INNOVATION

PEOPLE

PROGRESS

CANADIAN STROKE NETWORK ANNUAL REPORT

2002-2003

Canadian Stroke Network

Réseau Canadien contre
les accidents cérébrovasculaires

Our Mission

The Canadian Stroke Network's mission is to reduce the impact of stroke on the lives of individual Canadians and on society as a whole. The Network will place Canada at the forefront of stroke research through its multi-disciplinary research program, high-quality training for Canadian scientists and clinicians and national and global partnerships.





The Network of Centres of Excellence of Canada

Networks of Centres of Excellence are unique partnerships among universities, industry, government and non-governmental organizations aimed at turning Canadian research and entrepreneurial talent into economic and social benefits for all Canadians. An integral part of the federal government's Innovation Strategy, these nationwide, multidisciplinary and multisectorial research partnerships connect excellent research with industrial know-how and strategic investment.

CANADIAN STROKE NETWORK ANNUAL REPORT 2002-2003

Network of Centres of Excellence

Réseaux de centres d'excellence

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David W. Scott Katie Lafferty Antoine Hakim

message from CSN management

Over the past year, the CSN has renewed its commitment to reducing the effects of stroke on Canadian society. In the autumn of 2002, an external panel reviewed the progress of the CSN, recommended approval of its mandate, and provided positive feedback. The panel encouraged the CSN to maintain its direction in the years ahead. The CSN, through a strategic planning exercise, recognized the need to focus its efforts on fewer, yet higher-impact projects and to make a concerted effort in knowledge translation – moving the latest research to the bedside. Over the 2002-2003 year, the CSN has made significant progress in achieving these goals.

The CSN began its 2002-2003 year with a successful AGM in Calgary, Alberta. Approximately 100 CSN investigators, trainees and partners gathered for the event, which featured a keynote address by Matt Spence, President of the Alberta Heritage Fund for Medical Research. The investigators were provided with an opportunity to exchange ideas, communicate progress on their projects, and plan for the upcoming CSN call for proposals.

This year's call for proposals reflected the CSN's intention to focus its resources and investment. The CSN's External Scientific Review Committee reviewed all CSN projects based on criteria that extended beyond research excellence. Projects needed to reflect the strategic goals of the CSN (i.e. be collaborative, value-added projects), and have a tangible and measurable impact on the disease of stroke. As a result, the CSN is funding 18 projects with more significant resources dedicated to each. The partner contributions to these projects are worth noting, with four projects benefiting from at least one partner dollar per CSN dollar invested.

Most impressive is the degree of collaboration evident in CSN projects. As the Network matures so do the working relationships of the investigators – resulting in more powerful research. For example, the project "Stroke Canada Optimization of Rehabilitation through Evidence" (SCORE) has built on CSN research, bringing together a diverse group of rehabilitation and knowledge transfer experts to ensure that the best rehabilitation evidence is applied in practice. Another project, "Adult Stem Cells to Treat Stroke", pairs CSN researchers with researchers from the Stem Cell Network. Although still in its early days, this field of research offers tremendous potential for stroke recovery.

Integral to the CSN's goals is the training of the next generation of stroke researchers and clinicians. The CSN is proud of its achievements in this sphere. More than 200 highly qualified personnel are involved in CSN research projects. Another 40 research trainees are directly supported by the CSN through its own training program and through the Focus on Stroke partnership, for which the CSN won the "Partner of the Year" award from the Canadian Institutes of Health Research in 2002. The CSN also recognizes the importance of training clinicians in delivering optimal stroke care. To address this, the CSN is currently working with a group of experts in London, Ontario, developing a modular, Web-based clinical training program.

The CSN recognizes that in addition to furthering knowledge about stroke, it has an important role to play in ensuring that this knowledge is applied in practice. Over the past year, the CSN has renewed its commitment to knowledge translation, dedicating a new research theme (Theme 5) to this effort. The major project within this theme will look at ways of applying research evidence in stroke.

Creating Theme 5 was the first step in the broader catalyst role the CSN is playing in bringing into stroke practice, across Canada, the best evidence available to health-care workers. In spring 2003, the CSN co-hosted a "Stroke Summit" with the Heart and Stroke Foundation of Canada. The summit brought together individuals and organizations in Canada with an interest in stroke to discuss national priorities. As a result of this meeting, the CSN and the Heart and Stroke Foundation will work together this year to develop a Canadian Stroke Strategy.

The Registry of the CSN continues to play an important role in shaping health systems and policy in Canada. With over 9,000 patients currently registered, CSN researchers and policymakers are beginning to tap into this wealth of stroke information. CSN researchers have presented the findings at major conferences and several articles are in production.

At a management level, this year saw several changes for the CSN: We constituted the Business Development Advisory Committee, we added four new members to the External Scientific Review Committee, we welcomed Jennifer Masek as CSN Financial Coordinator, we said goodbye to our NCE project officer Eniko Megyeri-Lawless, and we mourned the passing of Dr. Peter Garner, a dedicated member of the CSN Ethics Committee and a stroke survivor. At the close of 2002-2003, the terms of the following Planning and Priorities Committee (PPC), members drew to a close: Drs. Kue Young, Stephen Phillips, Harold Robertson, Nathalie Dakers, and Nancy Mayo. We thank these PPC members for their scientific leadership and support during the critical first few years of the Network. We welcome the new PPC members: Mary Lewis, of the Heart and Stroke Foundation of Ontario, Brian MacVicar of the University of British Columbia, and Nicol Korner-Bitensky of McGill University.

At the Board level, Bill Tholl of the Canadian Medical Association, Susan Crocker, and Brian Field of Interdev Technologies stepped down as Directors. In recognition of his lifetime achievement in stroke research, the CSN named Dr. Henry Barnett a Director Emeritus. This year the CSN lost one of its founding Directors, The Honourable Ramon Hnatyshyn. In recognition of his commitment to the CSN, the Network established "The Ramon Hnatyshyn" keynote address to be delivered each year at the Annual General Meeting. We recognize the commitment and leadership of these Directors and thank them for generously giving their time and enthusiasm to the Network. We welcome the new CSN Directors: Dr. Aubrey Tingle of the Michael Smith Foundation for Health Research, Sally Brown of the Heart and Stroke Foundation of Canada, Anthony DiMonte of Emergency Medical Services Ottawa, and Eric Elvidge of Blakes Cassels&Graydon LLP.

The CSN has much to be proud of in the past year, yet the disease of stroke continues to provide significant challenges. As a mature Network, the CSN is confident that it has the leadership, the expertise, and the experience to meet these challenges as it continues to forge strong partnerships. We look forward to an exciting year ahead.

David W. Scott
Chair, Board of Directors

Antoine Hakim
CEO and Scientific Director

Katie Lafferty
Executive Director

stroke is preventable

Stroke is unique among the brain's many possible afflictions. By and large, we cannot prevent Parkinson's disease or premature Alzheimer's disease but we know a number of risk factors for stroke, and we know that the chances of suffering a stroke are significantly reduced if risk factors are controlled. These risk factors prominently include high blood pressure, heart disease, such as atrial fibrillation, high cholesterol levels, smoking, sedentary lifestyle, and TIAs (Transient Ischemic Attacks) – small warning events that often precede a stroke. There are a number of other risk factors specific for females (menopause, mitral valve prolapse, migraine + birth control).

One of the health-care system's major failures is that the known risk factors are not adequately controlled. It is, for instance, estimated that only 16% of hypertension is adequately controlled. Why is that? The answer is complex, including lack of knowledge by the patient, lack of adequate medical care, and lack of follow up. In Theme 1, CSN scientists are investigating several aspects of this problem.

Projects

Fast Assessment of Stroke and Transient ischemic attack to prevent Early Recurrence (FASTER)

A. Buchan, J. Kennedy, H. Barnett, S. Black, R. Côté, A. Demchuk, M. Eliasziw, M. Hill, L. Lebrun, S. Phillips, D. Selchen, A. Shuaib, F. Silver, D. Spence, P. Teal and G. del Zoppo.

If we intervene rapidly, within hours of the first occurrence of the mild and reversible symptoms that often precede a stroke, can we prevent the big one from happening? Patients that experience a transient ischemic attack (TIA), or "mini-stroke", are at high risk for a major stroke. The risk is particularly high within the first few days following the TIA. Research will assess the impact of rapid (within 12 hours) therapeutic intervention following TIA symptoms. Patients will receive various combinations of drugs that reduce cholesterol (statins), drugs that reduce blood clotting (aspirin and anti-platelet drugs) or placebo. Fifteen sites across Canada will participate in the initial phase of this 7,500-patient clinical trial. The CSN's partners in supporting this research are the Canadian Stroke Consortium and the Ministry of Health and Long-Term Care in Ontario. In-kind contributions are also being provided by Merck Frosst.

Is Lipoprotein (a) a Risk Factor for Recurrent Ischemic Stroke in Children?

G. deVeber, P. Connelly, A. Chan and M. Koschinsky.

Three out of 100,000 children are the victims of an ischemic stroke. Ischemic stroke – the most common kind – occurs when the flow of blood to the brain is interrupted by a blood clot. Children who survive the first stroke often suffer additional (recurrent) TIAs or mini-strokes. In adults, a component of the blood called lipoprotein (a) has recently been linked with diseases of the arteries. This study looks at children who have suffered ischemic stroke and asks: Do higher than normal levels of lipoprotein (a) increase the risk of further strokes? Researchers will also develop improved tests for measuring lipoprotein (a) levels. This pilot-scale project, involving 3 institutions in Ontario, will bring experts in lipid research together with experts in pediatric stroke. Research will provide information on the importance of lipoprotein (a) levels as a stroke risk factor and may lead to ways to reduce recurrent strokes in children.

Early Stroke Risk Indicators: Cognitive Impairment and Carotid Atherosclerosis in a Canadian Aboriginal Population

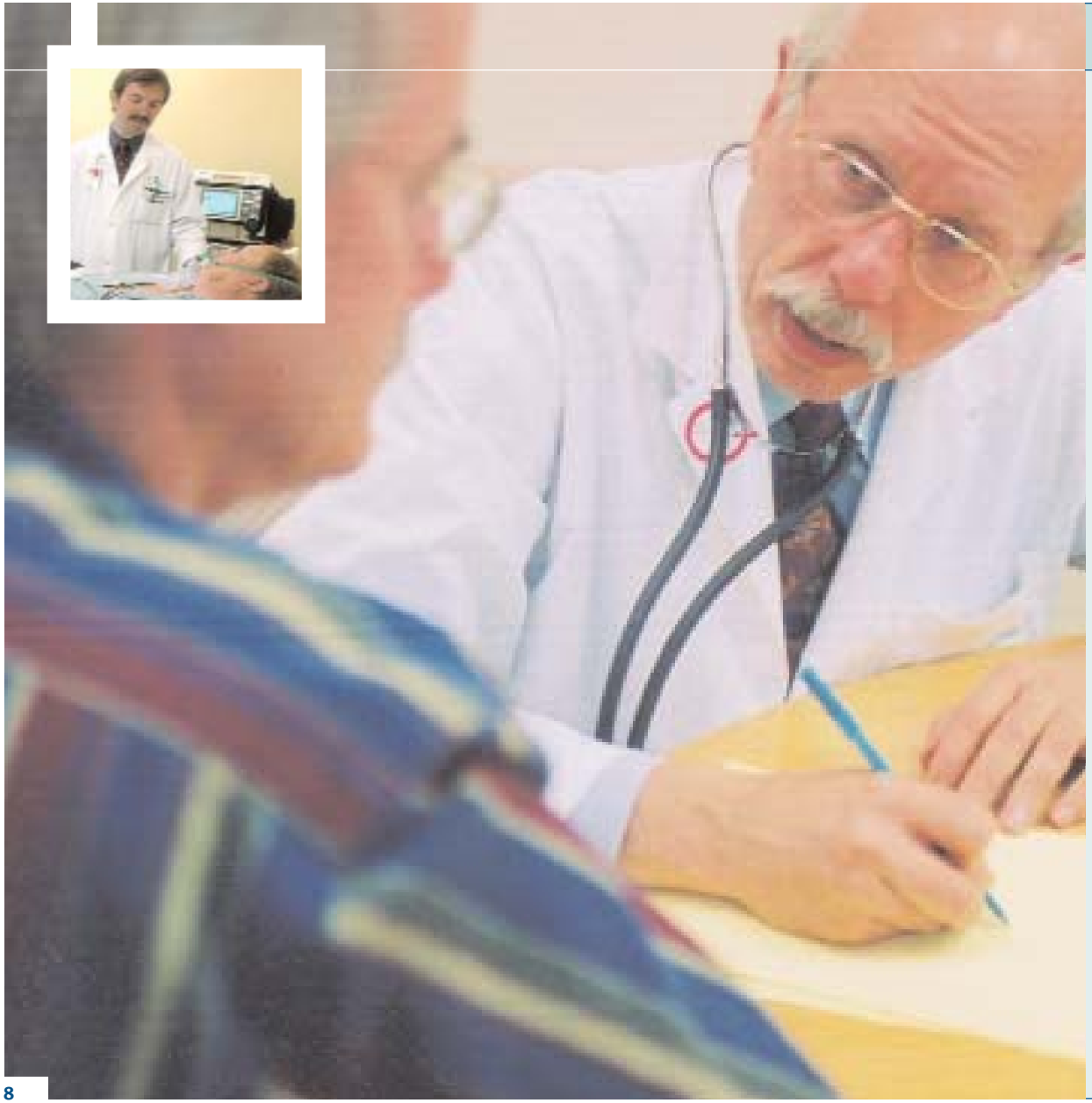
S. Bruce, D. Spence, V. Hachinski, K. Young, V. Menec and B. Anderson.

Carotid atherosclerosis – the formation of fatty deposits in the arteries that lead to the brain – is a risk factor for stroke. The incidence of atherosclerosis among Canada's First Nations peoples, a population that is thought to be at increased risk for stroke, is largely unknown. This study will investigate if the level of atherosclerosis in an aboriginal population is associated with a reduction in brain function (cognitive impairment) as assessed by a series of simple mental tests. A mild loss of memory, orientation and attention in individuals with atherosclerosis may possibly reflect the effects of a reduction in the flow of blood to the brain, or a series of undetected mini-strokes. Making the link between cognitive impairment and atherosclerosis will give health-care workers additional tools to identify patients who are likely to progress to stroke. Investigators from Ontario and Manitoba representing the disciplines of clinical neurology, epidemiology, anthropology and psychology will work with the Ojibway First Nation on this initiative that synergistically builds on an established CIHR-funded project in diabetes.

Improving Secondary Stroke Prevention: Usual Care versus Usual Care Plus Monitoring of and Counselling for Vascular Risk Factors

V. Hachinski, C. Mayer, S. Di Legge, V. Jain, F. Hart, J. Robertson, M. Harnadek, D. Spence, S. Black, D. Sahlas, R. Nolan, R. Côté, J. Minuk and B. Anderson.

Do patients who have suffered a minor stroke respond to counselling on stroke risk factors and the monitoring of their levels? Do they make lifestyle changes and take the prescribed medications and, if so, does this help reduce their risk factors and chances of getting additional strokes? This study of some 1,000 patients will answer these questions and provide insights into why patients often fail to follow physicians' advice on reducing stroke risk factors. A team of researchers from Ontario, Québec and Manitoba will collaborate on this project, which explores the barriers and tests solutions to effective stroke risk factor management. This is an important area of investigation as even a modest improvement in the control of risk factors in the population is likely to have a large impact on stroke incidence.



stroke is treatable

In the past few years, major advances have been achieved in stroke treatment. The Canadian Stroke Network aims to optimize stroke care so that all patients have access to the full range of appropriate treatments. A unique characteristic of stroke, compared to other brain conditions, is that, within certain time constraints, it is treatable. If a patient recognizes what is happening as a stroke, rapidly gets to an emergency room (ER), and this particular ER gives the patient priority access to a CT scan, and the scan does not show any hemorrhage in the brain, and the clot-busting drug t-PA is started within three hours from the onset of symptoms, the patient's deficit is much reduced, and sometimes totally eliminated.

What percentage of stroke patients receive t-PA? Our research shows that less than 10 per cent of eligible patients get the drug. Why? Do they not recognize the symptoms? Can they not find adequate transportation to an ER? Do they end up in an ER that is unprepared to treat them? What happens to the patients after they enter hospital? Do they go to a specialized ward, or to a general medicine ward? Are they admitted at all? If they are, do they get adequate nursing care? Adequate physiotherapy? What percentage is back at work within six months? These and other unanswered questions are the reasons the CSN has set up the Registry of the Canadian Stroke Network, where data on stroke patients are being collected in small and large hospitals across the country. The information is then anonymized and centralized at the Institute for Clinical and Evaluative Sciences (ICES) for analysis.

Project

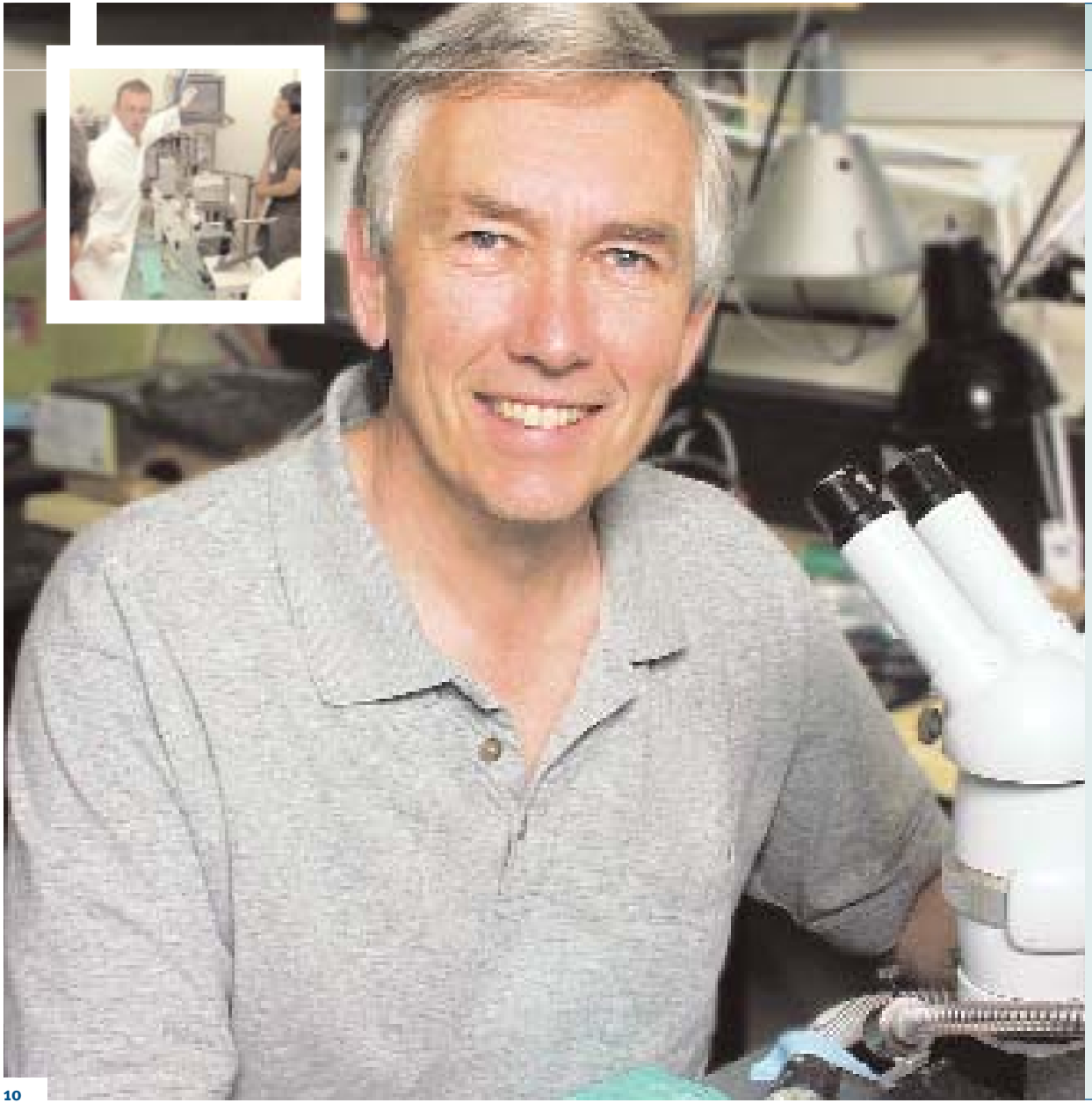
The Registry of the Canadian Stroke Network

M. Kapral and F. Silver, S. Phillips, J. Tu, A. Laupacis and K. Willis.

Specific aims of the Registry include: (i) determine the characteristics (age, gender, stroke severity, associated conditions and risk factor profile) of patients with stroke and TIA presenting to participating institutions; (ii) document the care they receive, with a specific focus on recognized stroke care quality indicators including the use of neuroimaging, thrombolysis, stroke unit care, and antithrombotic agents; (iii) determine the impact on patient outcomes of variations in age, gender, stroke type and the type of services and interventions received; and (iv) evaluate the outcomes of patients after stroke.

The Registry of the Canadian Stroke Network was the first national prospective database of stroke patients. In Phase I and II of the Registry, collaborators from 21 Canadian hospitals in eight provinces collected clinical data that characterized the entire stroke event from the onset of symptoms to the patient's status six months post-stroke. From the analysis of data on almost 10,000 patients collected in Phase I & II of the Registry, the CSN will formulate recommendations for best practice in stroke management that will place Canada at the forefront of stroke care and research. Phase III of the Registry is being developed to provide a population-based sampling of stroke patients that will complement the Phase I & II data.

This large-scale project is partnered with the Institute for Clinical Evaluative Sciences (ICES) and is supported in Ontario by the Ministry of Health and Long-term Care. The Canadian Stroke Consortium also provides in-kind support. The Registry forms a key tool for monitoring and evaluating the Heart and Stroke Foundation of Ontario and Ontario Ministry of Health's "Ontario Coordinated Stroke Strategy". The CSN is also exploring the commercial potential of the Registry data and the software and infrastructure developed for the Registry.



stroke creates havoc in the brain

Stroke provokes many molecular and cellular changes in the brain. Like aftershocks from an earthquake, the effects of these changes can continue for days. It is known that the primary effect of stroke and these consequent biochemical changes is the death of brain cells. Understanding the biochemical changes and pathways that lead to the death of brain cells can lead to new ideas as to how to block these processes with drugs and reduce stroke damage.

Projects

Inflammation in Cerebral Ischemia

D. Corbett, M. Del Bigio, J. Nagy, J. Peeling, L. Schlichter and W. Walz.

Does reducing the inflammation that occurs in the brain following stroke limit the extent of brain damage? A strong inflammatory response is triggered in the brain in the hours following stroke and can persist for several days. There is evidence that this response is not beneficial. Minocycline is an established anti-inflammatory drug that is able to enter the brain. The drug will be tested in animal models to determine if reducing inflammation can provide some level of protection against the lasting functional damage that occurs following stroke. Since Minocycline has a well-determined safety profile in humans, demonstrating that it is effective in animal models of stroke could rapidly lead to clinical trials. Investigators at laboratories in Newfoundland, Ontario, Manitoba and Saskatchewan are collaborating on this important project.

Pre-clinical Studies on Treatment of Stroke with Inhibitors of NMDA receptor – PSD-95 Interaction

M. Salter, J, Gurd, R. Tasker, M. Tymianski and Y. Wang.

The central role of a protein called the NMDA receptor in the death of brain cells after stroke is well established. However, agents targeting the NMDA receptor have not proven to be clinically useful in stroke as they block the normal function of the receptor that is important for brain activity. An alternative strategy is to interfere with just the cell-death inducing NMDA receptor signaling pathways, by disrupting interactions of the NMDA receptors with their associated scaffolding (PSD-95) and signaling proteins. In previous studies funded by the CSN, this team of researchers has established the importance of the NMDA-PSD-95 interaction and has developed peptides that can interfere with this interaction. Furthermore, they subsequently demonstrated in animal models of stroke that injections of these peptides can reduce the extent of brain damage. This work has been described in two publications in the prestigious journal *Science*. The next key goals for this project are (i) to show that the peptides are effective in reducing the longer-term disability caused by stroke, and (ii) to identify “drug-like” compounds that can inhibit the NMDA-PSD-95 interaction. This collaboration among investigators based in Ontario, British Columbia and Prince Edward Island is likely to attract partnerships from the private sector as the potential of the research to lead to a treatment for stroke develops.

Viral Vector Core Facility

R. Slack and D. Park.

A unique laboratory is turning a common cold virus into microscopic cargo carriers to shuttle healthy DNA into cells – and helping top Canadian stroke researchers explore the enormous potential of gene therapy in the process. The Adenovirus Core Facility is constructing customized viral vectors, or messengers, for use in gene therapy projects. The facility uses a disabled adenovirus – the virus that causes the common cold – to deliver healthy copies of genes into cells to replace faulty or missing genes. The ability to express foreign genes in brain cells represents a milestone in brain cell death research. The Viral Vector Core Facility will further develop this technique and produce reagents that will be available to other researchers in the Stroke Network to facilitate their use of this important tool.

Molecular Mechanisms of Neuronal Injury: Development of a Therapeutic Strategy for Stroke-Induced Damage

D. Park and B. MacVicar, M. Cynader, G. Robertson, J. Roder, T. Murphy, J. MacDonald, M. Tymianski, R. Slack, W. Tetzlaff, S. Vincent and P. Stys.

The dramatic biochemical changes that occur in the brain following stroke trigger multiple signaling events in brain cells. Signals traveling by different molecular pathways in the cell can carry the same message: Die! Therefore, in order to achieve robust protection of the cells from death, it may be necessary to simultaneously block several of the alternative cell death signaling pathways. The failure of "neuroprotective" drug candidates in stroke trials could be due in part to their pathway-specific mechanism of action. This research will compare three major cell death pathways and ask if additive, or better yet, synergistic protective effects can be obtained by blocking them in combination. Research carried out in this collaboration between laboratories in British Columbia, Ontario and Alberta may point the way to the need for a "cocktail" approach to neuroprotective therapy for stroke.

Molecular Mechanisms of Preconditioning

L. Sabourin, P. Morley, A. Hakim, C. Thompson and B. Kolb.

Just as training for a sports event leads to improved performance, "preconditioning" of the brain can increase its resistance to a subsequent stroke. Preconditioning can be induced in experimental models of stroke by, for example, electrical stimulation, or short sub-critical exposure to the chemicals that would be released by a stroke. The aim of this research is to identify genes in the brain that are turned on or off by the preconditioning process – since this may yield important insights into the mechanisms triggered by preconditioning that protect the preconditioned brain from the effects of stroke. One promising candidate gene known as Egr-1 has been identified by this approach and its role in neuroprotection is being evaluated.

brain function can be restored

Sixty per cent of stroke victims are left with a permanent disability. The impact on quality of life is enormous – both for stroke patients and their families. The good news is that the brain is optimally wired for repair. It has efficient mechanisms to heal itself, all aimed at preserving life and improving its quality. Clinicians have always marveled at the fact that the most common type of stroke leaves the patient with a rigid extended leg, and a flexed arm. This allows the patient to use the leg as a stiff “stick” to walk with, and the arm, bent at the elbow, to eat with by bringing it thus closer to the mouth. Think if, as a result of the stroke, the leg was bent and the arm was stretched, how impossible survival would be.

The other common observation is that stroke patients regain some of the functions lost early. This recovery process is due to the brain “re-wiring” itself. If the part of the brain that moves the right arm is damaged by a stroke, there is initial paralysis of the arm. The brain then assigns the job of moving the arm to an adjacent brain segment that previously had a different assignment, and over time, the arm starts to move again. Reservoirs of young cells (stem cells) have recently been discovered in adult humans. As a result of a stroke, these cells are mobilized out of their hiding places and directed to go towards the site of injury to get involved in the re-building process.

Projects

The Stroke Canada Optimization of Rehabilitation through Evidence (SCORE) Project

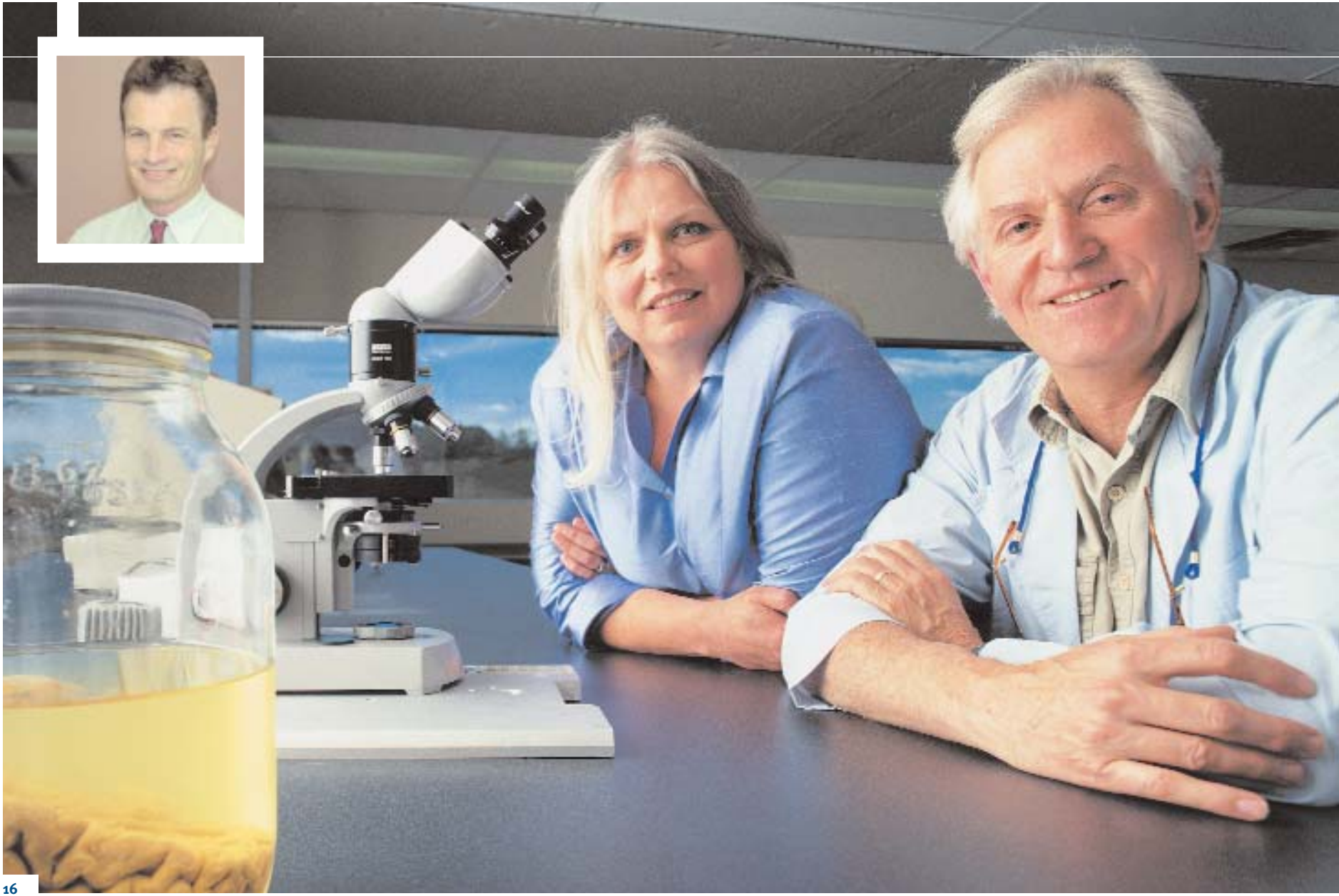
M. Bayley, R. Teasell, N. Korner-Bitensky, S. Barreca, S. Black, L. Brosseau, J. Desrosiers, I. Graham, M. Harrison, S. Jaglal, J. Jutai, M. Lewis, R. Lyons, R. Martino, N. Mayo, C. Richards, F. Malouin, J. Hanley, E. Kehayia and S. Wood-Dauphinee.

Rehabilitation, the physical restoration and re-education required to allow a stroke victim to regain the activities of a normal life, is an important part of the stroke recovery process. The current practice of rehabilitation in Canada is a hodgepodge of techniques and approaches. This large-scale project sets out to change the practice of rehabilitation in Canada by (i) identifying and eliminating therapies that are not effective, (ii) by identifying and communicating gaps in our knowledge as to the effectiveness of common therapies and techniques, and (iii) implementing existing evidence-based rehabilitation strategies. A nationwide network of academic rehabilitation centres will be developed to accomplish these goals. The various components of this multidisciplinary project which include evidence-based review, research gap analysis & research priority setting, rehabilitation knowledge translation, practice guideline development and a national survey of rehabilitation practice will be coordinated by Canada's leading experts in these fields. Financial contributions from the Canadian Stroke Rehabilitation Clinical Network, London Life, Ontario Ministry of Health and Long-Term Care, Heart and Stroke Foundation of Ontario, the Toronto Rehabilitation Institute, and Le Fonds de la Recherche en Santé du Québec are helping to support this project.

Adult Stem Cells to Treat Stroke

S. Weiss, F. Miller, M. Bhatia, F. Colbourne, D. Corbett, B. Kolb, I. Mendez, C. Morshead and R. Slack.

Can adult stem cells repair the damage to the brain caused by stroke? Stem cells have the ability to reproduce themselves and change ("differentiate") into other more specialized cell types, such as nerve cells. Two approaches to adult stem cell mediated brain repair will be evaluated in animal models of stroke. In the first approach, stem cells pre-existing in the brain are stimulated by adding growth factors to make new brain cells that will repair the damage caused by stroke and facilitate recovery of function. The second approach is to isolate adult stem cells from tissue, such as skin or bone marrow, and transplant them into the damaged brain. As part of this investigation a detailed comparison will be made of the properties of brain nerve-like cells derived from adult "non-nerve" stem cells (e.g. isolated from skin) versus adult "nerve" stem cells (e.g. isolated from the brain). This multi-disciplinary project involving cell biology, transplantation and animal models brings together leading researchers from the fields of stem cells and stroke from across the country. Recognizing the potential impact of this work, the CSN has partnered with the Stem Cell Network and the CIHR's Institute of Neurosciences, Mental Health and Addiction and the Institute of Circulatory and Respiratory Health to support this important large-scale project.



Stimulating Plastic Processes to Facilitate Functional Restitution after Cortical Stroke

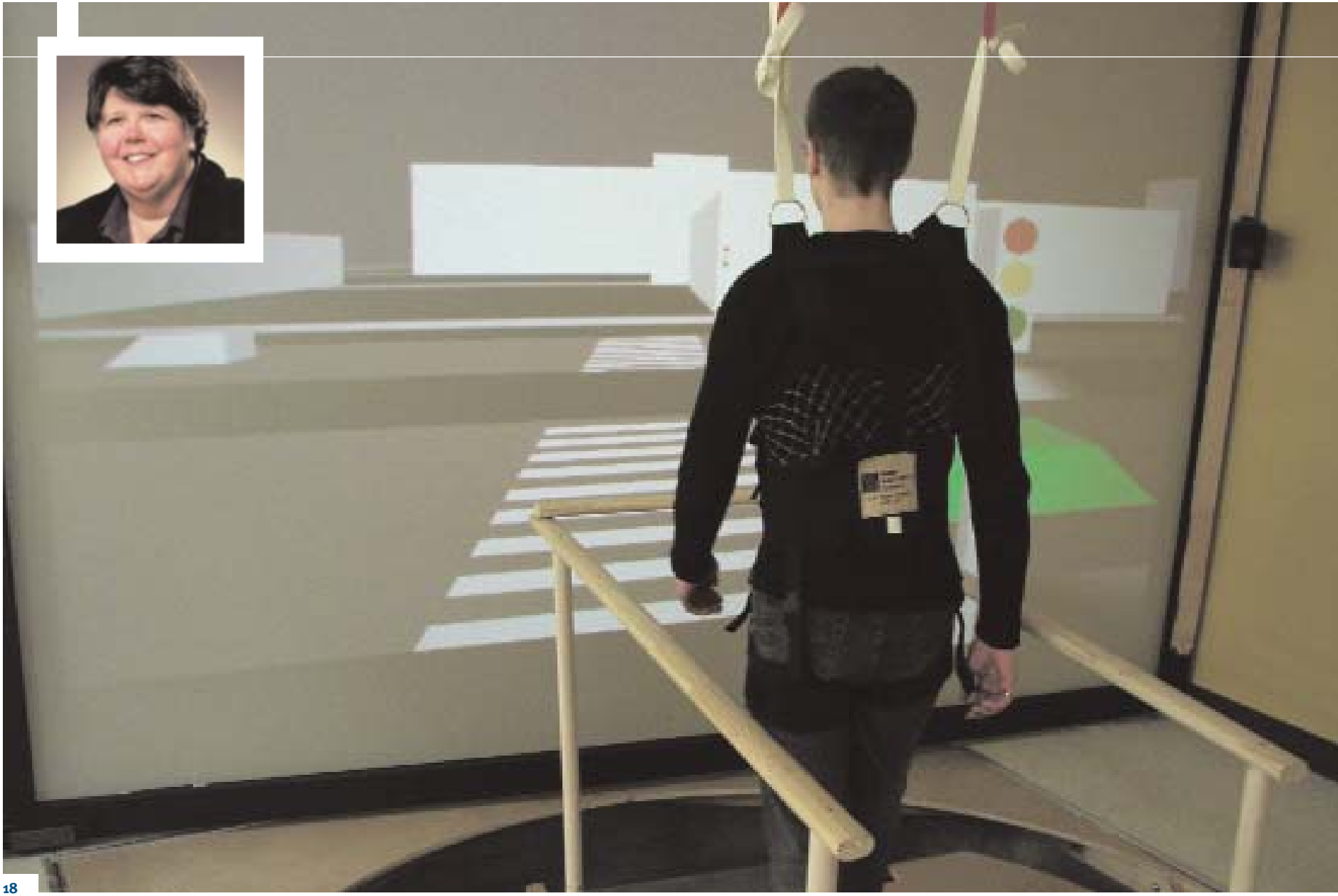
B. Kolb, F. Colbourne, R. Dyck, A. Hakim, J. Kleim, R. McDonald, G. Prusky, R. Sutherland and C. Teskey.

What are the mechanisms in the brain underlying the functional improvements that can result from post-stroke rehabilitation? Animal models will be used to study a range of treatments known to affect the normal brain to determine the impact they have on post-stroke recovery in the presence and absence of forms of rehabilitation. Treatments will include, for example, growth factors, hormones, stimulants and electrical stimulation. The recovery process will be correlated with changes occurring in the brain at the level of genes, proteins and cells. Researchers with expertise in animal behavioural analysis, psychology, neuroanatomy, biochemistry and clinical stroke from five universities will collaborate on this project. It is expected that this work will lead to better insights into the mechanisms of recovery, which will in turn direct the development of new approaches to rehabilitation.

Understanding Quality of Life Post-Stroke: A Study of Individuals and their Caregivers

S. Wood-Dauphinee, N. Mayo, A. Cheung, M. Bayley, J. Garland and J. Jutai.

What is the meaning of quality of life in the context of stroke? Quality of life (QL) has emerged as the ultimate outcome upon which the impact of stroke interventions and stroke programs should be evaluated. Despite acceptance of its importance, there is little agreement about which aspects of the life of the person with stroke or of the informal (family) caregiver should be measured or how this should be done. Considerable thought needs to be given to the conceptualization of QL post stroke for both parties. The purpose of this project is to (i) build and empirically test models of health related quality of life (HRQL) for people with stroke and QL for their family caregivers, (ii) characterize the process and outcomes of recovery following a stroke on HRQL, and (iii) characterize the process and implications of informal caregiving over time. A prospective study of 600 persons with stroke and 360 informal caregivers recruited from sites in Quebec and Ontario is underway.



Development of Optimized Virtual Environments for the Training of Locomotor Disorders after Stroke

C. Richards, J. Fung, F. Malouin, B. McFadyen, A. Lamontagne and D. Laurendeau.

A flight simulator combines virtual reality computing and robotics technology to create an environment where pilots can practice their skills safely, repetitively and in a confined space. This research project aims to develop and test a "walking simulator". The project team includes academic experts from the fields of rehabilitation and engineering at two institutions in Quebec and collaborators from a Dutch computing and robotics technology company. The walking simulator will allow patients to safely re-acquire locomotor skills lost as a consequence of stroke.

Evaluating Driving after Stroke: Validity and Reliability of the Faros-ErgoDrive Driving Simulator

M. Vanier and I. Gélinas.

Individuals who survive a stroke and retain or subsequently re-acquire the ability to drive a car are typically required to have their skills re-evaluated. This process currently involves an extensive battery of tests, including road tests, and results in high costs and frustratingly long waiting lists. A driving simulator has been developed to mimic actual driving and road conditions. In this pilot study, investigators will determine if the simulator is a valid and reliable tool for predicting safe driving performance post stroke. For those individuals who are able to drive safely, validation of the simulator could facilitate the regaining of freedom and mobility that is so important to post stroke quality of life. The manufacturer of the driving simulator device provides in-kind support for this research.

Development of Animal Models for the study of Impairment, Compensation, and Recovery following Stroke

I. Whishaw and G. Metz.

Rodent models of stroke are important tools in the development and testing of new therapies and rehabilitation techniques. Simple models in which a stroke is induced and the subsequent ability of the animal to perform a single basic task is assessed may not provide a sufficiently complete description of the effects of the stroke or the therapy under investigation. Sophisticated behavioural analysis techniques are required to distinguish between (i) recovery from the intervention used to induce the stroke, (ii) "true recovery" from the stroke, (iii) simple compensation for the loss of function caused by the stroke, and (iv) the effects of rehabilitation. The research in this pilot scale project is directed towards developing the next generation of rodent models of stroke that are able to resolve these components of gross recovery.

making all this count – knowledge translation, practice and policy

What if CSN scientists discovered new ways of preventing strokes, designed effective therapies, gathered very useful demographic data on stroke care, and had definitive ideas on methods of repairing the brain – and no one with influence in the health care system, or over it, paid any attention? This theme is designed to open the right doors: to effect appropriate changes in the policies guiding our health care system, to modify physician behaviour in ways designed to improve practice and care, and to ally the medical and health care professions to enhance recovery of the stroke patient.

Project

Health Systems Utilization of Stroke Research: A Program of Research and Infrastructure Development to Facilitate Knowledge Translation in Health Services and Policy

R. Lyons, J. Grimshaw, S. Phillips, G. Gubitz, C. O'Callaghan, J. Farquarson, S. Jones, F. Silver, I. Sketris, R. Landry, E. Harrison, M. Lewis and M. Solomon.

Much of what is known in stroke is simply not applied in practice. Changes in the health care system require changes at the policy level. This project will come up with a survey that researchers can use to see if there are research findings that they should be sharing with politicians, doctors, physiotherapists and stroke patients. The project will also study how successful stroke care delivery systems currently manage knowledge translation. The primary example that will be studied is Ontario's Coordinated Stroke Strategy, a province-wide initiative to deliver top-quality stroke care. After studying the Ontario model, the project team will come up with a way to turn stroke research into routine care in other parts of the country, starting with Atlantic Canada. This project capitalizes on the desire for the four Atlantic Provinces to move forward together in a stroke strategy. Partnerships with the provincial Heart and Stroke Foundations and Ministries of Health will also be sought.

training

Under the leadership of Dr. Paul Morley and Dr. Vladimir Hachinski, the CSN has continued to make significant progress in implementing training programs for both basic scientists and health professionals. Based on the success of the "Focus on Stroke I" program, the CSN successfully leveraged partner dollars to implement the "Focus on Stroke II" initiative, targeted towards basic scientists at the graduate student, postdoctoral and new investigator levels. In addition, the CSN supports undergraduate students to work with Network investigators on summer research projects. Combined with grant-funded trainees, CSN is currently supporting more than 100 trainees.

In addition to personnel awards, the CSN has developed a video library of techniques for behavioural assessment of rodents following stroke. These videos form part of the curriculum for the Summer Program in Neuroscience (SPIN), a highly successful program attended by 45 graduate students and post-docs from all across Canada. Organized by CSN scientist Dr. Dale Corbett, the course at Memorial University in St. John's (pictured below) provided trainees with the complete picture of stroke research in Canada and theneed for meaningful interaction between basic scientists and clinicians. CSN trainees are also exposed to the entire spectrum of stroke research through attendance at the CSN's Annual General Meeting and Theme Meetings.

The CSN is very aware that there are critical capacity issues in the clinical sciences, rehabilitation and nursing. For the first time, the CSN has partnered to support two nursing fellowships, beginning in 2003. Dr. Hachinski has taken the lead in developing the curriculum for the CSN's national physician training program. The CSN has also expanded training outside of Canada's major centres through the TeleStroke Project, which uses interactive computer technology to link remote communities with stroke specialists in urban centres.

The CSN will continue to work with partners to develop targeted training programs for under-represented disciplines within the stroke community.

Paul Morley and trainee Barbara Murdoch

partnerships

The Canadian Stroke Network's foundation is its close interactions with a wide range of organizations that share our mission to reduce the impact of stroke. These relationships take many forms and include partners from academic, clinical, government, non-profit and private sectors. For example:

- Funding for the Adult Stem Cells To Treat Stroke project at the level of almost $2 million was made possible by forming a partnership between four organizations: The CSN, the Stem Cell Network, and two Canadian Institutes of Health Research – the Institute of Circulatory and Respiratory Health and the Institute of Neurosciences, Mental Health and Addiction.

- The Registry of the Canadian Stroke Network brings together funding support from the Ontario Ministry of Health and Long-Term Care, the participation of over 20 medical and health science centres across the country and significant in-kind resource contributions from Ontario's Institute for Clinical Evaluative Sciences.

- Partnerships with the national and provincial Heart and Stroke Foundations is central to our operations. In addition to the generous funding support that the Foundations provide, we are collaborating on a number of initiatives that will bring stakeholder organizations together to improve stroke services across the country.

- Examples of private sector partnerships include funding support from companies such as Boehringer Ingelheim and AstraZeneca. We are also working with pharmaceutical companies to facilitate the testing of drugs in development for the treatment of stoke.

Looking forward, the Network will continue to leverage its resources and effectiveness by the formation of innovative partnerships. A particular focus will be to strengthen our ties with the Heart and Stroke Foundation and to increase the involvement of the private sector.

Kevin Willis – Director of Partnerships

STATEMENT OF FINANCIAL POSITION

Year ended March 31, 2003

	2003	2002
	$	$
ASSETS		
Current		
Cash	3,154,490	4,090,399
Contributions receivable	703,075	808,918
Other receivables	11,212	35,676
Prepaid expenses	77,100	80,714
Total current assets	3,945,877	5,015,707
Capital assets	62,029	123,757
	4,007,906	5,139,464
LIABILITIES AND NET ASSETS		
Current		
Accounts payable and accrued liabilities	73,986	112,443
Contributions received in advance	3,219,646	4,274,366
Research commitments payable	-	143,000
Total current liabilities	3,293,632	4,529,809
Deferred capital contribution	47,396	63,200
	3,341,028	4,593,009
Net assets		
Invested in capital assets	14,633	60,557
Unrestricted	652,245	485,898
Total net assets	666,878	546,455
	4,007,906	5,139,464

STATEMENT OF OPERATIONS

Year ended March 31, 2003

	2003	2002
	$	$
REVENUES		
Network Centres of Excellence grant	5,951,493	4,922,415
Other grants	928,313	634,783
Contributions	226,000	286,085
Services in-kind	64,289	61,000
Deferred capital contribution recognized	15,804	15,800
Interest	5,827	211
	7,191,726	5,920,294
EXPENSES		
Research grants	5,926,153	4,573,502
Salaries and benefits	574,071	501,615
Conferences, seminars and meetings	245,743	309,454
General and administration	226,966	210,284
Amortization of capital assets	62,868	134,779
Professional and consulting fees	35,502	30,743
	7,071,303	5,760,377
Excess of revenues over expenses for the year	120,423	159,917

partners

The Canadian Stroke Network includes partnerships that extend across many disciplines and sectors. The CSN relies on these collaborations and the generous support of funding partners, including national and provincial Heart and Stroke Foundations.

Academic and Clinical

24 Canadian universities and research institutions
Canadian Stroke Consortium
25 medical and health science centres

Industry

AstraZeneca
Boehringer Ingelheim (Canada) Ltd.
Chalmers Research Group
Eli Lilly and Company
Hoffmann-LaRoche Limited
Interdev Technologies
Med-Eng Systems Inc.
Merck Frosst Canada
NeuroInvestigations
NeuroMed
NORTH Network
SYN•X Pharma

Non-profit organizations

Heart and Stroke Foundation of Canada
All provincial Heart and Stroke Foundations

Government Departments and Agencies

Networks of Centres of Excellence (NCE)
National Research Council of Canada
Canadian Institutes of Health Research
Institute for Circulatory and Respiratory Health
Institute of Neurosciences, Mental Health and Addiction
CIHR Rx&D
Health Canada
Institute for Clinical Evaluative Sciences
Ontario Ministry of Health and Long-Term Care
REPAR: Réseau provincial de recherche en adaptation-réadaptation
Stem Cell Network

board of directors

General Community

David W. Scott, Chair of the Board of Directors, QC, *Borden Ladner Gervais LLP,* Barristers and Solicitors (Ottawa, ON)

The Right Honorable Ramon J. Hnatyshyn, PC, CC, CMM, CD, QC., former Governor General of Canada and a senior partner at Gowling Lafleur Henderson

(The CSN mourned the passing of Ray Hnatyshyn in December 2002. In his honour, the CSN has established an annual memorial lecture delivered at our Annual General Meeting)

Stroke Community

William G. Tholl, Chief Executive Officer, Canadian Medical Association and former National Executive Director, Heart and Stroke Foundation of Canada

Frank Nieboer and Louise Nieboer, founders of the Stroke Recovery Association of Alberta

Business and Financial / Investment Community

Gerald P. McDole, MBA, President and CEO, AstraZeneca Canada

George Jackowski, PhD, Vice-Chairman and Chief Scientific Officer, SYN•X Pharma Inc.

Joy Calkin, PhD, former CEO and Deputy Chair, Extendicare Inc.

Susan Crocker, BSc, Corporate Director. Former President and CEO, Hospitals of Ontario Pension Plan (HOOPP).

Health Service Professionals Community

Brian Field, MBA, Executive Vice-President, CAO, Interdev Technologies Inc.

Government

Arthur J. Carty, PhD, President, National Research Council of Canada

National Scientific/Academic Community

H.J.M. Barnett, OC, MD, FRCPC, Professor Emeritus, University of Western Ontario and Scientist, *John P. Robarts* Research Institute (Ontario)

Alastair Buchan, MD, FRCPC, Professor of Neurology, Department of Clinical Neuroscience, University of Calgary, and Foothills Medical Centre, and Heart and Stroke Foundation of Alberta Professor of Stroke Research

International Scientific/ Academic Community

Gregory Del Zoppo, MD, Department of Molecular and Experimental Medicine, The Scripps Research Institute, and Division of Hematology/ Medical Oncology, Department of Internal Medicine, Scripps Clinic and Research Foundation (California)

Participating Institutions

Richard Riopelle, MD, Professor and Chair, Department of Neurology and Neurosurgery, McGill University

Host institution

Howard Alper, PhD, Vice-Rector, Research, and Professor, Department of Chemistry, University of Ottawa

Networks of Centres of Excellence

Enikö Megyeri-Lawless, Program Officer

CEO and Scientific Director

Dr. Antoine Hakim, MD, PhD, Director, Neuroscience Research Program, Ottawa Health Research Institute, Head, Division of Neurology, University of Ottawa, Senior Director, Heart and Stroke Foundation of Ontario Centre for Stroke Recovery

Deputy Scientific Director

Paul Morley, PhD, Senior Research Officer and Group Leader, Receptors and Ion Channels Group, Institute for Biological Sciences, National Research Council of Canada

Executive Director

Katherine Lafferty, BSc, MBA

The CSN wishes to thank the following founding Board Members whose terms expired in 2003:

Susan Crocker

Brian Field

Eniko Megyeri-Lawless

William Tholl

Dr. Henry Barnett retired from active service on the Board this year, but he was named a Director Emeritus in recognition of his role as a world leader in stroke research and as a mentor to the Canadian stroke research community.

The CSN welcomes the following individuals to the Board of Directors:

Sally Brown, Executive Director, Heart and Stroke Foundation of Canada

Anthony DiMonte, Director, Emergency Medical Services, City of Ottawa

Eric Elvidge, Partner, Business & Securities Law Group, Blake, Cassels & Graydon LLP

Louise Poulin, Program Officer, Network of Centres of Excellence

Dr. Aubrey Tingle, President and CEO, Michael Smith Foundation for Health Research

theme leaders

Theme 1 Co-Leaders:

Dr. Vladimir Hachinski, Professor, Department of Clinical Neurological Sciences, University of Western Ontario

Dr. T. Kue Young , Professor, Department of Public Health Sciences, University of Toronto

Theme 2 Co-Leaders:

Dr. Frank Silver, Associate Professor of Medicine, Division of Neurology, University of Toronto

Dr. Stephen J. Phillips, Associate Professor of Medicine, Dalhousie University

Theme 3 Co-Leaders:

Dr. Harry Robertson, Carnegie and Rockefeller Professor and Head of the Department of Pharmacology, Dalhousie University

Dr. Samuel Weiss, Professor and Alberta Heritage Foundation for Medical Research (AHFMR) Scientist, Departments of Cell Biology & Anatomy and Pharmacology & Therapeutics, University of Calgary Faculty of Medicine

Theme 4 Co-Leaders:

Dr. Bryan Kolb, Professor of Psychology and Neuroscience, University of Lethbridge

Dr. Nancy Mayo, Associate Professor, Department of Medicine and School of Physical and Occupational Therapy, McGill University

Theme 5 Leaders:

Dr. Jeremy Grimshaw, Director and Senior Scientist, Clinical Epidemiology, Ottawa Health Research Institute

Dr. Renée Lyons, Director, Atlantic Health Promotion Research Centre, Dalhousie University

Planning and Priorities Committee

Nathalie Dakers, Chief Operating Officer, NeuroMed Technologies Inc.

Vladimir Hachinski

Bryan Kolb

Debra Lynkowski, Health Canada

Nancy Mayo

Eniko Megyeri-Lawless

Stephen Phillips

Harold Robertson

Frank Silver

Samuel Weiss

Kue Young

The CSN wishes to thank the following founding Planning and Priorities Committee members whose terms expired in 2003:

Nathalie Dakers

Nancy Mayo

Eniko Megyeri-Lawless

Stephen Phillips

Harold Robertson

Kue Young

The CSN welcomes the following individuals to the Planning Priorities Committee members:

Mary Lewis, Government Relations, Heart and Stroke Foundation of Ontario

Louise Poulin, Network of Centres of Excellence

Brian MacVicar, Canada Research Chair in Neuroscience, University of British Columbia

Nicol Korner-Bitensky, School of Physical and Occupational Therapy, McGill University

External Scientific Review Committee

Pamela Duncan, PhD, Director, Brooks Center for Rehabilitation Studies, University of Florida, Gainsville, FL

Giora Feuerstein, PhD, Merck Research Laboratories, West Point, PA

Larry Goldstein, MD, Director, Duke University Center for Cerebrovascular Disease, Durham, NC

Constantino Iadecola, MD, Director, Weill Medical College, Cornell University, New York, NY

Lynn McQueen, Dr. PH, Office of Quality and Performance, Department of Veterans Affairs, Washington, DC

Ralph L. Sacco, MD, Associate Chair of Neurology and Associate Professor of Neurology and Public Health at Columbia University College of Physicians and Surgeons, New York, NY

Donald Stein, MD, Professor of Neurology and Psychology, Emory University, Georgia

Steven Wolf, PhD, Department of Rehabilitation Medicine, Emory University School of Medicine, Atlanta, GA

Business Development Advisory Committee

Susan Crocker, Corporate Director, Member of the Board of Directors of the Canadian Stroke Network

John Dickey, Capital Insights Incorporated

Eric Elvidge, Partner, Business and Securities Law Group (Ottawa), Blake, Cassels & Graydon LLP

George Jackowski, Ph.D., Vice Chair and CSO, SYN•X Pharma, Inc.

Marc LePage, Executive Vice President, Corporate Development, Genome Canada

Brian Radburn, Partner, PriceWaterhouseCoopers LLP

Ethics Advisory Committee

Bernard Dickens (Chair) Faculty of Law, University of Toronto

Timothy A. Caulfield, Research Director, Health Law Institute, University of Alberta

Peter R. Garner – Department of Obstetrics and Gynaecology (formerly) University of Ottawa (The CSN mourns the passing of Dr. Garner, a dedicated member of the Ethics Committee and a stroke recoverer, who died in November 2002.)

Robert F. Nelson – Neurologist, Department of Medicine, Ottawa Hospital

Burleigh Trevor-Deutsch – Faculty of Medicine, University of Ottawa

Donald J. Willison – Clinical Epidemiology and Biostatistics, McMaster University

university partners

Carleton University
Concordia University
Dalhousie University
John P. Robarts Research Institute
London Health Sciences Centre
McGill University
McGill University Health Centre
McMaster University
Memorial University of Newfoundland
Ottawa Health Research Institute
Queen's University
Samuel Lunenfeld Research Institute
Sunnybrook and Women's College Health Sciences Centre
The Hospital for Sick Children
Toronto Rehabilitation Institute
Trent University
Université de Montreal
Université de Sherbrooke
Université Laval (IRDPQ)
University Health Network, Toronto
University of Alberta
University of British Columbia
University of Calgary
University of Lethbridge
University of Manitoba
University of Ottawa
University of Prince Edward Island
University of Saskatchewan
University of Toronto
University of Waterloo
University of Western Ontario

investigators

Anderson, B. St. Boniface General Hospital
Anderson D. Dalhousie University
Bailey, P. Saint John Regional Hospital
Barnett, H. University of Western Ontario
Bayley, M. University of Toronto
Berger, L. Hôpital Charles LeMoyne
Black, S. Sunnybrook and Women's College Health Sciences Centre
Buchan, A. University of Calgary
Cain, D.P. University of Western Ontario
Cameron, D. Lions Gate Hospital
Cechetto, D. University of Western Ontario
Cheung, A. University Health Network
Chrétien, M. Ottawa Health Research Institute
Colbourne, F. University of Alberta
Corbett, D. Memorial University of Newfoundland
Côté, R. McGill University
Currie, W. Dalhousie University
Cynader, M. University of British Columbia
De Veber, G. Hospital for Sick Children
Del Zoppo, G. Scripps Clinic
Del Bigio, M. University of Manitoba
Demchuk, A. Foothills Medical Centre
Detsky, A. University of Toronto
Diamant, N. University Health Network
Doyon, J. Université de Montreal
Dyck, R. University of Calgary
Eliasziw, M. University of Calgary
Feasby, T. University of Calgary
Feeny, D. University of Alberta
Garland, J. University of Western Ontario
Ghali, W. University of Calgary

Grover, S. McGill University
Gurd, J. University of Toronto
Hachinski, V. University of Western Ontario
Hakim, A. University of Ottawa
Hill, M. University of Calgary
Hoch, J. University of Western Ontario
Hoffmaster, C.B. University of Western Ontario
Hogan, M. University of Ottawa
Howse, D. Kingston General Hospital
Jamieson, D. University of Western Ontario
Jia, W. University of British Columbia
Jutai, J. University of Western Ontario
Kapral, M. University of Toronto
Kleim, J. University of Lethbridge
Kolb, B. University of Lethbridge
Laupacis, A. Institute for Clinical Evaluative Sciences
Lebrun, L. Centre hospitalier de l'Université de Montréal
Lee, T.-Y. John P. Robarts Research Institute
MacDonald, J. University of Toronto
MacManus, J. National Research Council
MacVicar, B. University of Calgary
Malouin, F. Université Laval
Man-son-Hing, M. Ottawa Health Research Institute
Marcinkiewicz, M. Université de Montréal
Matchar, D. Duke University Medical Centre
Mayo, N. McGill University
McAlister, F. University of Alberta
McIntyre, D. Carleton University
Mikulis, D. University Health Network
Miller, F. Hospital for Sick Children
Morley, P. National Research Council
Mumby, D. Concordia University
Murkin, J. University of Western Ontario
Murphy, T. University of British Columbia
Nagy, J. University of Manitoba
Naus, C. University of Western Ontario
Nichol, G. Ottawa Health Research Institute
O'Connor, A. University of Ottawa
Park, D. University of Ottawa
Peeling, J. University of Manitoba
Pellis, S. University of Lethbridge
Penn, A. Centre for Stroke Research
Pennefather, P. University of Toronto
Phillips, S. Dalhousie University
Power, C. University of Calgary
Prusky, G. University of Lethbridge
Richards, C. Université Laval
Robertson, G. Dalhousie University
Robertson, H. Dalhousie University
Roder, J. Samuel Lunenfeld Research Institute
Sabourin, L. University of Ottawa
Salama, S. McMaster University
Salter, M. Hospital for Sick Children
Schlichter, L. University of Toronto
Seidah, N. Université de Montréal
Selchen, D. Trillium Health Sciences Centre
Sharma, M. Ottawa Health Research Institute
Shuaib, A. Walter MacKenzie Centre
Silver, F. University Health Network
Simard, D. Hôpital de l'Enfant-Jesus
Slack, R. University of Ottawa
Smith, P. University of Waterloo
Spence, D. University of Western Ontario
Straus, S. University of Toronto
Stys, P. Ottawa Health Research Institute

Tasker, A. University of P.E.I.
Teal, P. Vancouver Hospital and Health Sciences Centre
Teasell, R. University of Western Ontario
Tees, R. University of British Columbia
Teskey, C. University of Calgary
Tetzlaff, W. University of British Columbia
Thornhill, J. University of Saskatchewan
Tu, J. Institute for Clinical Evaluative Sciences
Tymianski, M. University Health Network
van der Kooy, D. University of Toronto
Veinot, J. University of Ottawa
Verrier, M. University of Toronto
Vincent, S. University of British Columbia
Voll, C. Royal University Hospital
Walz, W. University of Saskatchewan
Wang, Y.T. University of British Columbia
Weiss, S. University of Calgary
Whishaw, I. University of Lethbridge
Willison, D. McMaster University
Winocur, G. Trent University
Wong, M. St. Paul's Hospital
Wood-Dauphinee, S. McGill University
Young, T.K. University of Toronto

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