medical Grand Rounds, Queen's University, May 15, 1997.
83. "The Pathophysiology of Stroke", Emergency Medicine Task Force, Sainte-Adele, Quebec, February 1997.
84. Lecture - Acute Stroke Management - The Brain Attack Paradigm, Montreal, Quebec, September 28, 1996
85. "Improve your Awareness of Stroke", Women's Health Matters, September 1996
86. Invited lecturer - "The potential for neuroprotection in ischemia", Montreal Neurological Institute, September 1996.
87. Invited to Participate - Princeton Research Conference, 1996.
88. Invited to organize and chair "Molecular Biology of Ischemic Damage" - symposium for the 19th International Joint Conference on Stroke and Cerebral Circulation, The American Heart Association, San Diego, CA, February 17-19, 1994.
89. Invited to organize and chair "Role of Nitric Oxide in Cerebral Ischemia" - symposium for the 18th International Joint Conference on Stroke and Cerebral Circulation, The American Heart Association, Miami Beach, Florida, February 11-13, 1993.
90. Invited lecturer - "From Bench to Bedside" series - McGill University, April 1992.
91. Invited to organize and chair "Reversibility in Cerebral Ischemia" - symposium for the 17th International Joint Conference on Stroke and Cerebral Circulation, The American Heart Association, Phoenix, Arizona, January 30 to February 1, 1992.
92. Invited lecturer - "Stroke and Its Prevention", The Canadian Stroke Society, Halifax, NS, June 22, 1991.
93. Invited lecturer - "Cerebral Ischemia: From Pathophysiology to Treatment", Istanbul, Turkey, October 1990.
94. Invited lecturer - Satellite symposium of the XIth International Congress of Pharmacology, titled "Drug Treatment of Stroke and Ischemic Brain", Amsterdam, The Netherlands, June 1990.
95. Invited lecturer - Excitatory Amino Acid Receptors in the Brain: Functions and Disorders, Montreal, Quebec, June 1990.
96. Invited lecturer - Deidesheim Gespräch 1990, Cologne, West Germany, April 1990.
97. Invited lecturer - Preclinical Studies with Nimodipine Workshop, Scottsdale, Arizona, March 1990.

TEACHING ACTIVITY (selected)

1. Invited Speaker at the Division of Neurology Grand Rounds, "The Contribution of Restful Sleep to Stroke Recovery", The Ottawa Hospital, June 23, 2006
2. Annually Participates in teaching Neuroscience Graduate Course, University of Ottawa, Course No. NSC 8106 - since 2000
3. "Stroke", Neurology Teaching Sessions, University of Ottawa Medical School, annually since 2000.
4. Participation at Scientific Meetings Canadian Congress of Neurology - Neurobiology Review – Stroke Prevention, Ottawa, June 18, 2005
5. Invited speaker, "Ischemic Cascades" at the Neurology Half-days The Ottawa Hospital, November 9, 2004
6. Invited speaker to the Neurosurgery Rounds, "Clinical Challenges in Stroke", The Ottawa Hospital, Civic Campus, Ottawa, ON March 5, 2004.
7. Invited speaker at the Stroke Book Club, "Inventing a brighter future for stroke patients and their families", Ottawa ON, March 2, 2004.
8. Invited speaker at the Division of Neurology Grand Rounds, "Conditioning the Brain: Mechanisms of Increased Brain Resistance to Ischemic Damage", The Ottawa Hospital, May 16, 2003.
9. Neuroscience Seminar Series "Conditioning" the Brain. What Mechanisms Contribute to Making it More Resistant to Ischemic Damage?" April 14, 2003.
10. Invited speaker, BioNorth "Principles of Brain Plasticity Should Guide Clinical Interventions after Stroke" November 6, 2002
11. Invited speaker, Westend Learning Unlimited, Ottawa, Ontario. "Stroke", October 29, 2002.

12. Lecture - Hospital Auxiliaries Association of Ontario, "Recent Developments in the Treatment of and Research into Strokes", Ottawa, October 20, 1999.
13. Invited speaker - "Damage and recovery in cerebral ischemia", Department of Cellular and molecular Medicine, University of Ottawa, June 30, 1998.
14. Invited speaker - "The Stroke Network: A Network of Centres of Excellence in Stroke", Neuroradiology/Neurology/Neurosurgery Rounds, Ottawa Hospital - General Campus, February 27, 1998.
15. Invited speaker - "Brain Attacks - Emergency Management", Annual Refresher Course for Family Practitioners and other Health Care Professionals, Ottawa General Hospital, December 5, 1997.
16. Neurology tutor, Physicians Skills Development, Neuroblock for second-year medical students, University of Ottawa, 1997.
17. Rounds speaker, "The potential for neuroprotection in ischemia", Ottawa General Hospital Neurology Rounds, 1997.
18. "Invited speaker - "Cell death in ischemia and potential for neuroprotection", Department of Biochemistry, University of Ottawa, January 17, 1997.
19. Lecture - "Stroke Management" - Regional Heart Saver Committee of Ottawa-Carleton, November 23, 1996.
20. Current Clinical Trials in Stroke ", Neurology teaching sessions, University of Ottawa Medical School, April 4, 1995.
21. Cerebrovascular Disease ", Continuing Medical Education University of Ottawa, 1994
22. Ad hoc examiner for neurology trainees, University of Ottawa, 1993-1997.
23. Attending staff neurologist on neurology service, with two-three residents - The Ottawa Hospital, 1992-2002.
24. Organizer, Seminars in Brain Imaging Research, Montreal Neurological Institute, 1990.
25. "Brain Ischemia", Neurosurgery teaching sessions, McGill University, 1988.
26. "Headaches", Neurology for Non-Neurologists, Continuing Medical Education, McGill University, 1986.
27. "Metabolism of brain before, during and after a stroke", Seminars on Atherosclerosis, Thrombosis and their Complications, McGill University, 1985-1987.
28. "Syncope", Neurology for Non-Neurologists, Continuing Medical Education, McGill University, 1985.
29. Responsible for "Link" students during their second year of medical school - one month per year, McGill University, 1985-1992.
30. "Biology of Disease" - Lectured with Drs. L. Wolfe and H. Pappius, second year medical students, McGill University, 1984-1986.
31. "Metabolic Encephalopathies", lecturer and organizer of series, Neuroscience seminars, McGill University, 1985.
32. "Neurology of Dementia", Neuropsychiatry Seminars, McGill University, 1984-1985.
33. "Cerebrovascular Accidents", School of Physical and Occupational Therapy, Neurology Lecture Series, McGill University, 1984-1985
34. "Cerebrovascular Diseases", Thursday evening lecture series, McGill University, 1984.
35. Frequent speaker and discussant at Grand Rounds at Montreal Neurological Institute, Royal Victoria Hospital and Montreal General Hospital, 1980-1990.
36. Attending staff neurologist on neurology service "C", Montreal Neurological Institute in charge of approximately twenty patients during January and February for each year. This entailed considerable teaching of residents, McGill University, 1979-1992.

OTHER CONTRIBUTIONS

- a) Editorial Boards
 - STROKE, 2000 to 2006
 - Member, Board of Directors, Canadian Medical Association Journal, 1999 – 2002.
 - Board Member, Strokeline: Support for Survivors and Caregivers, a publication of the Heart and Stroke Foundation of Canada

- b) Journals
Ad Hoc Reviewer for:
- American Journal of Physiology
 - Annals of Neurology
 - Canadian Medical Association Journal
 - CNS Drug Reviews
 - Journal of Cerebral Blood Flow and Metabolism
 - Journal of Neurochemistry
 - Stroke

COMMITTEES

CURRENT

Ottawa Hospital Committees -

- Ottawa Health Research Institute - Senior Management Team
- Department of Medicine Joint Division Heads Committee

Division of Neurology Committees

- Recruitment Committee

Canadian Stroke Network

- Board of Directors
- Management Committee
- Planning and Priorities Committee
- External Scientific Review Committee
- Audit and Finance Committee
- Executive Committee

Canadian Stroke Strategy

- Steering Committee
- Best Practices Committee

Heart and Stroke Foundation Centre for Stroke Recovery

- Advisory Board
- External Scientific Review Committee
- Site Leaders' Committee
- Scientific Committee

OTHER

- Member - NCE Directors Committee
- Chair - Phoenix BioPharm External Scientific Selection Committee, Chair
- Member - Champlain CVD Prevention Network
- Board Member - International Advisory Committee for 6th World Stroke Congress - 2008
- Board Member - Canadian Heart Health Strategy and Action Plan Steering Committee
- Chair - Eurostroke Network Advisory Board
- Chair - World Stroke Organization International Stroke Guidelines Sub-Committee
- Board Member - World Stroke Organization - Advisory Board
- Member - World Stroke Organization - Executive Committee
- Board Member - FRSQ

PAST

University of Ottawa Committees

- Neuroscience Research Institute Advisory Board
- Neuroscience Research Institute External Scientific Committee

Canadian Institutes for Health Research

- Institute Advisory Board, Institute for Circulatory and Respiratory Health, 2001-2004
- Stroke Summit Committee, November 2003
- AstraZeneca Neurology Advisory Board

PROFESSIONAL SOCIETIES

1. American Academy of Neurology
2. American Association for the Advancement of Science
3. American Heart Association
4. American Neurological Association
5. American Society for Neurochemistry
6. Canadian Institute of Academic Medicine
7. Canadian Neurological Society
8. Canadian Stroke Society
9. Society for Neuroscience

RESEARCH AWARDS

Research Grants

A) INSTITUTIONAL

Heart and Stroke Foundation of Ontario and Matching Funds

Centre of Excellence – Heart and Stroke Foundation Centre for Stroke Recovery
Scientific Director

2001 – 2011 **\$12,000,000**

Additional fundraising goal set in 2005 **\$25,000,000**

Achieved to Date **\$25,000,000**

Goal raised to \$40,000,000

Networks of Centres of Excellence Program -

Network of Centres of Excellence for the Canadian Stroke Network (CSN)

CEO and Scientific Director, Dr. Antoine M. Hakim

Network grant with 145 investigators from across Canada

2000 - 2006 **\$32,900,000**

2006 – 2013 **\$44,800,000**

Support of the infrastructure of the OSCAR program grant (T-3551) - Ottawa Stroke Consortium for Applied Research (OSCAR) - Group Grant with 16 other investigators

Total Grant - \$1 237 357 (July 1, 1997 - June 30, 2000) **\$1,237,357**

B) INDIVIDUAL

Canadian Stroke Network

Mobilization of Neural Stem Cells Following Stroke

Principal Investigator: A. Hakim, with Dr. Luc Sabourin

2002-2003 **\$55,000/yr**

Networks of Centres of Excellence

Post-Stroke Recovery Can be Modulated by Manipulating Calcium and NMDA Homeostasis During The Repair Phase

2000 - 2003 **\$60,000**

Networks of Centres of Excellence

Understanding the Molecular Basis of Neuroprotection; Gene Expression Analyses in Dying Neurons (in vitro and *in vivo*) Using DNA Chip Arrays and Differential Display

2000 - 2003 **\$30,000**

Heart and Stroke Foundation of Ontario

Molecular Mechanisms of Neuroprotection – with Dr. Luc Sabourin

2003- 2005 (NA-5084) **\$106,000**

Role of XIAP in calcium ion homeostasis - (part of the OSCAR program) - with Dr. Charlie Thompson (NA-4373)

2000 - 2002 **\$62,000/yr**

The molecular basis of cerebral plasticity - with Dr. Andre Douen (B-3624)

1998 - 1999 **\$51,365**

1999 - 2000 **\$51,586**

The ischemic penumbra dies by apoptosis (NA-3623)

1998 - 2000 **\$58,680/yr**

Effect of modulation of calcium homeostasis on ischemic neuroprotection - (part of the OSCAR program) - with Dr. Matthew J. Hogan (PI), and Dr. Paul Morley (T-3379)

1997 - 1998 **\$45,267**

1998 - 1999 **\$46,172**

1999 - 2000 **\$47,096**

Seed money for "MRI project" (within the Infrastructure support of OSCAR program grant) with Drs. Matthew J. Hogan, Diana M. Grinnell, Brian E. Heisel and Leonard I. Avruch (part of T-3551)

1997 - 1998 **\$25,000**

CNS plasticity: its molecular substrates and its modulation (B-3068)

1996 - 1998 **\$48,169/yr**

Modalities of cellular injury, protection and treatment of stroke (Infrastructure support) (ST-2719)

Ottawa Stroke Consortium for Applied Research (OSCAR) - Group Grant with 17 other investigators

Total Grant - \$826 872 (July 1, 1995 - June 30, 1997)

1995 - 1997 **\$56,000/yr**

Calcium channel activation, trophic factors and neuroprotection - with Dr. Matthew Hogan (PI), and Dr. Rainald Schmidt-Kastner (ST-2721)

1995 - 1996 **\$46,654**

1996 - 1997 **\$49,466**

Neurotrophins in cerebral ischemia: expression and therapeutic potential - with Dr. Rainald Schmidt-Kastner (NA-2867)	
1995 - 1996	\$64,260
1996 - 1997	\$57,760
Induction and function of immediate early genes in cerebral ischemia - with Dr. George S. Robertson (B-2568)	
1994 - 1996	\$66,272/yr
Nimodipine binding in cerebral ischemia	
1992 - 1993	\$45,397
1993 - 1994	\$48,018
London Life Medical Research Award - Improving the brain's resistance to stroke damage - with Drs. Matthew J. Hogan, Rainald Schmidt-Kastner and George S. Robertson	
1994 - 1996	\$100,000/yr
Miles Pharmaceuticals - Immediate early genes in focal ischemia	
1993 - 1995	\$16,000/yr
Medical Research Council	
Determinants of tissue survival in two models of selective vulnerability (MT-8789)	
1992 - 1994	\$64,605/yr
1994 - 1995	\$16,151
Calcium channel activity in two models of selective cerebral vulnerability	
1989 - 1990	\$42,423
1990 - 1992	\$56,565/yr
Coordinator of Program Grant to PET Research	
1987 - 1990	\$300,000/yr
1987 - 1989	Towards the acquisition of a new tomograph \$1,000,000
Cerebral acidosis and other metabolic functions in models of focal brain damage	
1984 - 1985	\$30,186
1985 - 1986	\$40,852
1986 - 1987	\$52,817
1987 - 1989	\$57,007/yr
Ciba-Geigy Canada Ltd. -	
Measurement of kinetic and physiologic properties of two NMDA-receptor antagonists in normal and ischemic brain	
1992 - 1994	\$107,396/yr
Nordic Laboratories Inc.	
Binding of TA-3090 in normal and ischemic brain	
1990 - 1991	\$86,918
National Institutes of Health	
Calcium channel activation in models of cerebral ischemia	
1989 - 1990	\$64,478
1990 - 1991	\$75,478

University-Industry Collaborative Grant

NMDA-receptor function and blockade in cerebral ischemia (using CGS-19755 as a prototype)

1989 - 1990 \$67,000
1990 - 1991 \$38,000

Quebec Heart Foundation Grant-In-Aid

1986 - 1988 Cerebral acidosis in ischemia \$17,000/yr
1988 - 1991 Cerebral metabolic responses to stroke and therapy \$25,000/yr

Juvenile Diabetes Foundation

Cerebrovascular function and responsiveness in diabetes studied by positron emission tomography and magnetic resonance imaging

1985 - 1987 \$33,000/yr

Canadian Heart Foundation

1984 - 1990 Research Scholarship \$35,000/yr

Heart and Stroke Foundation of Canada - Scholarship - Source of salary support.

1984 - 1990 \$42,650/yr av.

PUBLICATIONS

- * Identifies peer-reviewed articles where the applicant's scientific contribution was major.
- ** Identifies peer-reviewed articles where the applicant's scientific contribution was important but not major.
- *** Show manuscripts where the applicant contributed to the study at various stages which may have involved, when appropriate, discussing and approving details of the study, preparing ethics committee proposal and defending it, identifying patients for study or analysis, being on call during the study, funding the study, supervising data collection and analysis, reading the manuscript and advising main authors until its publication.

Submitted and Pending Publications:

1. **Hakim A** and Thompson C. 2008. Gene Induction, Protein Synthesis and Related Issues. Handbook of Clinical Neurology. In Press.

Articles Published in Peer-Reviewed Journals:

1. **Schock, SC, LeBlanc D, **Hakim AM**, Thompson CS. 2008. ATP release by way of connexin 36 hemichannels mediates ischemic tolerance in vitro. *Biochem Biophys Res Comm*. 2008 Mar. 368 (1): 138-144.
2. **Hakim AM**, Vascular Disease: The Tsunami of Health Care - The 2007 Willis Lecture. *Stroke*. 2007 Dec. 38 (12) 0039-2499. *
3. Schock SC, Munyai N, Yakubchuk Y, Sabourin L, **Hakim AM**, Ventureyra ECG, Thompson CS. 2007. Cortical spreading depression releases ATP into the extracellular space and purinergic receptor activation contributes to the induction of ischemic tolerance. *Brain Res*. 2007 Sep 7, 1168C: 129-138. *
4. Hester I, McKee S, Pelletier P, Thompson C, Storbeck C, Mears A, Schulz JB, **Hakim AM**, Sabourin L. Transient expression of Nxf, a bHLH-PAS transactivator Induced by neuronal preconditioning, confers neuroprotection in cultured cells. *Brain Res*. 2007 Mar 2; 1135(1): 1-11. **
5. Hallenbeck J, Del Zoppo G, Jacobs T, **Hakim AM**, Goldman S, Utz U, Hasan A. Immunomodulation Workshop Participants. Immunomodulation strategies for preventing vascular disease of the brain and heart: workshop summary. *Stroke*. 2006 Dec; 37 (12): 3035-42. **

6. McKee SC, Thompson CS, Sabourin LA, **Hakim AM**. Regulation of Expression of Early Growth Response Transcription Factors in Rat Primary Cortical Neurons by Extracellular ATP. *Molecular Brain Research*. 2006 May 9; 1088 (1): 1-11. **
7. Dowlatshahi D, Fang J, Kawaja M, **Hakim AM**. Use of calcium channel blockers after stroke is not associated with poor outcome: A cohort from the registry of the Canadian Stroke Network. *J. Neurol*. 2006 Nov; 253 (11): 1478-83. **
8. Thompson CS, **Hakim AM**: Cortical Spreading Depression Modifies Components of the Inflammatory Cascade. *Molecular Neurobiology* 32: 51-57., 2005. *
9. **Hakim AM**, Simon R: Ischemic Preconditioning, Introduction. *Stroke*, 35(suppl 1) 2675, 2004. **
10. D, Walker JR, Thompson CS, Moroz I, Lin W, Veselits MS, **Hakim AM**, Fienberg AA, Thinakaran G. Characterization of stanniocalcin 2, a novel target of the mammalian unfolded protein response with cytoprotective properties. *Molecular & Cellular Biology*, 24:21, 9456-9469, 2004. **
11. Moroz IA, Kreling K, Thompson CS, **Hakim AM**: Effects of d-amphetamine on long-term functional outcome after middle cerebral artery occlusion in the rat. *Society for Neuroscience Abstracts*, 30, 807.7, 2004. **
12. Douen AG, Dong L, Vanance S, Munger R, Hogan MJ, Thompson CS, **Hakim AM**: Regulation of nestin expression after cortical ablation in adult rat brain. *Brain Research*, 1008: 139-146, 2004. **
13. Gulyaeva N, Thompson C, Shinohara N, Lazareva N, Onufriev M, Stepanichev M, Moiseeva Y, Fliss H, **Hakim AM**: Tongue Protrusion: A Simple Test for Neurological Recovery in Rats Following Focal Cerebral Ischemia. *The Journal of Neuroscience Methods*, 125 (1-2): 183-193, 2003. *
14. Kametsu Y, Osuga S, **Hakim AM**. Apoptosis occurs in the penumbra zone during short duration focal ischemia in the rat. *J. Cereb. Blood Flow & Metab*. 23:416-422, 2003. *
15. Gladstone D, Black S, **Hakim AM**. Toward Wisdom from Failure: Lessons Learned from Negative Stroke Treatment Trials and New Therapeutic Frontiers *Stroke* 33:2123-2136, 2002.*
16. Chow AK, Thompson CS, Hogan MJ, Banner D, Sabourin LA, **Hakim AM**: Cortical spreading depression transiently activates MAP kinases. *Molecular Brain Research* 99:75-81, 2002. *
17. Gendron TF, Mealing GAR, Paris J, Lou A, Edwards A, Hou ST, MacManus JP, **Hakim AM**, Morley P: Attenuation of neurotoxicity in cortical cultures and hippocampal slices from E2F1 knockout mice, *Journal of Neurochemistry*, 78: 316-324, 2001. ***
18. Zhang, YH, Hume K, Cadonic R, Thompson C, **Hakim AM**: Expression profile and activity of the Ste20-like kinase SLK in the embryonic and adult nervous system. *Brain Res Dev Brain res* 139(2):205-15, 2002. **
19. Wang F, Corbett D, Osuga H, Osuga S, Ikeda J, Slack RS, Hogan MJ, **Hakim AM** and Park DS: Inhibition of cyclin dependent kinases provides improvements in CA1 neuronal survival and behavioural performance after global ischemia in the rat. *J. Cereb. Blood Flow & Metab*. 22(2): 171-182, 2002. **
20. Fortin A, Cregan, SP, MacLaurin JG, Kushwaha N, Hickman, ES, Thompson CS, **Hakim AM**, Albert PR, Cecconi F, Helin K, Park DS, and Slack RS. APAF1 is a key transcriptional target for p53 in the regulation of neuronal cell death. 2001, *Journal of Cell Biology*. 155(2): 207-216, 2001. **
21. Osuga H, Osuga S, Wang F, Fetni R, Hogan MJ, Slack RS, **Hakim AM**, Ikeda J and Park DS. Cyclin-dependent kinases as a therapeutic target for stroke. *Proc Natl Acad Sci USA* 97:18 10254-10259, 2000. **
22. Douen AG, Akiyama K, Hogan MJ, Wang F, Dong L, Chow AK and **Hakim AM**. Preconditioning with cortical spreading depression decreases intra-ischemic cerebral glutamate levels and down regulates EAAT1 and EAAT2 from rat cerebral cortex plasma membranes. *Journal of Neurochemistry* 75/2: 812-818, 2000. **
23. Tauskela JS, Hewitt K, Kang LP, Comas T, Gendron T, **Hakim AM**, Hogan M, Durkin J and Morley P. Evaluation of glutathione-sensitive fluorescent dyes in cortical cultures. *Glia* 30: 329-341, 2000. ***

24. **Hakim AM**: Physiologie et pathologie de l'ischémie cérébrale. *Revue Neurologique* 155: 9: 631-637, 1999. *
25. Tauskela J, Chakravarthy BR, Murray C, Wang Y, Comas T, Hogan MJ, **Hakim AM** and Morley P. Evidence from cultured rat cortical neurons of differences in the mechanism of ischemic preconditioning of brain and heart. *Brain Res* 827: 143-151, 1999. ***
26. McGahan L, **Hakim AM** and Robertson GS: Hippocampal Myc and p53 expression following transient global ischemia. *Molecular Brain Research*, 56(1-2): 133-145, 1998.**
27. McGahan L, **Hakim AM**, Nakabeppu Y and Robertson GS: Ischemia-induced CA1 neuronal death is preceded by elevated FosB and Jun expression and reduced NGFI-A and JunB levels. *Molecular Brain Research*, 56(1-2): 146-161 1998.**
28. Skljarevski V, Turek M and **Hakim AM**: Cervical artery dissection is associated with widened aortic root diameter. *Can J Neurol Sci* 25: 315-319, 1998.*
29. Douen AG and **Hakim AM**: Physiopathologie de l'ischémie cérébrale. In: *Revue: Accidents vasculaires cérébraux de l'adulte*, P Aubourg and JL Maas (Eds), Médecine Thérapeutique, John Libbey, Montrouge, France. Vol 4: 435-441, 1998.
30. Matsushima K, Schmidt-Kastner R, Hogan MJ and **Hakim AM**: Cortical spreading depression activates trophic factor expression in neurons and astrocytes and protects against subsequent focal brain ischemia. *Brain Res* 807: 47-60, 1998.*
31. Tauskela JS, Mealing G, Jacobson SL, **Hakim AM** and Morley P: A regulated environmental perfusion system for the study of anoxic or hypoxic cultured neurons using micro fluorescence imaging and electrophysiology. *Pflugers Arch - Eur J Physiol* 435: 775-780, 1998. ***
32. **Hakim AM**, Silver F and Hodgson C. Organized stroke care: A new era in stroke prevention and treatment. *CMAJ* 159: 1-S, September 1998.
33. Hazell AS, **Hakim AM**, Senterman MK and Hogan MJ: Regional activation of L-type voltage-sensitive calcium channels in experimental thiamine deficiency. *J Neurosci Res* 52: 742-749, 1998.*
34. Hazell AS, McGahan L, Tetzlaff W, Bedard AM, Robertson GS, Nakabeppu Y and **Hakim AM**: Immediate-early gene expression in the brain of the thiamine-deficient rat. *J Molec Neurosci* 10: 1-15, 1998.**
35. Duggal N, Schmidt-Kastner RS and **Hakim AM**: Nestin expression in reactive astrocytes following focal cerebral ischemia in rats. *Brain Res* 768: 1-9, 1997.*
36. Xu DG, Crocker SJ, Doucet J-P, St-Jean M, Tamai K, **Hakim AM**, Ikeda J-E, Liston P, Thompson CS, Korneluk RG, MacKenzie A and Robertson GS: Elevation of neuronal expression of NAIP reduces ischemic damage in the rat hippocampus. *Nature Med* 3: 997-1004, 1997.**
37. Xu DG, Korneluk RG, Tamai K, Wigle N, **Hakim AM**, MacKenzie A and Robertson GS: Distribution of neuronal apoptosis inhibitory protein-like immunoreactivity in the rat central nervous system. *J Comp Neurol* 382: 247-259, 1997. **
38. Schmidt-Kastner R, Bedard A and **Hakim AM**: Transient expression of GAP-43 within the hippocampus after global brain ischemia in rat. *Cell Tissue Res* 288: 225-238, 1997. **
39. Osuga S, **Hakim AM**, Osuga H and Hogan MJ: *In vivo* uptake of [3H]nimodipine into brain during cortical spreading depression. *J Cereb Blood Flow Metab* 17: 586-590, 1997. **
40. Matsushima K, MacManus JP and **Hakim AM**: Apoptosis is restricted to the thalamus in thiamine-deficient rats. *NeuroReport* 8: 867-870, 1997.*
41. Schmidt-Kastner R, Fliss H and **Hakim AM**: Subtle neuronal death in striatum after short forebrain ischemia in rats detected by in situ end-labelling for DNA damage. *Stroke* 28: 163-169, 1997.**
42. Matsushima K, Hogan MJ and **Hakim AM**: Cortical spreading depression protects against subsequent focal cerebral ischemia in rats. *J Cereb Blood Flow Metab* 16: 221-226, 1996.*
43. Osuga H and **Hakim AM**: Relationship between extracellular glutamate concentration and voltage-sensitive calcium channel function in focal cerebral ischemia in the rat. *J Cereb Blood Flow Metab* 16: 629-636, 1996.*
44. Hogan MJ, Takizawa S and **Hakim AM**: In vitro binding of [3H] nimodipine and [3H] CGS-19755 to rat brain in focal cerebral ischemia. *Exp Neurol* 134: 56-63, 1995.**

45. Matsushima K and **Hakim AM**: Transient forebrain ischemia protects against subsequent focal cerebral ischemia without changing cerebral perfusion. *Stroke* 26: 1047-1052, 1995.*
46. Osuga H and **Hakim AM**: Relevance of interstitial glutamate to selective vulnerability in focal cerebral ischemia. *J Cereb Blood Flow Metab* 14: 343-347, 1994.*
47. Takizawa S, Hogan MJ, Buchan AM and **Hakim AM**: *In vivo* binding of [3H] nimodipine in rat brain after transient forebrain ischemia. *J Cereb Blood Flow Metab* 14: 397-405, 1994.**
48. **Hakim AM**: Could transient ischemic attacks have a cerebroprotective role? *Stroke* 25: 715-717, 1994.*
49. Hogan MJ and **Hakim AM**: Nimodipine binding in cerebral ischemia: Response to therapy. *Drugs in Develop* 2: 325-335, 1993.**
50. Hazell AS, Butterworth RF and **Hakim AM**: Cerebral vulnerability is associated with selective increase in extracellular glutamate concentration in experimental thiamine deficiency. *J Neurochem* 61: 1155-1158, 1993. **
51. Hogan MJ and **Hakim AM**: Reversibility of nimodipine binding to brain in transient cerebral ischemia. *J Neurochem* 59: 1745-1752, 1992. **
52. **Hakim AM**, Hogan MJ and Carpenter S: Time course of cerebral blood flow and histological outcome after focal cerebral ischemia in rats. *Stroke* 23: 1138-1144, 1992.*
53. Hogan MJ, Gjedde A and **Hakim AM**: In-vivo distribution of CGS-19755 within brain in a model of focal cerebral ischemia. *J Neurochem* 58: 186-191, 1992.**
54. Meyer E, Delpla P, Petrides M, Ethier R, Bes A and **Hakim AM**: PET metabolic and neuropsychological correlates of periventricular lucencies. In: *Cerebral Ischemia and Dementia*, Hartmann, Kuschinsky, Hoyer (Eds), 368-373, 1991.
55. Takizawa S and **Hakim AM**: Animal Models of Cerebral Ischemia. 2. Rat Models. *Cerebrovasc Dis* 1(suppl 1): 16-21, 1991.*
56. Hogan MJ, Gjedde A and **Hakim AM**: *In vivo* binding of nimodipine in the brain. II. Binding kinetics in focal cerebral ischemia. *J Cereb Blood Flow Metab* 11: 771-778, 1991.*
57. **Hakim AM** and Hogan MJ: *In vivo* binding of nimodipine in the brain. I. The effect of focal cerebral ischemia. *J Cereb Blood Flow Metab* 11: 762-770, 1991.*
58. Takizawa S, Hogan M and **Hakim AM**: The effects of a competitive NMDA receptor antagonist (CGS-19755) on cerebral blood flow and pH in focal ischemia. *J Cereb Blood Flow Metab* 11: 786-793, 1991.*
59. Meyer E, Ferguson SS, Zatorre RJ, Alivisatos B, Marrett S, Evans AC and **Hakim AM**: Attention modulates somatosensory cerebral blood flow response to vibrotactile stimulation as measured by positron emission tomography. *Ann Neurol* 29: 440-443, 1991.
60. Archer DP, Labrecque P, Tyler JL, Meyer E, Evans AC, Villemure JC, Casey WF, Diksic M, **Hakim AM**, Trop D: Measurement of cerebral blood flow and volume with positron emission tomography during isoflurane administration in the hypocapnic baboon. *Anesthesiology* 72: 1031-1037, 1990.***
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