47th ANNUAL REPORT 1981-1982

Montreal Neurological Hospital
Montreal Neurological Institute

47th Annual Report

Montreal Neurological Hospital

Montreal Neurological Institute

1981-1982

(Version française disponible sur demande.)

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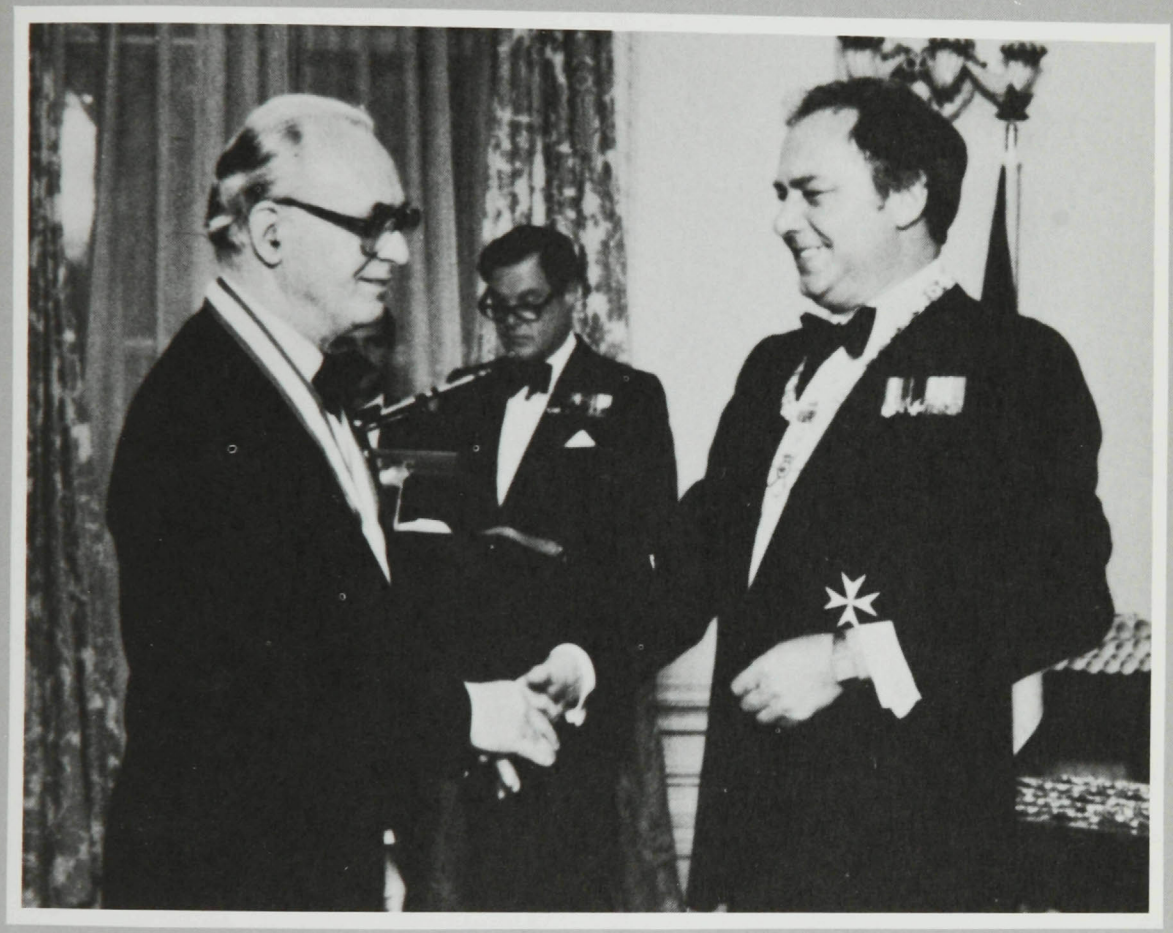
Montreal Neurological Hospital



In April 1983 Dr. William Feindel, director of the Montreal Neurological Institute and director-general of the Montreal Neurological Hospital was named an officer of the Order of Canada. Overleaf, Governor-General Edward Schreyer presents the decoration.

Board of the Corporation

President
Lawrence McDougall, BA, BCL*
President, Board of Directors, Montreal Neurological Hospital

Vice-President
William Feindel, BA, MSc, MDCM, DPhil, DSc, FRCS(C), FACS, FRSC*°
Director General, Montreal Neurological Hospital

Members
Roméo Ethier, BA, MD
Neuroradiologist-in-chief, Montreal Neurological Hospital

Yves Fortier, QC, BCL, BLitt

Richard Cruess, BA, MD, FRCS(C)
Dean of Medicine, McGill University

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Principal and Vice-Chancellor, McGill University

Colin Webster, BA, LLD
Governor Emeritus, McGill University

* Executive Committee member
° *Ex officio* member

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March 31, 1982

President
Lawrence McDougall, BA, BCL*
Elected by the Corporation

Honorary President
Colin Webster, BA, LLD*
Elected by the Corporation

Ex officio member
William Feindel, BA, MSc, MDCM, DPhil, DSc, FRCS(C), FACS, FRSC*
Director General, Montreal Neurological Hospital

Secretary
Laughlin Taylor, BEd, MSc
Neuropsychologist, Montreal Neurological Hospital

Members
Jacques Bergeron
Appointed by the Lieutenant-Governor of Quebec
(Representing Socio-Economic Groups)

Robert Birkett
Storekeeper, Montreal Neurological Hospital
Elected by non-clinical staff

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Director of Social Work Department, Montreal Neurological Hospital
(Representing the CLSC)

Richard Cruess, BA, MD, FRCS(C)
Dean of Medicine, McGill University
Appointed by McGill University

Yves Fortier, QC, BCL, BLitt
Elected by the Corporation

Samuel Freedman, BSc, MD, FRCP(C), FACP, FRSC
Dean of Medicine, McGill University
Appointed by McGill University

Richard Leblanc, MD
Elected by interns and residents

Raymond Matte
Appointed by the Lieutenant-Governor of Quebec
(Representing Socio-Economic Groups)

Jill Price
Elected by the users

Joy Shannon, BA
Elected by the users

Alan Gibb Thompson, MD, DABS, FACS, FRCS(C)
Elected by the Corporation

Jean-Guy Villemure, BA, MD, FRCS(C)
Neurosurgeon, Montreal Neurological Hospital
Elected by the Council of Physicians

Lloyd MacLean, MD, PhD, FRCS(C)
Surgeon-in-chief, Royal Victoria Hospital
By invitation

Caroline Robertson, N, BN, MScA
Director of Nursing, Montreal Neurological Hospital
By invitation

Membership as of September, 1982
Jacques Bergeron
Robert Birkett
Verna Bound
Richard Cruess, MD
William Feindel, MD
Yves Fortier
Richard Leblanc, MD
Peter Leggat
Raymond Matte
Lawrence McDougall
Sonja Newman
Laughlin Taylor
Alan G. Thompson, MD
Jean-Guy Villemure, MD
Colin Webster
Nancy Wright
Lloyd MacLean, MD *(by invitation)*
Caroline Robertson *(by invitation)*
Joy Shannon *(by invitation)*
Irena Straszak *(by invitation)*

* Executive Committee member

Council of Physicians Executive

Executive Committee, 1981-82
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Vice-Chairman, André Olivier, MD

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Irving Heller, MD
André Olivier, MD
Allan Sherwin, MD
Leonhard Wolfe, MD

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Admission and Duration of Stay
Serge Gauthier, MD

Credentials
Denis Melanson, MD

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Jean-Guy Villemure, MD

Library
Theodore Rasmussen, MD

Medical Evaluation
Michel Aubé, MD

Medical Records
Bernard Graham, MD

Nursing (Patient Care)
Allan Sherwin, MD

OR-ICU
Gilles Bertrand, MD

Out-patient
Irving Heller, MD

Pharmacology
Allan Sherwin, MD

Research Evaluation
Francis McNaughton

Representative to the Board of Directors
Jean-Guy Villemure, MD

Representative to the Board of the Corporation
Roméo Ethier, MD

Executive Committee, 1982-83
Chairman, John Woods, MD
Vice-Chairman, Jean-Guy Villemure, MD

Members
Michel Aubé, MD
William Feindel, MD *(ex officio)*
Irving Heller, MD
Jean-Guy Villemure, MD
Leonhard Wolfe, MD

Clinical and Laboratory Staff

Director General
William Feindel, BA, MSc, MDCM, DPhil, DSc, FRCS(C), FACS, FRSC

Biomedical Engineering
Biomedical Engineer
John Ives, MSc

Brain-Scanning Laboratory
Director
Lucas Yamamoto, BSc, MD, PhD

Electroencephalography
Electroencephalographer and Neurophysiologist
Pierre Gloor, MD, PhD, FRCP(C)

Associate Electroencephalographers
Frederick Andermann, BA, BSc, MD, FRCP(C)
Luis Felipe Quesney, BSc, MD, PhD

Assistant Electroencephalographers
Eva Andermann, BSc, MD, MSc, PhD, FCCMG
Michel Aubé, BA, MD, FRCP(C)
Ivan (John) Woods, MB, BAO, MSc, FRCP(C)

Electromyography
Electromyographer and Assistant Electroencephalographer
George Elleker, MD, FRCP(C)

Assistant Electromyographer
Daniel Gendron, MD, FRCP(C)

Neuroanesthesiology
Neuroanesthesiologist-in-chief
Davy Trop, MA, MD, MSc, FRCP(C), FACA

Associate Neuroanesthesiologist
Mounir Abou-Madi, MB, DA, FRCP(C), DABA, FACA

Assistant Neuroanesthesiologists
Klaus-Peter Karsunky, MD
Lise Morin, MD, FRCP(C)

Neurochemistry
Neurochemist and Medical Research Council Career Investigator
Leonhard Wolfe, BSc, MSc, PhD, MD, FRCP(C), ScD, FRSC

Neurochemist
Hanna Pappius, BSc, MSc, PhD

Neurogenetics
Neurogeneticist
Eva Andermann, BSc, MD, MSc, PhD, FCCMG

Neurology
Senior Consultants in Neurology
Francis McNaughton, BA, MSc, MD, FRCP(C)
J. Preston Robb, MSc, MD, FRCP(C)

Neurologist-in-chief
Donald Baxter, MD, MSc, FRCP(C)

Neurologists
Frederick Andermann, BA, BSc, MD, FRCP(C)
James B.R. Cosgrove, MD, MSc, MSc, FRCP(C)
Irving Heller, BSc, MD, MSc, PhD, FRCP(C)
George Karpati, MD, FRCP(C)
Allan Sherwin, BSc, MD, PhD, FRCP(C)

Associate Neurologists
Michel Aubé, BA, MD, FRCP(C)
David Caplan, BS, PhD, MD, FRCP(C)
Bernard Graham, BA, BSc, MD
Ivan (John) Woods, MB, BAO, MSc, FRCP(C)

Assistant Neurologists
George Elleker, MD, FRCP(C)
Serge Gauthier, BA, MD, FRCP(C)
Daniel Gendron, MD, FRCP(C)
Antoine Hakim, BS, MS, PhD, MD, FRCP(C)
Elizabeth Matthew, MBBS, FRCP(C)

Assistant Neurologist and Consultant in Pediatrics
Sergio Pena, MD, PhD, FRCP(C)*

Neuro-ophthalmology
Neuro-ophthalmologist
Trevor Kirkham, MBChB, DO, FRCS

Neuropathology
Neuropathologist
Stirling Carpenter, AB, MD

Assistant Neuropathologists
Kathleen Meagher-Villemure, BA, MD
Yvon Robitaille, BA, MD, FACP

Neurophotography
Neurophotographer
Charles Hodge, RBP, FBPA, AIMBI

Assistant Neurophotographer
Marcus Arts

Neurophysiology
Electroencephalographer and Clinical Neurophysiologist
Pierre Gloor, MD, PhD, FRCP(C)

Associate Electroencephalographer and Associate Clinical Neurophysiologist
Luis Felipe Quesney, MD, PhD

Neuropsychology
Neuropsychologist and Medical Research Council Career Investigator
Brenda Milner, BA, MA, PhD, ScD, FRSC, FRS

Associate Neuropsychologist
Laughlin Taylor, BSc, BEd, MSc

Assistant Neuropsychologists
Marilyn Jones-Gotman, BA, MA, PhD
Michael Petrides, BSc, MSc, PhD

Clinical Assistants
Mary Kay Ajersch, BA, MA**
Eva Flannery, BSc, MA, PhD
Gabriel Leonard, BA, DAP

Clinical Psychologist
Clara Strauss, BA, MA***

Neuroradiology
Neuroradiologist-in-chief
Roméo Ethier, BA, MD

Associate Neuroradiologist
Denis Melanson, BA, MD

Assistant Neuroradiologists
Gary Bélanger, BA, MD****
Guy Breton, BA, MD
Pierre Charles Milette, BA, MD

Neurosurgery
Honorary Neurosurgeon
Arthur Elvidge, MD, MSc, PhD, DCL, FRCS(C)

Honorary Consultant in Neurosurgery
Theodore Rasmussen, BS, MB, MD, MS, FRCS(C), Hon DM

Neurosurgeon-in-chief
Gilles Bertrand, BA, MD, MSc, FRCS(C)

Neurosurgeon
William Feindel, BA, MSc, MDCM, DPhil, DSc, FRCS(C), FACS, FRSC

Associate Neurosurgeon
André Olivier, BA, MD, PhD, FRCS(C)

Assistant Neurosurgeons
Elaine Joy Arpin, BSc, MD, FRCS(C)
Jean-Guy Villemure, BA, MD, FRCS(C)
John Wells, BA, MD, FRCS(C)

Psychiatry
Psychiatrist
Louise Demers-Desrosiers, BA, MD, FRCP(C)

Assistant Psychiatrists
Robert Bull, AB, BMSc, MDCM, FRCP(C)
Ghislaine Savard, MD, FRCP(C)

Radiochemistry
Radiochemist
Mirko Diksic, BSc, MSc, PhD

Research Computing
Computer Systems Engineer
Christopher Thompson, BSc, MSc

Assistant Computer Systems Engineer
Jean Gotman, ESE, MEng, PhD

Medical Physicist
Terence Peters, BE, PhD

* Resigned June 1982
** Deceased September 1982
*** Retired July 1982
**** Resigned July 1981

Consulting and Visiting Staff

Anesthesiology Consultants
Richard Catchlove, MB, BS, MSc, FFARCS
John Sandison, MB, FFARCS

Microbiology Consultant
Luis Martinez, BA, MD, FRCP(C)

Neuroendocrinology Consultant
George Tolis, MD, MSc, FRCP(Gr)

Neurology Consultants
Albert Aguayo, MD, FRCP(C)
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Sabah Bekhor, MB, FRCP(C)
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Joseph Carlton, BS, MD, FRCP(C)
Morrison Finlayson, MB, FRCP(C)*
Yves Jean Lapierre, BA, MD, FRCP(C)
Mortimer Lechter, BSc, MD, FAAN
Israel Libman, BA, MD, FRCP(C)
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Allan Morton, MD, MSc, PhD, FRCP(C)
Michael Rasminsky, BA, MD, PhD, FRCP(C)
Léo Renaud, BA, MD, PhD
Bernard Rosenblatt, BSc, MD, FRCP(C)
Jeffrey Rubin, BSc, MD
Kenneth Silver, BSc, MSc, MD, FRCP(C), ABNP
John Stewart, BSc, MB, BS, MRCP, FRCP(C)
William Tissington-Tatlow, MB, MRCP, FRCP(C)
Gordon Watters, BA, MD, FRCP(C)

Neurology Visiting Consultants
Claude Bélanger, BA, MD, FRCP(C)
André Bellavance, BA, MD, MSc, PhD
Jean-Gilles Blain, MD, ABNP, FRCP(C)
Mihai Botez, MD, FRCP(C)
Guy Courtois, BA, MD, MSc, FRCP(C)
Jean-Léon Desrochers, BA, MD, FRCP(C)
Norman Giard, BA, MD, FRCP(C)
Raymond Lafontaine, MD
Guy Marcel Rémillard, BA, MD, FRCP(C)

Neuro-otology Consultant
Athanasios Katsarkas, MD, MSc, FRCS(C)

Neurophysiatry Consultant
Dorothy Stillwell, BA, MD, MS, FRCP(C)

Neurosurgery Consultants
Ehud Arbit, MD
John Blundell, MA, MB, MD, MRCP, FRCS
Steven Brem, BA, MD
Robert Ford, BA, MD, FRCS(C)
José Montes, BSE, MD
Peter Richardson, BA, MD, FRCS(C)
Joseph Stratford, BSc, MD, MSc, FRSC(C), FACS

Neurosurgery Visiting Consultants
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Maurice Héon, MD, FRCS(C), FACS
J.-Cartier Giroux, MD, FRCS(C), FACS
Jules Hardy, MD, FRCS(C), FACS
Gérard Leblanc, BA, MD, FACS, DABNS, FRCS(C)

Pathology Consultant
John Richardson, BSc, MD, PhD

Psychiatry Consultants
Maurice Dongier, MD, FRCP(C)
Heinz Lehmann, OC, MD, FRSC, FRCP(C)

Radiation Oncology Consultant
Carolyn Freeman, MBBS, LRCP, MRCS, FRCP(C)
Joseph Hazel, BSc, MD, FRCP(C), DABTR, DNBME

Radiology Consultants
Jean Gagnon, BA, MD, DMR, DABR, FRCP(C), FACR
Lawrence Stein, BSc, MD

Radiology Visiting Consultants
Jean-L. Léger, BA, MD, FRCP(C), FACR
Jean-L. Vézina, BA, BM, MD, FRCP(C)

*Deceased October 1982

Professional Advisors

Administrative Consultants
Steve Herbert, BSc, MHA
François Schubert, BSc (Pharm), DPH

Physiology
Kresimir Krnjevic, BSc, MB, PhD, FRCP

Veterinary Medicine
Richard Latt, DVM

Resident and Rotator Staff
July 1981—June 1982

Elizabeth Angus
Peter Bailey
Léo Berger
Laeora Berkson
Jean-Pierre Bernier
Deborah Black
Sylvia Bloomberg
Carlo Brogna
Scott Brown
Jean-Louis Caron
Claude Corbeil
Rees Cosgrove
Larry Dashefsky
David Dubuisson
Gary Dvorkin
Irving Dylewski
Konstantin Elisevich
Nancy Epstein
Howard Feldman
Cathy Flanagan
Hani Gabalawy
Mark Gans
Daniel Gendron
David Gomolin
Robert Hacker
David Halliday
Roberta Herlich
Leslie Huszar
Rick Holmberg
Morton Hyson
Pierre Jacob
Jack Jhamandas
Reed Kaplan
Gerard Kimmons
Richard Leblanc
Michel Levesque
Maurice Levitan
Robert Levy
Alain de Lotbinière
Athanas Mai[illegible]
Mohammad
Leslie Malna[illegible]
Erich Marchand
David Meek
Tilak Mendis
David McKeown
Rami Morcos
Benoit Panzini
Colette Paquin
Sharon Parnes
David Patry
Charles Posternack
Seth Pullman
Roy Purssell
Mark Quigley
Allan Ryder-Cook
Philippe Saltiel
Eric Sasso
Ghislaine Savard
Brian Schmidt
Hélène Senay
Ewa Sidorwicz
Myra Sourkes
Thomas Staunton
Marie-Hélène St. Hilaire
Cuneyd Tolek
André Therrien
Patricia Walicke
Simon Wing
Curtis Worthington
Karol Zakalik
Yonas Zegeye

Clinical and Laboratory Fellows
July 1, 1981 — June 31, 1982

Electroencephalography Laboratory
Dr. Douglas Arnold
Dr. Dan Bissoon Doyal
Dr. Daniel Gendron
Dr. Pierre Jacob
Dr. Reed Kaplan
Dr. Michael Krelina
Dr. Charles Krieger
Dr. Marc Lalisse
Dr. Sharon Parnes
Dr. David Patry

Electromyography Laboratory
Dr. Douglas Arnold
Dr. Robert Hall
Dr. Leslie Huszar
Dr. Reed Kaplan
Dr. Charles Krieger
Dr. Mohammad Maleki

Neuroanesthesia
Dr. Alain Briand
Dr. Caroline Covert
Dr. Margaret Jean Haig
Dr. Susan Jane Harper
Dr. Margaret Hay
Dr. Brian Kuwahara
Dr. Laurence Landow
Dr. Mohammad Maleki
Dr. Pamela Nicholls
Dr. Gordon Robbins
Dr. Morris Siu-Chong
Dr. Peter Slinger

Neuro-ophthalmology
Dr. Rees Cosgrove
Dr. Robert Hacker
Dr. Charles Krieger
Dr. Mohammad Maleki
Dr. May-yung Yen

Neuropathology
Dr. Deborah Black
Dr. Scott Brown
Dr. Michel Desrosiers
Dr. Marie-Bernadette Dilisle

Dr. Norbert Hautzer
Dr. Pierre Jacob
Dr. Charles Krieger
Dr. Michel Levesque
Dr. Athanas Maingi
Dr. Mohammad Maleki
Dr. Michel Mohr
Dr. David Patry
Dr. Seth Pullman
Dr. Myra Sourkes
Dr. Yonas Zegeye

Neuroradiology
Dr. Scott Cutler
Dr. Renée Dery-Côté
Dr. David Dubuisson
Dr. David Dwyer
Dr. Peter Ender
Dr. Marc Girard
Dr. Robert Hacker
Dr. David Halliday
Dr. Charles Krieger
Dr. Athanas Maingi
Dr. Mohammad Maleki
Dr. Maurice Perras
Dr. Curtis Worthington
Dr. Karol Zakalik

Nursing Administration and Education

Director of Nursing and Assistant Professor, School of Nursing, McGill University
Caroline Robertson, N, BN, MScA

Assistant Director of Nursing
M. Irene MacMillan, BA, N, MScA

Nursing Coordinators
Emily Andrews, N, BScN
Felicia Skretkowicz-Benarroch, N, BN
Joan Boucaud, N
Anne Carney, N, BN
Melencia de Guzman, N, BScN
Linda Maruska, N
Catherine Negus, N
Susan Panicker, N*
Abdool Saumtally, N, BN
Margaret Smeaton, N*

Nurse Clinician and Lecturer, School of Nursing, McGill University
Linda Norman-Robbins, N, BN

Operating Room Supervisor
Norma Isaacs, N, BN

Head Nurses
Lucy Dalicandro, N
Marion Everett, N
Kimiko Hinenoya-Worsley, BA, N
Georgette Jotic, N
Cecilia Largo, BScN, N
Frances Murphy, N
Barbara Petrin, N
Ursula Steiner, N
Winsome Wason, N

Assistant Head Nurse
Clavelina Feliciano, N, BScN

Assistant Director, Post-Basic Clinical Program in Neurological and Neurosurgical Nursing
Marilyn Manchen, N, BA, BN

Nurse Clinician Teachers, Post-Basic Clinical Program in Neurological and Neurosurgical Nursing
Lise Desbiens, N, BScN
Geraldine Fitzgerald, N, BN

Consultant in Nursing
Florence Mackenzie, N, BN, MScA

* Part-time coordinators

Graduates of the Post-Basic Clinical Program in Neurological and Neurosurgical Nursing

September 1981 — February 1982
Yolande Audette (Hôtel-Dieu de Montréal, Montreal, Quebec)
Delores Chen (Taiwan Provincial Junior College of Nursing, China)
Lillian Houle (Victoria General Hospital, Halifax, Nova Scotia)
Ginette Imbeault (Hôtel Dieu de Gaspé, Gaspé Harbour, Quebec)
Fariba Maleki (Shiraz University, Nemazee School of Nursing, Teheran, Iran)
Sarai Porritt (Algonquin College, Nepean, Ontario)

March 1982 — August 1982
Brigitte Bouchard (Collège de Chicoutimi, Chicoutimi, Quebec)
Pierrette Dicaire (CEGEP Trois-Rivières, Trois-Rivières, Quebec)
Mariette Lambert (CEGEP Bourgchemin, Drummondville, Quebec)
Betty Ann Launière (CEGEP de Limoilou, Limoilou, Quebec)
Nicole Tourville (CEGEP de Limoilou, Limoilou, Quebec)

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J. Taylor Kennedy

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Director of Professional Services
William Feindel, MD

Associate Director General
Roland Saint-Arnaud*
Joy Shannon

Director of Auxiliary Services
Winston Rochette

Director of Finance
Gean-yuan Pwu

Director of Nursing
Caroline Robertson

Director of Personnel
Leo Robitaille

Director of Social Work
Verna Bound

Registrar
Bernard Graham, MD

* Resigned July 1981

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Admitting
Margaret Bernard*
James Gates

Dietician
Oresta Podgurny

Employee Health Service
Rita Lacombe

Librarian
Marina Boski

Medical Records
Lucie Bédard**
Bernard Graham, MD

* Resigned September 1981
** Resigned October 1981

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Tony Newman

Vice-President
Ann Redfern

Secretary
Nancy Wright

Treasurer
Sheila Martin

Clergy

Protestant
Reverend Ronald Christie

Roman Catholic
Father Francis Donnelly

Montreal Neurological Institute

The Izaak Walton Killam Conference Room was considerably brightened by a mural titled "The World of Neurology." Overleaf the artist, Luba Genush, with her husband, Dr. Pierre Gloor at the unveiling ceremony on January 26, 1983.

Neurosciences Advisory Council

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Medical Research Council of Great Britain

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President, University of Florida

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Professor, Departments of Biochemistry and Psychiatry, McGill University
Director, Laboratory of Neurochemistry, Allan Memorial Institute

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US Department of Health and Human Services

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Director, Montreal Neurological Institute

Vice-Chairman
Colin Webster, BA, LLD
Governor Emeritus, McGill University

Members
Donald Baxter, MD, MSc, FRCP(C)
Chairman, Department of Neurology and Neurosurgery, McGill University
Appointed by the Board of Governors, McGill University

Gilles Bertrand, BA, MD, MSc, FRCS(C)*
Associate Director (Neurosurgery), Montreal Neurological Institute
Elected by the staff of the Montreal Neurological Institute

Richard Cruess, BA, MD, FRCS(C)*
Dean of Medicine, McGill University
Appointed by the Principal, McGill University
From August 1, 1981

Samuel Freedman, BSc, MD, FRCP(C), FACP, FRSC*
Vice-Principal (Academic), McGill University
Appointed by the Principal, McGill University

Yves Fortier, QC, BCL, BLitt
Governor, McGill University
Appointed by the Board of Governors, McGill University

Pierre Gloor, MD, PhD, FRCP(C)
Associate Director (Neurosciences), Montreal Neurological Institute
Elected by the staff of the Montreal Neurological Institute

Francis Glorieux, MSc, MD, PhD
Associate Dean of Medicine (Graduate Studies and Research)
McGill University
Appointed by the Principal, McGill University

J. Taylor Kennedy, BEng, MEng*°
Governor Emeritus, McGill University
Appointed by the Board of Governors, McGill University

Gordon Maclachlan, BSc, MA, PhD
Vice-Principal (Research), McGill University
Appointed by the Principal, McGill University

Alan Gibb Thompson, MD, DABS, FACS, FRCS(C)
Governor, McGill University
Appointed by the Board of Governors, McGill University

Member-at-large
Donald Byers, QC, LLD
Trustee, Estate of Dorothy Killam
Elected by the staff of the Montreal Neurological Institute from nominations by the Director

* Executive Committee member
° *Ex officio* member

Scientific Staff

Honorary Neuroscientists
K.A.C. Elliott, MSc, PhD, ScD, FRSC, *Neurochemistry*
Herbert Jasper, OC, PhD, DèsSc, MD, FRSC, DSc, *Neurophysiology*
Francis McNaughton, BA, MSc, MD, FRCP(C), *Neuroanatomy*
Theodore Rasmussen, BS, MB, MD, MS, FRCS(C), Hon DM, *Neurosurgery*
J. Preston Robb, MSc, FRCP(C), *Neurology*

Neuroscientists
Pierre Gloor, MD, PhD, FRCP(C), *Neurophysiology*
Brenda Milner, BA, MA, PhD, ScD, FRSC, FRS, *Neuropsychology*
Hanna Pappius, BSc, MSc, PhD, *Neurochemistry*
Leonhard Wolfe, BSc, MSc, PhD, MD, FRCP(C), ScD, FRSC, *Neurochemistry*
Lucas Yamamoto, BSc, MD, PhD, *Brain-Scanning*

Associate Neuroscientists
Alain Beaudet, BA, MD, PhD, *Neuroanatomy*
Mirko Diksic, BSc, MSc, PhD, *Radiochemistry*
Heather Durham, BSc, MSc, PhD, *Neurotoxicology*
Robert Dykes, BA, PhD, *Neurophysiology*
Jean Gotman, ESE, MEng, PhD, *Computer Systems Engineering*
Daniel Guitton, BEng, MEng, PhD, PhD, *Neurophysiology*
Charles Hodge, RBP, FBPA, AIMBI, *Neurophotography*
Paul Holland, BA, PhD, *Biochemistry*
John Ives, MSc, *Biomedical Engineering*
Barbara Jones, BA, MA, PhD, *Neuroanatomy*
Marilyn Jones-Gotman, BA, MA, PhD, *Neuropsychology*
George Kostopoulos, MD, PhD, *Neurophysiology**
Donald Lawrence, BSc, MD, FRCP(C), *Neuroanatomy*
N.M.K. Ng Ying Kin, BSc, PhD, *Neurochemistry*
Yogesh Patel, MD, PhD, FRACP, *Neuroendocrinology*
Sergio Pena, MD, PhD, FRCP(C), *Neurology***
Terence Peters, BE, PhD, *Computer Systems Engineering*
Michael Petrides, BSc, MSc, PhD, *Neuropsychology*
Laughlin Taylor, BSc, BEd, MSc, *Neuropsychology*
Christopher Thompson, BSc, MSc, *Computer Systems Engineering*

Clinical Neuroscientists
Frederick Andermann, BA, BSc, MD, FRCP(C), *Electroencephalography*
Donald Baxter, MD, MSc, FRCP(C), *Neurology*
Gilles Bertrand, BA, MD, MSc, FRCS(C), *Neurosurgery*
Stirling Carpenter, AB, MD, *Neuropathology*
Roméo Ethier, BA, MD, *Neuroradiology*
William Feindel, BA, MSc, MDCM, DPhil, DSc, FRCS(C), FACS, FRSC, *Neurosurgery*

George Karpati, MD, FRCP(C), *Neurology*
Allan Sherwin, BSc, MD, PhD, FRCP(C), *Neuropharmacology*
Davy Trop, MA, MD, FRCP(C), FACA, *Neuroanesthesiology*

Associate Clinical Neuroscientists
Mounir Abou-Madi, MB, DA, FRCP(C), DABA, FACA, *Neuroanesthesiology*
Eva Andermann, BSc, MD, MSc, PhD, FCCMG, *Neurogenetics*
Elaine Joy Arpin, BSc, MD, FRCS(C), *Neurosurgery*
Michel Aubé, BA, MD, FRCP(C), *Electroencephalography*
Jennifer Barnes, MB, *Neuroanesthesiology****
David Caplan, BSc, PhD, FRCP(C), *Neurolinguistics*
J.B.R. Cosgrove, MD, MSc, MSc, FRCP(C), *Neurology*
Louise Demers-Desrosiers, BA, MD, FRCP(C), *Psychiatry*
George Elleker, MD, FRCP(C), *Electromyography*
Serge Gauthier, BA, MD, FRCP(C), *Neuroanatomy*
Daniel Gendron, MD, FRCP(C), *Electromyography*
Bernard Graham, BA, BSc, MD, *Neurology*
Antoine Hakim, BS, MS, PhD, MD, FRCP(C), *Neurochemistry*
Irving Heller, BSc, MD, MSc, PhD, FRCP(C), *Neurology*
Klaus Karsunky, MD, *Neuroanesthesiology*
Trevor Kirkham, MBChB, DO, FRCS, *Neuro-ophthalmology*
Elizabeth Matthew, MBBS, FRCP(C), *Neurobiology*
Kathleen Meagher-Villemure, BA, MD, *Neuropathology*
Denis Melanson, BA, MD, *Neuroradiology*
Lise Morin, MD, FRCP(C), *Neuroanesthesiology*
André Olivier, BA, MD, PhD, FRCS(C), Dip ABNS, *Neurosurgery*
Luis Felipe Quesney, BSc, MD, PhD, *Electroencephalography*
Yvon Robitaille, BA, MD, FACP, *Neuropathology*
David Thomas, MD, FFARCS, *Neuroanesthesiology*****
Jean-Guy Villemure, BA, MD, FRCS(C), *Neurosurgery*
John Wells, BA, MD, FRCS(C), *Neurosurgery*
Ivan (John) Woods, MB, BAO, MSc, FRCP(C), *Electroencephalography*

* Resigned May 1982
** Resigned June 1982
*** Resigned October 1981
**** Resigned September 1981

MNH/MNI Academic Appointments
Department of Neurology and Neurosurgery
McGill University

(Brackets denote joint appointments.)

Chairman
Donald Baxter

Neurology
Emeritus Professors
Francis McNaughton
J. Preston Robb

Professors
Frederick Andermann
Donald Baxter
Irving Heller
George Karpati (Pediatrics)
Donald Lawrence (Anatomy)
Allan Sherwin

Associate Professors
Eva Andermann
Michel Aubé
David Caplan
J.B.R. Cosgrove
Bernard Graham
Ivan (John) Woods

Assistant Professors
George Elleker
Antoine Hakim
Serge Gauthier
Elizabeth Matthew
Sergio Pena (Pediatrics)*

Lecturers
Douglas Arnold
Heather Durham
Gordon Francis
Daniel Gendron
Peter Herscovitch**

Neurosurgery
Emeritus Professor
Theodore Rasmussen

William Cone Professor
William Feindel

Professor
Gilles Bertrand

Associate Professor
André Olivier

Assistant Professors
Elaine Joy Arpin
Jean-Guy Villemure
John Wells

Neurosurgical Research
Professor
Lucas Yamamoto

Neurophysiology
Professor
Pierre Gloor

Associate Professors
Robert Dykes (Surgery, Physiology)
Luis Felipe Quesney

Assistant Professors
Daniel Guitton
George Kostopoulos***

Neurochemistry
Emeritus Professor
K.A.C. Elliott (Biochemistry)

Professors
Hanna Pappius (Biochemistry)
Leonhard Wolfe (Biochemistry)

Assistant Professor
N.M.K. Ng Ying Kin

Radiochemistry
Assistant Professor
Mirko Diksic (Chemistry)

Neuroradiology
Professor
Roméo Ethier (Radiology)

Associate Professor
Denis Melanson (Radiology)

Neuroanesthesiology
Associate Professor
Davy Trop (Anesthesia)

Assistant Professors
Mounir Abou-Madi (Anesthesia)
David Thomas (Anesthesia)****

Lecturers
Jennifer Barnes (Anesthesia)*****
Klaus Karsunky (Anesthesia)
Lise Morin (Anesthesia)

Neuropathology
Professor
Stirling Carpenter (Pathology)

Assistant Professor
Yvon Robitaille (Pathology)

Lecturer
Kathleen Meagher-Villemure (Pathology)

Neuropsychology
Professor
Brenda Milner (Psychology)

Assistant Professors
Marilyn Jones-Gotman
Michael Petrides (Psychology)
Laughlin Taylor

Clinical Psychology
Lecturer
Clara Strauss*****

Biochemistry
Associate Professor
Paul Holland

Neuroanatomy
Professor
Donald Lawrence (Anatomy)

Associate Professor
Barbara Jones (Psychology)

Assistant Professor
Alain Beaudet

Biomedical Engineering
Associate Professor
Christopher Thompson

Assistant Professors
Jean Gotman
John Ives
Terence Peters (Radiology)

Neuro-ophthalmology
Associate Professor
Trevor Kirkham (Ophthalmology)

Neuroendocrinology
Associate Professor
Yogesh Patel (Medicine)

Neuropsychiatry
Assistant Professor
Louise Demers-Desrosiers (Psychiatry)

* Resigned June 1982
** Resigned March 1982
*** Resigned May 1982
**** Resigned September 1981
***** Resigned October 1981
****** Retired July 1982

Executive Committee of the Montreal Neurological Institute

Director
William Feindel, MD

Director Emeritus
Theodore Rasmussen, MD

Associate Director (Administration)
Joy Shannon, BA

Associate Director (Finance)
Norman Bleakley, FCMA

Associate Director (Neurology)
Donald Baxter, MD

Associate Director (Neurosciences)
Pierre Gloor, MD

Associate Director (Neurosurgery)
Gilles Bertrand, MD

Associate Director (Nursing Research and Education)
Caroline Robertson, MScA

Associate Director (Publications)
Victoria Lees, PhD

Associate Director (Research)
Leonhard Wolfe, MD

Associate Director (Research Evaluation)
Francis McNaughton, MD

Associate Director (Special Projects)
Irena Straszak, MHA

Senior Executive Secretary
Sophie Malecka, BSc

Assistant Executive Secretary
Linda Kandestin, BA

Research Fellows
June 1, 1981 — May 31, 1982

Biochemical Genetics Laboratory
Dr. Maria Teresa Costa
Dr. Heather Durham
Benjamin Gordon

Cone Laboratory for Neurosurgical Research
Dr. Norio Arita
Dr. Simin Farrokhzad
Dr. Masahiro Izawa
Dr. Amami Kato
Dr. Keitaro Kobatake
Dr. Richard Leblanc
Dr. Devidas Menon
Dr. Ernst Meyer
Dr. Toshihiro Ouchi
Dr. Kazuhiro Sako
Dr. Takashi Shibasaki
Dr. Masato Shibuya
Dr. Hiroyuki Shimizu
Stephen Strother

Donner Laboratory of Experimental Neurochemistry
Uwe Goehlert
Dr. Jorma Palo (visiting scientist, University of Helsinki)

Experimental Neurophysiology Laboratory
Dr. Massimo Avoli
Dr. Daniele Giaretta
Dr. Itsuki Jibiki
Dr. Richard McLachlan
Dr. Rachel Ochs

Muscle Biochemistry Laboratory
Dr. Mario Armani
Jeffrey Charuk

Neuroanatomy Laboratory
Dr. Olivier Bosler

Dr. Denis Hervé
Michael Paré
Harry Webster
Dr. Tian-zhu Yang (visiting scientist, Hebei Medical College)

Neurogenetics
Linda Dansky-Garfinkle
Richard Nagy
Susan Wisebord

Neuro-ophthalmology
Dr. Stuart Coupland

Neuropsychology
Dr. Bessie Alivisatos
Julien Doyon
Virginia Frisk
Antonio Incisa della Rocchetta
Dr. Gregor Jason
Gabriel Leonard
Laurie Miller
Mary Louise Smith
Dr. Robert Zatorre
Dr. Dorothy Bishop (visiting scientist, University of Oxford)
Dr. Pierre Jordan (visiting scientist, Université Aix-Marseille II)

Director's Report

On April 5, 1983 Mavor Moore, OC, chairman of the Canada Council, announced Dr. Brenda Milner, FRS, winner of the prestigious Izaak Walton Killam Memorial Prize. Overleaf, he presents Dr. Milner with a $50,000. cheque.

Director's Report

The Montreal Neurological Institute was officially opened in September 1934. In September 1984 we will therefore be celebrating the 50th anniversary of this neurological hospital and brain research institute. During the year covered by these reports, from September 1, 1981 to August 31, 1982, we began planning with members of the scientific and clinical staff and with the university for a special celebration on the anniversary date. We look forward to the return on that occasion of many former fellows and nurses, as well as friends and supporters of the Neuro.

Established as a combined clinical and scientific institute with resources for teaching, research, and treatment related to diseases of the brain and spinal cord, the Montreal Neurological Institute in 1963 underwent a legal metamorphosis when the Montreal Neurological Hospital was formally set up under provincial legislation. Since that time most of the administrative and financial organization of the hospital has been moved from the university offices to the hospital itself. In this gradual and now almost completed transfer we have had the support and advice of the senior university officers, the members of the Board and Corporation of the hospital, and the programming and financial staff of the Ministry of Social Affairs. Although the members of the teaching staff with academic appointments have continued with the university, almost all the other staff members of the original institute have now been brought under the aegis of the hospital. This has proved a considerable advantage from the point of view of efficiency and direct relations to the needs of our personnel.

At the same time, the financial affairs of the institute to do with research and teaching continue to be managed through the McGill accounting system. Thus both our external competitive research grants, running at about $2.5 million, and the receipts from donations and earnings of our endowment funds are managed for the institute and hospital by the university. This is different from the other McGill teaching hospital research institutes, where the hospitals have largely taken over the internal as well as the external research funds available to them. The Montreal Neurological Institute in many ways serves the same function as the hospital foundations and hospital research institutes that have been set up for other Quebec teaching hospitals. It is essential to realize this close relationship of the institute and the hospital because of the increasing recognition over the past few years that such institutes have been identified for substantial support by the Fonds de la recherche en santé du Québec. It is necessary also to state that the Montreal Neurological Institute receives far less support than it should from the FRSQ in relation to the institute's scientific staff and productivity, compared with other hospital research centres in the province as published in the FRSQ's Annual Report. Negotiations are in progress to narrow this discrepancy and to develop more realistic support in future years. Such support is essential to provide this institute and hospital with resources and personnel comparable to those of the other excellent research centres supported by the FRSQ.

While the budgetary operations of the hospital and research institute have always been separate, the functioning of these two organizations is inextricably

integrated. We might well compare it to the relationship of the two halves of the brain, which we recognize scientifically and clinically as having their own identifiable functions but of necessity being integrated with each other to carry out properly the communication functions of the whole brain.

During 1981-82 we continued our long-term planning to update our resources and to maintain the research standing of the institute at an international level. Operating room No. 1, historically of interest as the site, over the years, of some two thousand operations for the treatment of seizures, was enlarged and renovated. This completed the modernization of our operating room suite and will free the former operating room No. 4, placed distally down the hall, for a central supply area and much needed expansion of radiology.

In the research area, we consolidated the positron emission tomography program for investigating the brain's chemical activity in epilepsy, cerebrovascular problems, and brain tumors. Radiolabelling of the chemicals used to treat brain tumors has advanced to the point where it is now possible to image the drug in the tumor in order to map its distribution, concentration, chemical breakdown and clearance in a quantitative way not previously possible. This will undoubtedly give us information useful to improve the administration and composition of antitumor drugs. The research team concerned with PET studies on epilepsy has demonstrated a correlation between cerebral blood flow measured by the positron krypton-77 method and simultaneous computer analysed brainwave recordings. Our findings are consistent with those obtained by the PET research team at the University of California, Los Angeles, using the deoxyglucose method.

The positron emission tomography program is, to return to an earlier point, an excellent example of the integration of hospital and institute. The work of the cyclotron-radiochemistry unit and the experimental laboratories meshes intricately with the camera imaging of patients and the computer analysis of these images, to the benefit of the investigative clinical teams who work hand-in-hand with the scientists.

The individual reports from each of the research laboratories printed here cover highlights of the year's activity. A ten-year research review was presented at a weekend conference at Montebello in November 1982. More extensive reports from this successful workshop will be published in a separate manual.

On the hospital side, as the director of finance states in her report, we have achieved a balanced budget. This extends our record of fiscal balance to a full five years. This balance has been made possible in recent years through a supplement related to opening of new services (the operating rooms, an intensive care unit, expanded nuclear medicine and ambulatory services) that resulted from the addition of the Penfield Pavilion and reallocation of certain functions in the older buildings. All these were added because of patient needs and with a view to economy, efficiency, and updating of these essential hospital services.

In July 1981 the Ministry of Social Affairs imposed budgetary cuts that had to be applied within the middle of the fiscal year. The MNH was among the first of the Quebec hospitals to have its *plan de redressement* accepted by the Ministry, and among the first also to establish that with a history of five years of balanced budgets (with minimum annual increases), temporary bed closure was the only way to generate the reductions the Ministry demanded. However, substantial reductions were also achieved by the cooperation and control of our staff at every level. We deferred replacements or new additions to the staff, and the staff members themselves agreed to take unpaid leaves of absence. Our success depended upon the hard work of our financial administrative group and the extraordinary cooperation and support of the hospital staff. We held workshops and committee meetings day-by-day and week-by-week to develop means of economizing. One example: posters with samples of surgical supplies and their prices faced the surgeons as they scrubbed for surgery, reminding them of the need for frugality.

We cannot pretend that all this was accomplished without a change in our services, and without some reduction in the adequate supervision of our seriously ill neurological patients, who require heavy nursing care. Nor can we state that there was not some levelling out of our constant efforts to improve, modernize, and enhance our services as a mark of progress becoming to an internationally recognized centre for neurological treatment, teaching, and research. While we thus ended up fiscally sound, something was lost along the way in what all health professionals would at once recognize as quality. It is here that the dedication and devotion of our loyal staff came shining through. Because of them proper, if not superior, care to our patients was well maintained. Indeed, we can say that in some significant non-fiscal areas — compassion, care, and concern for the sick — we ended the year with a substantial surplus. Letters from patients and relatives confirm this fact. While this "quality surplus" does not appear on our audited balance sheet (and under our present system will never do so), it is after all why we are here — to help through the best skills and care at our command. If that seems trite, it nevertheless needs to be stated in these days when the function of an ultra-specialized hospital centre for teaching and research could easily be distorted from a non-profit humanitarian operation to some sort of dollar-saving exercise. That we must avoid — at all costs.

Teaching role of the hospital and institute

Reviews by the neurosurgeon-in-chief and the neurologist-in-chief later in this report identify this institution's important role in the McGill system of training and postgraduate study in the neurological sciences. It should be added that the institute subsidises this teaching program generously from its research and endowment funds. For example, during the year the holders of a teaching fellowship in neurology, a senior neurological residency, and three neurosurgical fellowships from the institute received full or partial support for their clinical studies. Moreover, within the hospital extensive basic training is offered in neuropathology, electroencephalography and clinical neurophysiology,

neuroradiology, and neuroophthalmology. In the institute's twenty-five research laboratories clinical trainees may also elect to spend periods of study.

Virtually the entire neurological hospital operates as a teaching unit. This is especially true of the intensive care unit, the neuroradiology department, the operating suite, and the clinical areas where we see a working amalgamation of neurosurgeons, neurologists, anaesthetists, nurses, and technical and support staff.

The surgical training program continues to be directed by Dr. Gilles Bertrand; the neurological program is now supervised by Dr. John Stewart. The postgraduate students at the MNI as well as those at the other McGill teaching hospitals are coordinated under the Postgraduate Committee now chaired by Dr. Dykes. The location of Dr. Stewart at the Montreal General and Dr. Dykes at the Royal Victoria has been rendered less of a disadvantage through their individual devotion to duty.

In a hospital combined with a research institute we are especially concerned to protect patients' interests while at the same time providing opportunities and resources for our staff to carry out instruction at the undergraduate and postgraduate level. Many of our clinical staff are also heavily immersed in research activities, either in the laboratories or in clinical programs. The work of the Research Review and Ethics Committee, chaired by Dr. Francis McNaughton, has been particularly important in ensuring that all research projects meet the critical standards ascertaining patient safety and welfare, at the same time allowing for well-planned protocols to advance medical knowledge. Another concern has been the rotation of attending neurologists assigned to various patients in the hospital. While this plan offers certain advantages to the attending staff, in providing them research and study time not subject to urgent service calls from the wards, it leads to problems of discontinuity in the physician's supervision of patients. Such professional matters, the responsibility of the Director of Professional Services and the Council of Physicians, deserve scrutiny in order to ensure the patient's best interests.

Renovation program

Towards the end of this reporting period we received word of a munificent donation from the Donner Canadian Foundation in memory of its former secretary-treasurer, George Goad. This was used to update the research resources of the Donner Laboratory of Experimental Neurochemistry. This much-needed renovation, which had been curtailed because of the budgetary restrictions of Phase IV, will modernize these laboratories for more effective use.

In addition to the modification of operating room No. 1, a number of other urgent projects have been initiated or completed during the year. We still suffer from lack of ventilation in half the building, frequent false alarms set off by our nervous and aging fire protection system, a general lack of efficiency caused by old elevators, loss to service of ward areas because of inadequate supplies of medical gases, and an antiquated as well as expensive food service.

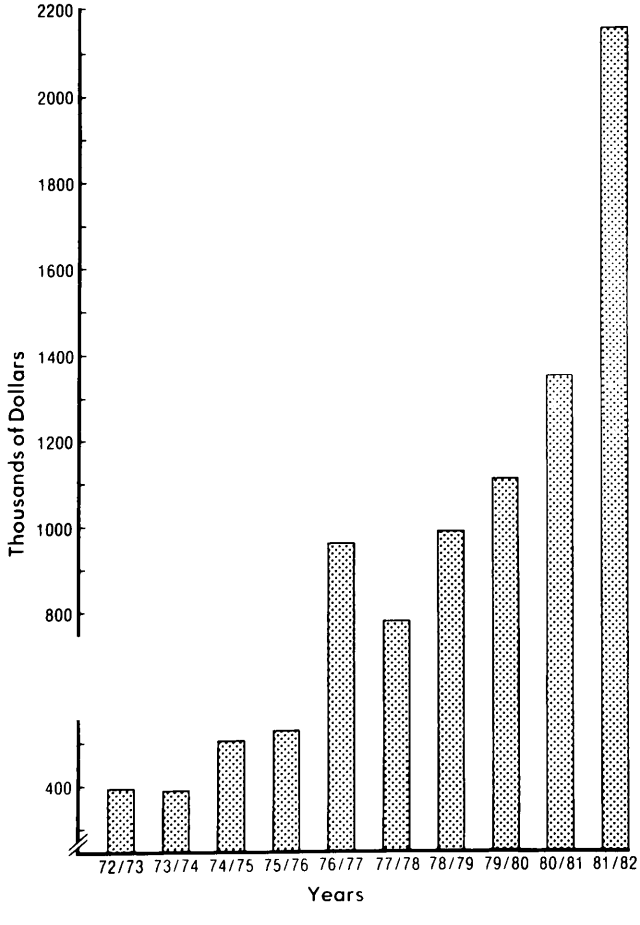
We have initiated negotiations with the federal government to retrieve a former credit that lapsed when a provincial-federal agreement related to the health resources fund terminated in December 1980. Some help in this direction seems to be on the horizon, giving us hope that Phase IV, which has been languishing since August 1978, will finally be reactivated.

External grants for research and fellowship

For 1981-82 our research grants reached $2.5 million, a six-fold increase over the past decade. The graph shows major increments in our external grants from 1975-76 which we would like to attribute in part to the enthusiastic reviews and long-term planning of research activities held at the two Hovey Manor symposia in 1972-73. Another increase is noted in 1978-79, when the prospect of new space and resources in the Penfield Pavilion allowed us to increase our scientific staff and expand the activities of the staff already here. The past five years has witnessed the most rapid growth in the history of the institute, with expansion of all existing laboratory departments, addition of new units, and of more research fellows, graduate students, technical and support staff.

MONTREAL NEUROLOGICAL INSTITUTE

External Grants for Research and Fellowships



In 1978 the PET project sprang to life with the development of the Thompson camera, and was enhanced in 1981 by the installation of the mini-cyclotron. A major Medical Research Council of Canada special program research grant for PET contributed greatly to our external funds since 1982.

Staff changes
Clara Strauss retired from the hospital staff after many years of devoted service, particularly to children with psychological problems. Margaret Bernard also retired as head of the admissions office. Her efficiency in this difficult task had become legendary.

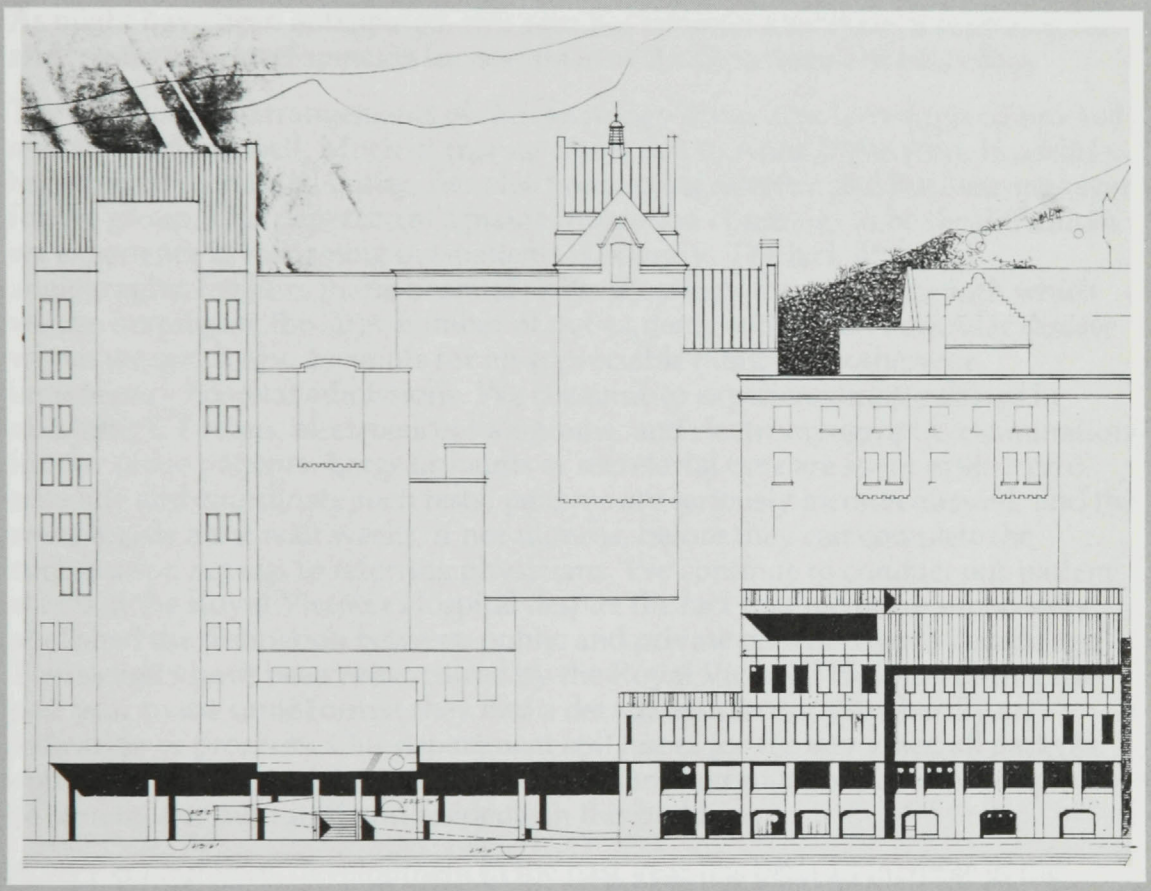
Taylor Kennedy finished his term as president of the hospital's Board of Directors and was replaced, through election, by Lawrence McDougall, who brings an expert legal background to our problems.

Dr. Ivan Woods, continuing as president of the Council of Physicians, devoted much effort to this organization, as did the chairmen and members of the numerous committees reporting to Council.

Finale
As in past years it is my privilege to express here my appreciation to all members of the hospital and institute staff who have contributed during the year to what is recognized both within and outside the institute as "the Neuro spirit". Though difficult to define, it is an intangible feature that adds something rather special to the work within this institution. Many not on our payroll have also helped enormously in our continuing development. We mention especially the hospital's Board of Directors, the institute's Neurosciences Council and Advisory Council, and the newly founded but flourishing Friends of the Neuro, who have already made their mark in so many areas of need in the hospital. We have benefitted greatly from generous donations from patients and their relatives and friends, from private and public foundations, and from many individuals whom we all thank for supporting the momentum of our clinical and scientific work. Our two closest sister institutions, the Royal Victoria Hospital and McGill University, provide generous collaboration and support in many facets of our activities. We also appreciate, in our hospital work, the continuing support of the Ministère des Affaires sociales and the Conseil de la santé et des services sociaux de la région de Montréal métropolitain.

—William Feindel, MD

Hospital Reports



In September 1983 the Montreal Neurological Hospital will install Quebec's first nuclear magnetic scanner. Overleaf, an architect's sketch of the Brain Imaging Centre where the new machine, as well as the PET scanning unit and EEG Laboratory, will coordinate these modern neurodiagnostic techniques.

Neurology

As might have been anticipated, this year has brought a mixture of encouraging and frustrating developments for members of the department of neurology.

The functional rearrangements of the neurology office area have been completed and are working well. Much of this success is due to Anne Bieler who, in addition to her usual secretarial duties, has also been acting as office and business manager for the group. Our department's major frustration continues to be the difficulties we experience investigating out-patients efficiently. The lack of digital angiographic facilities in the hospital seriously affects the adequacy with which we can investigate the large number of out-patients with cerebrovascular disease whom we see. It also accounts for an appreciable number of otherwise unnecessary hospital admissions. We continue to experience major delays in obtaining CT scans, electroencephalograms, and electromyographic examinations for our office patients. Large amounts of secretarial time are spent in efforts to schedule and coordinate such tests, patients are seriously inconvenienced, and the neurologists must wait weeks, if not months, before they can complete the consultation reports to referring physicians. We continue to conduct out-patient clinics in the Royal Victoria Hospital despite the fact that medicare supposedly abolished the distinction between public and private patients over a decade ago. These clinics have been restructured by the Royal Victorial Hospital during the past year to the same format they had a decade ago, in our view hardly an indication of progress. Our department still hopes for the day when all patients requiring neurological out-patient consultation, investigation, or follow-up will be seen by our own staff and residents in this building.

A very encouraging development in the past year has been an increase in the efficiency of our admission and discharge procedures, and our ability to admit elective patients. This has resulted partially from last year's decision to limit the number of patients assigned to each of the in-patient neurology services, and partially from the activities of the Admission and Stay Committee. However, it is largely due to the quiet effectiveness and cooperation of James Gates in the Admissions Office. He has gained the gratitude of all the attending neurologists for developing an admission system that is flexible, humane, and efficient. As a consequence, despite unexpected bed closures we have been able to increase the number of hospital admissions and discharges in comparison to 1980-81. During the coming year, the department of neurology will strongly urge that an effort be made to consolidate geographically our three clinical teaching units. Geographic consolidation would, in our view, appreciably facilitate the care of patients, improve communications between nurses and neurological staff, and eliminate a vast amount of unnecessary and time-consuming work for nurses, residents, and staff.

The department is pleased that Social Work will once again be sending representatives to the weekly rounds of the three neurology services. They, along with Mr. Gates, are the people largely responsible for the staff's ability to admit and discharge patients from hospital within a reasonable time.

Again this year it is almost impossible to overstate our debt to the trainees in neurology. Two visiting neuroscientists, Dr. Jorma Palo, chairman of the department of neurology at the University of Helsinki, and Dr. Frank Morrell, Professor of Neurological Sciences at Rush Presbyterian-St. Luke's Medical Center in Chicago, both made important contributions for which we are grateful. We have also benefitted from the visits of several distinguished clinical neurologists during the year. These visitors have broadened the clinical perspectives of our residents by their lectures and particularly by spending several hours in the discussion of clinical problems with them. On behalf of the residents, I would also like to thank our own neuroscientists for the role they played in the success of the neuroscience seminars now held each Friday morning at 8 a.m. An otherwise near-perfect year for the residency program was marred by the events earlier this month. I share with the residents their concern over the principle involved when the medical profession allows itself to be regulated by decree rather than negotiation. I also appreciate their disillusionment that those of us more senior in the profession have failed to evolve means of reacting effectively against such measures short of the morally deplorable method of strike action.

Allow me to conclude with more positive comments. The department of neurology, as well as the hospital and institute as a whole, takes great pride in the emeritus professorship that McGill awarded Dr. Preston Robb this year. Everyone associated with this hospital for any period of time is aware of the major contributions that Preston Robb has made to this hospital, to McGill, and to the community. All of us are delighted that these contributions have been appropriately acknowledged. Recently, Dr. Elizabeth Matthew joined the staff of the institute and of the hospital's department of neurology. She brings with her exciting new research techniques to add to the repertoire of the institute and hospital. Our department welcomes her wholeheartedly as a clinical colleague and wishes her every success in her research career. Dr. Daniel Gendron also joins the department as a clinical neurologist and electromyographer. A skilled clinician and teacher, he will add to the strength of the department of neurology. Finally, I would like to restate the department's intention to make realistic, optimistic plans for development, and to recruit the best young neurologists and physician-scientists available in order to fulfill properly our responsibilities in this university teaching hospital.

—Donald Baxter, MD
Neurologist-in-chief

Neurosurgery

From April 1 1981 to March 31 1982, 725 operations were carried out in our operating theatres. Of these, 277 were major craniotomies, 79 were for epilepsy, 99 for brain tumors (not counting pituitary tumors). These two categories, brain tumors and epilepsy, have shown a steady increase in the last few years whereas shorter procedures such as lumbar discs have continued to decrease slightly in numbers. This means that the average operating room time for any one case has tended to increase. Since these major craniotomies often require most of the day, two and sometimes three teams of nurses may follow each other during a single operation and these long cases are also very demanding on our surgical, anaesthetic, and resident staff.

Dr. Jean-Guy Villemure's vigilant infection committee unfortunately reported 8 operative infections this year, just over 1 per cent. This is still a very low figure but it is a definite increase over the incidence of the past years, which had been 0.5 per cent or less. Changes in techniques and wound management policies will have to be reexamined carefully to find the reasons for this increase and to make the necessary corrections.

New equipment has appeared in our theatres in the last few months. A major addition was a "Cavitron" ultrasonic aspirator. Many tumors and parts of diseased brain are removed by suction rather than by morcellation, but when the tissue is firm as it is in meningiomas, removal may be difficult. Ultrasonic waves vibrate the tip of the "Cavitron" suction 40,000 times per minute allowing it to aspirate gently even the toughest tumors with less danger of damaging sensitive adjacent structures such as optic nerves or important blood vessels.

An electrically driven operating chair has also been constructed to Dr. André Olivier's specifications for use in procedures like stereotactic cerebral angiograms and ventriculograms, electrode implantations, or tumor biopsies. This greatly facilitates positioning the patient and aiming the laser-guided x-ray beam for these complex and precise interventions.

This report would not be complete without a word of thanks to our nursing and auxiliary staff in the operating room under Miss Norma Isaacs, and to all those who look after our patients on the wards. The surgical procedure, important and dramatic as it may be, is only a part of the total care and attention the patient requires during his hospital stay.

We are especially grateful also to Dr. Richard Leblanc, Dr. David Dubuisson, Dr. Rick Holmberg, and Dr. Scott Brown who have, in turn, headed the residents on each of our two services. In July 1981, they were joined by 5 new assistant residents admitted to our training program, thanks to a long overdue increase from 7 to 10 in the number of our funded posts. This was a step in the right direction and in taking over the position of program director from Dr. William Feindel I was grateful to him for having obtained this increase. This number is still somewhat short of the complement needed to staff adequately the three hospitals that are part of the program, and still allow our residents time for study and for laboratory experience. Ideally our residents should have help from rotating

interns and junior residents from other surgical disciplines who would have much to learn from contacts with neurosurgical patients.

—Gilles Bertrand, MD

Council of Physicians

The past year has been unusually active for the Council of Physicians and its committees. The Executive Committee held regular monthly meetings and invited heads of the major hospital departments to participate.

The report of the survey conducted by the Corporation professionnelle des médecins du Québec held no major criticisms, but expressed concern over the lack of adequate documentation of some of our activities. Measures have been taken to improve this.

One of the major events affecting all hospital departments was the demand from the Ministère des Affaires sociales, on short notice, to reduce our expenditures. This could not be done without temporary closure of fifteen beds. To a greater or lesser degree everyone experienced difficulties and inconveniences. The spirit with which the problem was approached is a tribute to the tradition of cooperation that has always been a hallmark of this hospital. While every department had to bear part of the burden, I think special mention should be made of the efforts of Caroline Robertson and her nurses. The largest department in the hospital, nursing bore the lion's share of the cut and met its objective by a voluntary system of leaves of absence without pay. Joyce Shannon, associate director-general, through her infectious optimism, almost made us feel the whole thing was for our own good, and that we might even benefit from the experience. The spirit of harmony and good will that prevailed throughout this difficult period were in large part due to her influence. The Executive Committee was unanimous in voicing a vote of confidence on her behalf.

The Ministère des Affaires sociales gave us a further jolt in November with the introduction of Bill 27, which was eventually passed on December 21 in a modified form that included only a few changes of direct concern to this council. The long-term implications of this bill for the future of specialty medicine in Quebec, and of this hospital in particular, remain uncertain. It is clear that we will have to be more vigilant than ever if we are to protect the profession and the public from policies that can have only a deleterious effect on the future quality of health care in this province.

On a more positive note, certain measures were adopted during the year that were designed to improve the services we provide for our patients. Most notable was a policy for the performance of minor surgical procedures on ambulatory patients, including nerve decompressions and nerve-muscle biopsies. These patients formerly had a low priority on our admission lists, particularly where beds were short. A new admissions policy, submitted by the Committee on Admissions and Stay, was adopted to streamline procedures and clarify certain grey areas. Grand Rounds were moved from Monday morning to Tuesday afternoon to make more efficient use of the operating rooms. The neurodiagnostic centre committee was reactivated under Dr. Serge Gauthier. We hope to commence activities in this unit, at least in a small way, in the near future.

I thank the chairmen and members of the various committees for their generous service to the affairs of the council. The opportunity to work with the members of the Executive Committee and the committee chairmen has been both enjoyable and enriching.

—Ivan Woods, MD
Chairman

Nursing

The nursing department has both full-time and part-time staff, making 240 full-time equivalents. There are 12 coordinators and 9 head nurses for supervision, education, and research in nursing. Working in an ultra-specialized facility, we are responsible for nursing 133 in-patients on eight general neuro units and in radiology, intensive care, and the operating room. A central supply unit is also managed by a nurse.

Nine months into this fiscal year we were ordered by the provincial government to cut back our year's total expenditures by one-tenth. We must maintain this "one-tenth less" objective during the whole of the coming year.

Our response was to consolidate the activities of service, education, and research into one position description for all coordinators, which luckily we had started in September. This allows interchange when any one coordinator must be absent so that activities can continue to be carried on.

We changed four less needed positions into more needed ones, thus making do without this amount of service. We increased staff education at the unit level because research has shown that this is more cost effective than teaching in large groups. In a further attempt to cut costs we closed one unit for three months, and encouraged staff to take leave of absence without salary.

How did we protect the quality of patient care while we nursed "one day at a time"? In spite of four patient attendant positions being lost, and a program of voluntary leave of absence, we maintained the same daily quota of staff on duty per unit. Any shortfall was caused by unexpected illness. The valuable contribution of head nurses, staff nurses in charge of the units, and union leaders enabled us to keep morale at a level where patient care could be accomplished. We gave up all learning programs, including nursing rounds, except those at the basic unit level, but we increased our unit level learning, especially in regard to basic safety. We concentrated on effective mobility techniques. We also gave up committee meetings, including Audit and Infection Control, and concentrated fully on the activities of the Nursing Practice Committee.

For three months we survived, but did not develop. In comparison to previous years, this year we achieved less than half the staff learning sessions.

For moving and closing their units we pay tribute to the staff of 2 South and 4 East. An assistant head nurse, Rose Khoury, and following her, Clavelina Feliciano, took charge of the unit on 3 Rockefeller. Cecilia Largo has brought these two units together under one care management group. She and her staff are firm in their resolve to give good care, standing up for their patients' right to privacy in spite of the many difficulties of an open unit being treated as a throughway. During our next renovations move the nursing staff will again stand firm on the subject of patient privacy.

What is our next step in protecting the quality of patient care? Although we recognize that all care and cure workers are members of a team, along with the patient and his family, we also realize the necessity of a one-to-one relationship with our patients. It is important to a patient to have his own doctor, his own nurse, his own social worker. We are accordingly planning to commence a modular form of primary nursing.

The home care liaison nurse reports increased referrals to the community in spite of fewer hospital admissions. She was able to refer 23 patients to home services. We regret that consultation requests for this service are still sometimes placed only after the patient is discharged.

Although able to audit the nursing care of fewer patients we have worked on an outcome seizure audit, instituted a recovery room audit, and generally improved several other audits in the past year.

Infection Control reports that the number of patient days on isolation was twice that of the previous year, largely because of long-stay patients with respiratory infections. We have managed to send one such patient home with supportive home care.

The spinal trauma team worked with ten patients who had multiple deficits. They are preparing to publish a resource booklet for paraplegics and quadriplegics in the Montreal area.

Pharmacy Liaison attended four meetings of our doctors and the staff of the Royal Victoria Hospital. Eight nursing sessions were held to solve problems related to administration of medication. We still have not reduced the number of steps needed between the issuing of a prescription and the record of its administration. Medication controllers have been introduced this year and we have not increased medication errors.

Patient learning was a focus for the past year. Two of our children have gone out regularly to school. We are indebted to Jean Carroll, the teacher from Special Education, Commission des écoles catholiques de Montréal, for her interest in and help to these children. In every aspect of patient care we are constantly more aware of the learning needs of our patients and families as well as of ourselves.

The Nursing Practice Committee, under the leadership of Winsome Wason, has worked to produce teaching guides, to study learning methods, and to increase learning motivation.

We are grateful to the Royal Victoria Auxiliary for supplying funds for two highback wheelchairs, a transport stretcher, five transport wheelchairs, and an artificial thorax for learning the cardiac arrest procedure.

We are privileged to retain our Post-Basic Program within the Department of Education of Quebec. We graduated a group of seven students in July and six in February. We now have five students who are studying and practising in the French language.

We hope to meet the 1983 deadline of bilingual practice. Because we had a three-month setback and are not allocated funds for translation, this bilingualism will require superhuman effort. Nevertheless, we have set our sites on achieving this goal, and will work towards it with the medical staff.

If we wished to look at last year from an economic point of view, we would find that the ledger was heavily weighted on the debit side. However, our most important asset, then as now, is our people, both patients and staff. We have a magnificent potential for care in this hospital. We must refuse to accept anything less than excellence.

—Caroline E. Robertson, MScA
Director of Nursing

Administration

At a recent Canadian Hospital Association meeting, the keynote address was entitled "Who's in Charge Here." This strikes a responsive chord in administrators across Canada, but perhaps more particularly here in Quebec. Hospital administrators in this province are on the receiving end of almost daily bureaucratic directives from the Ministry of Social Affairs or the Regional Council. We cannot help wondering sometimes how people who have never set foot in our hospitals can be so sure they know the answers to our problems. Nevertheless, we do manage to retain our autonomy and we continue to maintain our high standards of patient care. It is my privilege on this occasion to pay tribute to our department heads and individual staff members who make this possible.

1981-82 has not been an easy year. We have had to replace our Director of Personnel, our Admitting Officer, and our Purchasing Manager, three important and sensitive posts. It takes time to learn the ways of a hospital and to be accepted by staff, but we are satisfied that Leo Robitaille, James Gates, and Guy Lambert have accomplished this; they are valued members of our team. In the Business Office we have had to cope with a changeover in the payroll system as well as the computerization of stores.

The biggest headache for all of us was the famous or infamous "plan de redressement," the enforced budget cuts imposed on all Quebec hospitals. Many hours were spent trying to put together a plan acceptable to Quebec, and acceptable if not palatable to the staff. We closed fifteen beds from December 18, 1981 until April 5, 1982, and although this was far from desirable it did not turn out be a catastrophe thanks to the cooperation and goodwill of the medical and nursing staff, and, I must add, the flexibility and cheerfulness of Mr. Gates. Further, many staff members took voluntary leave of absence without pay, and we were able to achieve approximately 55 per cent of our objective. We knew from the beginning that we could not reach 100 per cent since part of our plan was contingent on purchasing complete food services from the Royal Victoria Hospital. This proposal is still being studied. We are also studying the merits of outside catering, and we are looking at areas such as laundry, staff health, and other services that we might share with the Royal Victoria to our mutual advantage.

Facts and figures are published elsewhere in this report, but in the final analysis hospitals mean people, patients and their families who are suffering, anxious, and worried. The occupancy rate and the average stay are valuable statistics, but it is more important to remember that they translate into human beings and sometimes tragedy. All of us, no matter how far removed we may be from actual patient care, must never lose sight of the fact that our primary purpose is to contribute to the well-being of the people who need our services.

The figures in our financial statements indicate, I believe, that our stewardship has been responsible. Credit must go to our business office and to our department heads, who have accepted cut-backs and budget restraints with remarkably good grace.

A year ago I was asked to consider the feasibility of establishing a Montreal Neurological Hospital auxiliary. With the blessing of the Royal Victoria Hospital Auxiliary, which has been so generous to us over the years, I agreed. I invited fifteen busy, intelligent women to become founding members of a group who are now officially known as "Friends of the Neuro." These ladies will decide what type of volunteer group will eventually best serve the needs of our hospital and how such a group should be structured. In one short year they have made themselves an indispensable part of our Neuro family. They have worked closely with our McGill student volunteers and have undertaken many projects, including a gift and book cart, the flowers in front of the hospital, and the sale of Neuro sweatshirts. They have ambitious plans for next year, and we are delighted to welcome two members of their group to the hospital's Board of Directors. Sonja Newman will represent the volunteers, and Nancy Wright will represent the recipients' committee.

For the immediate future, we must continue to retain tight control of the budgetary reins; there will be no frills and we will continue to study the possibilities of shared services.

For the long term I am optimistic. I believe we should plan and put into effect as many of our Phase IV projects as possible with the resources we have. In the area of safety and security some of these are already under way.

For my part, I will do everything I can to provide the administrative structure and environment that will make it possible to carry on the research and medical care that have given the Neuro its enviable reputation.

—Joy Shannon, BA
Associate Director General

Finance

Our total expenditure for the year ending March 31, 1982 was $14,375,372. Of this amount 69.19 per cent was spent on salaries, 5.64 per cent on fringe benefits, 2.76 per cent on medical and surgical supplies, 2.48 per cent on drugs, 6.51 per cent on purchased services, 1.53 per cent on repairs, and 11.89 per cent on other supplies.

Our total revenue was $14,947,368. of which 73.14 per cent derived from the Ministry of Social Affairs, 19.14 per cent from in-patients, 0.53 per cent from out-patients, 0.43 per cent from other revenues, 4.52 per cent from the Régie d'assurance-maladies du Québec as payment to interns and residents, 1.10 per cent from Collège Ahuntsic for financing of the post-graduate course in nursing, and 1.14 per cent from McGill University for payment of teaching support services.

This year the Ministère des Affaires sociales imposed mass budget cuts upon all hospitals. As a result of great effort from the personnel of this hospital, we were able to achieve 52 per cent of the amount required by the Ministry.

This year was exceptionally busy not only because of the budget cuts, but also because of the change in accounting, payroll, and purchasing systems. The changeovers were not easy, but with the passage of time, the systems have become satisfactory.

This year we admitted 1,721 patients, representing a total of 42,525 patient days. We treated 1,731 patients. The total days stay was 42,325, for an average of 24.47 days per patient. The hospital was occupied at 86.30 per cent capacity.

Purchasing procedures were modified in the past year. 2,475 purchase orders were placed and 7,345 deliveries carried out from the stores area.

—Gean-yuan Pwu, BCom
Director of Finance

Social Work

If there is one word to describe our department's activity this year, it would be "change." In our daily work we assist patients and their families in adapting to the imposed changes necessitated by physical injury or disease. As staff, we are also faced with constant imposed changes and demands that we feel helpless to control. Not all changes are negative, but the continual erosion of resources, in particular manpower, leads not only to a reduction in quantity but also quality of care.

The Ministry of Social Affairs' budget cutbacks led to the loss of one and a half social work positions; in our small department, this represents 25 per cent of staff. This, in turn, necessitated a reorganization of social service delivery within the hospital. The first major impact was the closing of all out-patient services other than consultation to physicians. This means that many patients and their families have to struggle and cope without assistance. Having just set up an integrated team concept, we had to revert to a general intake system, accepting referrals on rotation and responding to the most urgent situations. This is extremely difficult for us to accept, as all patients admitted to the Montreal Neurological Hospital are quite likely to have psychological and social difficulties requiring intervention. Team relationships, coordination, and communication have suffered, which leads to a delay in discharge planning.

We assessed 438 new in-patients this year, representing 25.7 per cent of all admissions. Last year we served 557 new in-patients representing 31.6 per cent coverage. The impact of staff reduction in terms of quantity is clear. Unfortunately, we are unable to compare other statistics as the Ville Marie information system is not yet stabilized. Thirty-two patients were placed in chronic care hospitals.

Direct patient service is not the only area affected. For the first time, we are unable to accept social work interns from McGill because of the lack of time for supervision. Staff participation at educational conferences, seminars, lectures, and other community programs was almost non-existant. As I do not carry an active caseload, I find myself assuming much of the necessary teaching, committee, and community linkage roles that staff would like to share, but feel to be valuable time away from direct patient care. If we are not to stagnate as professionals, we must make time to participate in these professional activities.

In spite of these gloomy remarks, we were still able to provide consultation to Epilepsy Montreal, the Canadian Multiple Sclerosis Association, and to students writing term papers from various faculties. We provided a front-page human interest story for the *Gazette*, had a social worker from India for two days observing our work, and lectured at both McGill and College Marie Victorin. I represented Quebec on the CASW National Task Force on Domestic Violence, and as president of the Canadian Association of Social Work Administrators in Health Facilities became quite involved in the setting of national standards and policies for health social workers.

Besides the support group of epilepsy patients, led by Saroj Gupta for the past three years, Monica Wilde initiated and worked with an evening self-help group of multiple sclerosis patients and also participated in the development of a resource booklet for spinal cord injured patients. Our department attempted to produce a weekly newsletter for in-patients that unfortunately had to be discontinued after only four issues because of staff shortages. We introduced a case audit quality-assurance system on social work files and have spent considerable time struggling with the computerized information system centralized at Ville Marie Social Service Centre for the keeping of Ministry of Social Affairs statistics.

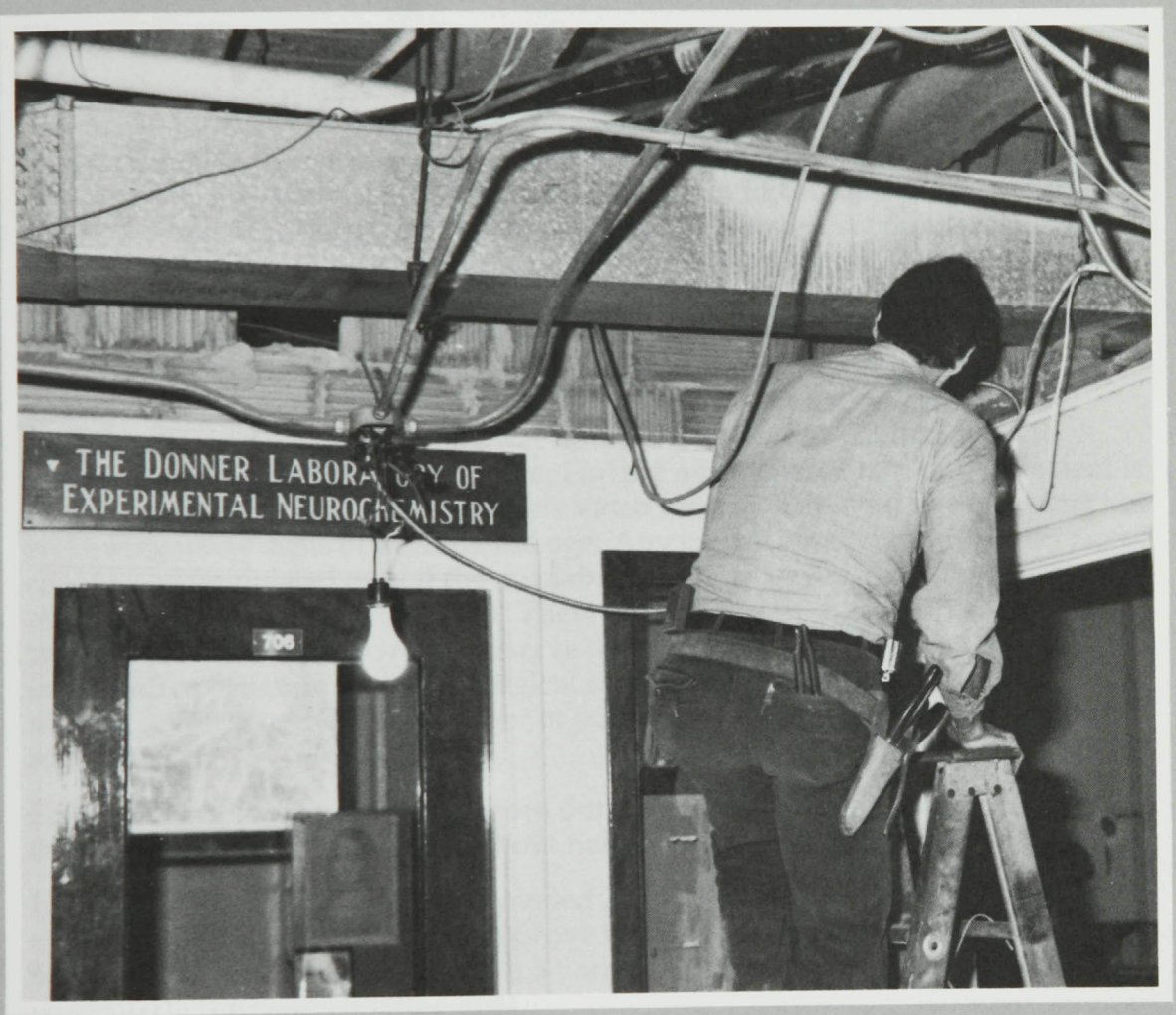
One other exciting event was the institute's appointment of Judith Ripley as a research fellow to the Social Work department. This led to our obtaining a research grant through the Conseil québécois de la recherche sociale to measure the psycho-social impact of seizure surgery.

The McGill student volunteer group grew in numbers to 72 and has become very much part of the hospital scene. Under the supervision of our department these students are often assigned specific patients to work with besides their general visiting and weekly activity "Bingo" evening. They have made a valuable contribution.

Throughout this most difficult year the staff have not succumbed to the "burn out" syndrome, but instead have struggled to convert these setbacks into a challenge. I would like to thank them for their perseverance, support, and continued dedication to high quality patient care.

—Verna Bound, PSW
Director of Social Work

Institute Reports



Thanks to a $50,000. donation given by the Donner Canadian Foundation in October 1982, the Donner Laboratory of Experimental Neurochemistry has been completely renovated in memory of the foundation's secretary, the late George Goad. A $1.6 million grant given by the federal government in April 1983 will permit the Neuro to begin the long-awaited Phase IV renovations of the Rockefeller and McConnell Wings.

Electroencephalography and Clinical Neurophysiology

Clinical activities

The number of EEGs has remained relatively steady over the past few years, at just above 4,000 a year. Two-thirds were recorded on in-patients. But there has been a change in the nature of the examinations. The proportion of "routine" EEG examinations has diminished while that of longterm EEG monitoring studies has gone up. These studies are usually done in conjunction with computer analysis of the EEG and/or videotape recording of seizures in patients who either present thorny diagnostic problems or are investigated because surgical treatment of their medically intractable seizure problem is being contemplated. With Dr. André Olivier we have investigated some of these patients by means of stereotaxically implanted depth electrodes. Our EEG and video monitoring systems are now working day and night, including weekends; even so we are quite unable to satisfy all the demands for this service. Further modernization of the equipment is necessary. In particular, we need a new video recording system, as the present one is showing many signs of decrepit old age. Any expansion of monitoring services could be contemplated only if the availability of both technical and medical manpower in this area is increased. These are pressing problems which will have to be solved soon if we want to preserve the excellence of our clinical epilepsy investigative program and offer surgical treatment based on the best possible selection criteria to the large number of patients who come to us, often as a last resort.

EEG recordings in the operating room during endarterectomies increased to thirty-four during the past year (about half the number of electrocorticograms).

In addition, our laboratory has provided 215 visual and 155 brainstem auditory evoked potential studies, tests that prove to be increasingly valuable in the diagnostic work-up of patients with a variety of neurological diseases, particularly the demyelinating ones.

Research activities

Correlations between EEG and positron emission tomography (PET) in focal epilepsy

During the past year, with Dr. Rachel Ochs and the PET laboratory staff we have studied the correlation between EEG findings in patients with well-defined foci and changes in regional cerebral metabolism or blood flow as measured by positron emission tomography using both $^{15}O_2$ either as molecular $^{15}O_2$, $C^{15}O_2$ or $C^{15}O$. More recently we have studied these patients also with ^{18}F-deoxyglucose. Preliminary results seem to confirm that interictally the epileptogenic focus shows a decrease in oxygen and glucose utilization as well as in regional blood flow.

Experiential phenomena in temporal lobe epilepsy

In the past year we completed and published results of a study I did with Drs. André Olivier, Luis Quesney, Frederick Andermann, and Sandra Horowitz on the role of the limbic structures of the temporal lobe in the evocation of experiential phenomena characteristic of temporal lobe epilepsy. These

phenomena involve emotional, auditory, and visual perceptual and memory mechanisms. The data were collected from a series of patients with stereotaxically implanted depth electrodes. We showed that the limbic structures of the temporal lobe, in particular the amygdala, are crucially involved in these experiential phenomena.

Secondary epileptogenesis in human epilepsy
Dr. Frank Morrell, professor of neurology at the Rush Presbyterian-St. Luke Medical Center in Chicago, spent his sabbatical leave in our laboratory. He undertook with us, his wife (Dr. Leyla de Toledo Morrell), and Dr.Theodore Rasmussen, a retrospective study on patients who had been surgically treated here for seizures between 1960 and 1980 and in whom a tumor was found as the cause of the seizures. Secondary foci in homotopic areas contralateral to the primary lesion were found in 35.7 per cent of these patients. The likelihood of developing a minor focus was, in part, a function of the duration of the illness, and was also greater in the younger age group. Secondary epileptogenesis therefore seems to represent a significant aspect of the pathophysiology of human epilepsy.

New approach to the study of frontal lobe epileptic discharges
Although naso-ethmoidal electrodes provide adequate EEG recording from orbito-frontal regions, these electrodes must be applied by an ENT specialist. The technique is not devoid of potential complications which limit its practical use. We are currently testing the effectiveness of a regular EEG electrode that an EEG technologist can apply immediately above the eyebrows to record EEG activity from the orbito-frontal region. To date we have performed 35 supra-orbital electrode recordings of which 15 were obtained with simultaneous naso-ethmoidal electrode recordings. The results are promising. Focal epileptiform discharges involving the orbito-frontal region are recorded by both naso-ethmoidal and supra-orbital electrodes. However, the amplitude of the epileptiform discharges is higher when recorded with naso-ethmoidal electrodes. Based on our preliminary observations, we foresee an increasing role for naso-ethmoidal and supra-orbital electrodes in providing adequate EEG localization of focal epileptiform discharges involving the frontal-temporal convexity, as well as for the compartmentalized localization of the epileptiform profile within the frontal lobe.

Computer analysis of the electroencephalogram in epilepsy
The patient monitoring system in the EEG laboratory allows for the simultaneous recording of two patients, each by means of a 16-channel EEG. The EEG of both patients is recorded when the seizure push-button is pressed. Previously, only the EEG of the first patient could be analyzed for automatic spike and seizure recognition. However, the system was improved during the last year to allow the automatic analysis of at least some (usually three or four) of the channels of the second patient. This has resulted in more valuable recording sessions and more flexibility in patient scheduling.

A method is now being developed for the automatic recognition of bursts of spike and wave activity in EEGs recorded via the cable-telemetry system as well as in EEGs recorded on the ambulatory cassette recorder.

The propagation pattern of seizures that appear widespread in the EEG is being investigated. Seizures of patients with chronically implanted electrodes have been analyzed in detail, and some propagation patterns were found consistently in several seizures of the same patient.

Research in neuroelectronics
The main accomplishment of John Ives and his associates this year was the development of a 16-channel portable EEG cassette for ambulatory EEG recordings. The use of a walk-man type tape recorder integrated with the 16-channel cable telemetry system has produced an EEG data acquisition system that can be used on a completely ambulatory patient.

In the early seventies the first generation of sophisticated EEG monitoring was realized by combining telemetry with a mini-computer. The second generation combined cable telemetry and a mobile microcomputer, 'F4-P4'. Now a third generation system, when completed with a low power microcomputer, will bring about further advances in the field of clinical electroencephalography. What is now needed is a microcomputer development system to integrate the hardware and software.

—Pierre Gloor, MD

Electromyography

Research in clinical neurophysiology in the electromyography department has focussed on three general topics:

1. assessment of sensory nerve action potential contour dispersion as a sensitive early indicator of neuropathy;

2. correlation of individual somatosensory evoked potential component peaks with generator sites;

3. correlation of clinical and electrodiagnostic findings in peripheral nervous system disease.

The temporal dispersion of impulse traffic in sensory nerves following peripheral stimulation appears to be a reliable sign of polyneuropathy and of local nerve entrapment. The limits of normal impulse contour dispersion are not well defined in the literature — indeed, dispersions are rarely measured in most EMG labs. Using near-nerve percutaneous recording techniques and averaging methods we have been able to document a range of normals for a variety of recording paradigms. We have been able to correlate changes in dispersion with appropriate symptoms even in the absence of other nerve conduction abnormalities. Further development of this technique will provide precise electrodiagnostic confirmation early in the evolution of the underlying peripheral nerve disease.

Studies of cerebral evoked potentials recorded after the presentation of sensory stimuli in a number of modalities have proved increasingly useful in precise early diagnosis of a number of neurological diseases and in determining localizing information about the sites of pathological processes within the neuraxis. So-called far-field or subcortical somatosensory evoked potentials apparently arising from generator sites within the plexuses, roots, dorsal columns, and brainstem lemniscal pathways can be recorded using high sensitivity amplifiers and computer averaging techniques. Simultaneous recording at a number of sites permits a topographic analysis of the origins of the individual component potentials. An overall picture is gradually emerging based on research in a number of centres that will likely permit more precise localization of abnormalities within the somatosensory system based on patterns of abnormality in these far-field, short-latency, somatosensory evoked potentials. We have attempted to demonstrate accurately somatosensory evoked potential components that can be localized to plexus, root, or cord and may permit us to provide better localizing information about the sites of pathology in radicular syndromes. The acquisition of new equipment permitting a number of montages simultaneously will further these studies.

We recently completed a study of 54 patients undergoing thoracotomy for aorto-coronary bypass who developed ulnar neuropathies in the perioperative period. The pathophysiological mechanism of this rather frequent complication of thoracic surgery had not previously been explored with sophisticated electrodiagnostic techniques. Our studies demonstrated that in these patients compressive-ischemic damage occurred at three sites, often in combination —

lower trunk of brachial plexus, ulnar groove, and cubital tunnel. Sixteen patients were found to have ulnar conduction abnormalities localized to the elbow in the asymptomatic arm. Correlation with the degree of stretch placed on the plexus at the time of sternal splitting suggests that this mechanism is frequently responsible for converting an asymptomatic ulnar neuropathy into a symptomatic lesion at the time of operation by a "double crush" mechanism, and argues against the previously accepted hypothesis that these neuropathies were usually the result of compression at the elbow during the operative procedure.

We also participated in a pilot study of patients with diabetic polyneuropathy under the auspices of the World Health Organization. Twenty-four patients were followed for a period of six months with repeated clinical and electrodiagnostic studies in an attempt to establish a base-line before a trial of ganglioside therapy. After assessing the feasibility of a prolonged drug trial we were obliged to withdraw from the multicentred study because of concerns over trial rationale and design.

More patients with acute idiopathic polyneuropathy (Guillain-Barré syndrome) are being treated in this hospital with plasma exchange. We have instituted a study of patients to correlate clinical and electrodiagnostic features with improvement by plasma exchange. We are also examining the question of central nervous system involvement in this syndrome by measuring central conduction times using somatosensory evoked potentials. Although these two studies are preliminary, it is of interest that two patients have shown clear prolongation of central conduction times compatible with demyelination within the central nervous system.

The research activities of this department over the past twelve months have continued the research trends pursued in the EMG laboratory during the last decade, particularly with regard to the further development of the somatosensory evoked potential technique. The acquisition of more up-to-date equipment will allow us to continue active participation in the development of knowledge about evoked potential physiology. New equipment will also allow us to perform detailed single-fibre EMG studies of patients with neuromuscular disease, and should permit us to participate in the further development of this useful electrodiagnostic technique.

—George Elleker, MD

Experimental Neurophysiology

Studies of feline generalized penicillin epilepsy
During the past year we have continued to study several aspects of the pathophysiology of feline generalized penicillin epilepsy.

1. Behavioral studies: Deborah Taylor received an MSc degree for her studies of behavioral manifestations in the cat during generalized bilaterally synchronous spike and wave discharges. The close similarity of the manifestations in this model and in human generalized corticoreticular epilepsy which is so notable in the EEG is also apparent in the behavioral manifestations. During spike and wave discharge, the cats exhibit behavioral unresponsiveness or forms of behavioral impairment which duplicate those seen in human absence attacks. These findings support the validity of feline generalized penicillin epilepsy as a model of human generalized corticoreticular epilepsy.

2. Thalamocortical relationships in feline generalized penicillin epilepsy: Dr. Massimo Avoli was awarded a PhD for his studies on the interrelationship of the activity of single cortical and thalamic neurons during spike and wave discharge in feline generalized penicillin epilepsy.

Work during the year dealt with the detailed relationship of thalamic and cortical neurons within the main thalamocortical association system of the cat both during normal conditions and during spike and wave discharge. Some aspects of these relationships studied by Drs. George Kostopoulos, Massimo Avoli, and Richard McLachlan concerned the interrelationship of thalamic and cortical single neuron activity during recruiting responses and spontaneous spindles. The change in neuronal activities under the influence of penicillin when spike and wave discharge develops in response to penicillin was also studied. This involved an increase in excitability which appears not to be due to removal of inhibition, since inhibitory responses also undergo a significant augmentation after the intramuscular injection of penicillin. As a consequence, cortical and thalamic activity becomes more tightly interlocked. More recently Dr. Richard McLachlan has carried out microphysiological studies on the involvement of neurons of the midline and intralaminar nuclei in the mechanism of recruiting responses and spike and wave discharges. He has recorded simultaneously the activity of a cortical, and two thalamic neurons: one in the midline and intralaminar system, and the other in a specific thalamic nucleus.

Drs. Daniele Giaretta and Itsuki Jibiki have recently joined us and will be involved in our continuing studies on the thalamic and cortical mechanisms of feline generalized penicillin epilepsy.

3. Dopaminergic mechanisms in abnormal photosensitivity: In cats, bilateral cortical catecholamine denervation induced by topical 6-OH dopamine application reliably induces electrographic features of epileptic photosensitivity, namely photically induced spike and wave discharges, in animals which before the lesion were not photosensitive. This phenomenon is associated with a significant depletion of dopamine (DA) in cerebral cortex, particularly in the

occipital lobes. These findings support our view that the physiopathogenesis of epileptic photosensitivity is related to a presynaptic cortical dopaminergic deficit.

Apomorphine at low dosage (0.05 mg/K/ip) blocks the epileptic photosensitivity induced by diffuse cortical 6-OH dopamine application, suggesting denervation supersensitivity of postsynaptic DA receptors to DA agonists.

Quantitative studies on ictal and interictal focal epileptic discharge in the kindling model of epilepsy
Dr. Jean Gotman has been investigating the relationship, in time and space, between interictal epileptic activity and the occurrence of seizures in the cat on the kindling model of focal epilepsy. The EEG of experimental animals is being monitored and analyzed almost continuously in order to quantify the interictal activity and to capture possible spontaneous seizures. So far it has been established that spontaneous seizures are not preceded by any change in interictal activity; seizures, however, cause a dramatic increase in interictal activity. These results are similar to those we have found in many human recordings.

Neural control of eye and head movements
Dr. Daniel Guitton's current research activities relate to the general problem of how eye and head movements are elaborated by the nervous system. The eye-head system is a particularly convenient one for studying motor systems in general, because of the relative "simplicity" of the oculomotor system, the strong coupling between eye and head movements, and the relative ease with which both eye and head displacements can be measured. Studies on both animals and humans are now under way.

Dr. Guitton and Dr. Robert M. Douglas have extensively studied coordinated eye-head movements in the normal cat. Their results reveal two distinct motor strategies. They are now attempting to relate these strategies to brainstem neural mechanisms. With Douglas Munoz a study is being made of the discharge characteristics of tecto-reticular, tecto-spinal and reticulo-spinal neurons in relation to the characteristics of eye and head movements. Michel Volle is studying the discharge characteristics of prepositus neurons during head movements.

Results of a study done with Michel Volle of eye-head movements in humans suggest the use of two different motor strategies that depend on target eccentricity, analogous to that in the cat. A theoretical and experimental study of the mechanisms contributing to head stabilization uses the white noise approach for specifying the transfer function of a system. This is the final-year project of Norman Wereley, an honours student in mechanical engineering.

Morphology of functionally identified neurons in somatosensory cortex
Dr. Robert Dykes and his associates began to change the direction of research in their laboratory to focus on the morphological characteristics of functionally identified neurons in somatosensory cortex. They hope to identify the sequence of

neurons activated by an afferent signal in order to understand the respective roles of different, morphologically distinct neurons in somatosensory cortex.

Dr. Pierre Landry, an expert in intracellular staining of cell processes with HRP, has joined the laboratory and will lead this effort. In addition, Dr. Dykes' group has continued to use electrophysiological mapping techniques to study the reorganization of the somatosensory cortex following peripheral nerve injury with the objective of learning about the factors that guide the reorganization seen centrally following peripheral nerve repair.

Staff changes
During the past year a key member of our research team, Dr. George Kostopoulos, returned to Greece to assume a professorship in the department of physiology in the University of Patra Medical School. We wish him success in his work.

We are fortunate that Dr. Massimo Avoli is joining the institute staff. He will study epileptic mechanisms using *'in vitro'* neocortical and hippocampal slices obtained from experimental animal models as well as in slices from human epileptic cortex removed during neurosurgical operations for the cure of epilepsy.

—Pierre Gloor, MD

Fellows' Library

The Historical Collection is back. After seven years in storage, the working materials of the Fellow's Library are together under one roof, and available for on-the-spot consultation. Room 628 is now part of the library area, and holds books and periodicals published before 1960.

The Library Committee plans a weeding out of the older material. Only books truly of historic significance will be so designated; other pre-1960 volumes of no permanent value will be passed on for safekeeping to the McGill Medical Library, thus freeing space for further additions.

Careful financial planning over the past year has allowed the reinstatement of some periodical titles that had to be dropped in 1981/82 because of budget reductions. The splendid cooperation on the part of the research staff has permitted continuation of our subscription to *Brain Research*. The sale of surplus periodicals (gifts kept in storage) raised money earmarked for the purchase of books.

The library staff has been kept busy meeting requests for interlibrary loans, some of which could be filled only after lengthy searches. This provided us a great deal of satisfaction in seeing materials and users brought together. Claudia Ugolik deserves much credit in this area.

The library's physical condition has deteriorated considerably through constant use. We are therefore most grateful that repair and reupholstering of chairs, as well as recarpeting, has been accepted as a project by the Friends of the Neuro. This will definitely contribute to an atmosphere conducive to study and concentration.

—Marina Boski, BLS

Muscle Biochemistry

This year we welcomed two new predoctoral fellows to the laboratory. Brenda Joy began a project on cross-linking studies of proteins of the muscle cell surface. John D'Argenzio will develop and apply novel surface labelling techniques to the muscle cell surface.

The initial phase of our work on the relationship between muscle contractile activity and the development and maintenance of the differentiated state in culture has been completed. This work, now in press, has demonstrated that the effects of contractile activity on muscle phenotype are selective. Proteins such as myosin heavy chain and the sarcoplasmic reticulum ATPase are regulated by contractile activity. In contrast, other major proteins, which are also developmentally regulated, such as the MM isoenzyme of creatine kinase, are quite unaffected by contractile activity. We have also found that the effects of contractile activity on the sarcoplasmic reticulum ATPase precede detectable effects on other proteins in culture. This suggests that defective calcium transport by the sarcoplasmic reticulum may initiate many of the changes in concentration of other muscle proteins that are seen on inhibition of contraction. This could occur through elevation of intracellular calcium and regulation of protein synthesis, and/or turnover by the free calcium level in the cell. We now have evidence that total cellular calcium levels are indeed altered in contraction-inhibited cells. Jeffrey Charuk, a Muscular Dystrophy Associate Pre-doctoral Fellow working in our laboratory, is now developing procedures to measure precisely cytoplasmic and organellar total and free calcium levels in cultured muscle cells. This work should provide valuable new data on intracellular $Ca++$ in the developing muscle cell and the role of this ion in muscle hypotrophy.

Another major line of investigation has been the biosynthesis of plasma membrane proteins in cultured muscle cells. Our overall goals here are threefold. First, we wish to characterize more fully the proteins and glycoproteins of this complex membrane system. Second, we wish to determine which of these proteins are differentiation-regulated and may, therefore, be involved in key processes such as myoblast fusion. Finally, we wish to determine whether abnormalities in the synthesis and accumulation of membrane proteins are apparent in muscle cell cultures from individuals with genetic muscular dystrophy. To date our work has concentrated on surface labelling, immunochemistry, and lectin labelling of chick skeletal myoblasts. We are now extending these studies to human satellite cell cultures. Comparison will be made with similar cultures from Duchenne dystrophic muscle.

Finally, with Dr. George Karpati we have initiated studies on several individuals with unusual neuromuscular disorders that we feel can profitably be investigated biochemically. Two of these in particular will be studied further. One is a case of suspected sarcoplasmic reticulum $Ca++$ transport deficiency. The second is a case of reducing body myopathy in which we have an indication of abnormal accumulation of certain proteins in the muscle. While analysing these and other

biopsies, we have developed analytical procedures for the diagnosis of carnitine deficiency and carnitine palmitoyl transferase deficiency. It is expected that these assays will be useful adjuncts to the clinical diagnostic and research work of the institute's neuromuscular group.

—Paul Holland, PhD

Neuroanatomy

With four staff members, six fellows, and two visiting scientists, the Neuroanatomy Laboratory continued to expand its research activities in 1981-82. In addition, the staff continued to direct and provide the major teaching contribution to the central nervous system course for medical undergraduates and neuroscience graduate students. Recently we also created a new advanced seminar in neuroanatomy and histochemistry for fourth-year medical students and neuroscience graduate students.

Our director, Dr. Donald Lawrence, prepared to embark on a sabbatical leave with Robert Porter at the John Curtin School of Medical Research in Canberra, Australia, where he will pursue neurophysiological and neuroanatomical studies of corticospinal afferents to motoneurons in the monkey.

Dr. Alain Beaudet developed four major lines of research. Dr. Edith Hamel, an MRC post-doctoral fellow working with him, established histological procedures for the radioautographic demonstration of opiate receptors to be visualized by both light and electron microscopy in the rat brain. Dr. Denis Hervé, a post-doctoral fellow on leave from l'Université de Paris, worked with Dr. Beaudet on the interactions between serotonin or noradrenaline and dopamine neurons in the ventral tegmental area of the rat by combined radioautography and immunocytochemistry at the electron microscopic level. In a similar vein and with a similar approach, Dr. Beaudet has been investigating, with Dr. Olivier Bosler from CNRS, Marseille, France, and Dr. Virginia Pickel from Cornell University, New York, the cellular relationships among monoaminergic and peptidergic neurons. In collaboration with Dr. Alain Rambourg from CEA Saclay, France, and Dr. Yves Clermont from the anatomy department at McGill, Dr. Beaudet has also been studying the three-dimensional structure of Nissl bodies in rat primary sensory and lower motor neurons by stereoscopic analysis of metallic stained material viewed with low and high voltage electron microscopes. Finally, Dr. Beaudet and I are applying a technique of retrograde labelling with radiolabelled neurotransmitter molecules to the identification of transmitter specific neurons in the rat central nervous system.

Dr. Serge Gauthier continued studies of the central regulation of the sympatho-adrenal system by investigating the organization of descending supraspinal pathways that influence the preganglionic sympathic outflow in rats. In clinical studies carried out with Dr. Pierre Etienne and Dr. Paul Wood from the Douglas Hospital Research Institute, he is investigating the neurochemical substrates of Alzheimer's and Parkinson's diseases.

Investigating the neuroanatomical and neurochemical substrates of mechanisms of the sleep-waking cycle, I have continued my own research along three avenues. Under my supervision, Lee Friedman completed his PhD research which involved the topographic delimitation in the cat, by radiofrequency lesions, of neuronal systems located in the dorsolateral pons that are essential for the generation and maintenance of paradoxical sleep. Another of my students, Harry Webster, completed his master's thesis research involving the delineation, by retractable

wire knife cuts, of descending reticulospinal fibre systems in the cat that mediate the motor inhibition occuring during paradoxical sleep. In neuroanatomy, Dr. Tian-zhu Yang, a visiting scientist from Hebei Medical College, completed his research on the efferent projections of the brainstem reticular formation using the radioautographic technique, with anterograde transport of labelled proteins in the rat. In neurochemistry, I completed a study, using the histofluorescent technique, of the catecholamine pathways and terminals in the brainstems of the rat and the cat. Under the supervision of Dr. Beaudet and myself, Michael Paré began his master's thesis research involving the identification of acetylcholine neurons in the brain stem reticular formation of the rat by radioautographic demonstration of neurons retrogradely labelled after spinal cord injections of radiolabelled choline.

—Barbara E. Jones, PhD

Neurochemistry

Neurochemistry Clinical Laboratories
In the period from April 1, 1981 to March 31, 1982 the unit total for the Neurochemistry Clinical Laboratories was 511,706 (523,557 last year). The slight decrease reflects a change in unit values for some of the determinations rather than an actual downward change in volume of work done.

In the third floor laboratory, 23,891 hematological determinations were performed this year (9.5 per cent more than the previous year), 2,336 urinalysis (2,698 last year) and 10,747 miscellaneous tests (11,078 last year). As well, 14,316 blood samples (10.5 per cent more than last year) were procured for analysis in other laboratories.

In the seventh floor laboratory 28,031 biochemical determinations were performed, 7 per cent less than last year's total of 30,167.

Sixty-four special urinary screenings for abnormal oligosaccharides and dolichols and 13 blood glycosidases determinations for diagnosis of enzyme deficiency diseases were carried out in Dr. Leonhard Wolfe's Experimental Neurochemistry Laboratory in collaboration with Dr. N.M.K. Ng Ying Kin. Not included in the unit totals reported above, these represent a special service to the hospital.

Electrophoresis Laboratory
In the period from April 1, 1981 to March 31, 1982 the unit total for the Electrophoresis Laboratory was 31,292. This represented 1,735 different determinations (total protein, IGG, oligo-clonal banding) as compared to 2,104 in the previous year. Once again a considerable proportion of the assays (406) was carried out on samples submitted by other hospitals, indicating a continuing contribution to community needs.

—Hanna Pappius, PhD

Donner Laboratory of Experimental Neurochemistry
In the past year we studied extensively the biochemical changes in brain lipids in the infantile, late infantile, and juvenile forms of neuronal-ceroid lipofuscinosis (NCL) in collaboration with Dr. N.M.K. Ng Ying Kin. Polyisoprenols of the dolichol family are significantly increased when compared to age-matched control subjects. In the course of these studies it was found that the total dolichol content of brain undergoes as much as a tenfold increase from 5 to 80 years of age. Furthermore, analysis of the cerebral cortex dolichol content of 11 Alzheimer's disease subjects has also shown a highly significant increase in these lipids compared with age-matched control subjects. The increase in dolichol content corresponds to the well documented increase in lipofuscin in Alzheimer's and aging brain. A concurrent study showed a marked increase with age in dolichol in rats aged up to 500 days. A disturbance in the metabolism and utilization of these lipids occurs not only in the inherited neurological disorders of childhood associated with ceroid-lipofuscin storage but also in Alzheimer's disease and aging.

Since the storage material in NCL is also present in the sloughed-off renal tubular cells appearing in urinary sediment, a high performance liquid chromatographic method was developed to measure dolichols in urinary sediment. So far, more than 50 patients whose diagnosis was confirmed by skin biopsy have been analysed. At present the false negative rate on single determinations is less than 5 per cent. This relatively simple test is of value in confirming the diagnosis in these inherited diseases.

During the year we studied a new type of G_{M2}-gangliosidosis with late onset as well as the diagnosis of late onset fucosidosis with renal pathology but no evidence of neurological disability. These studies highlight the need to investigate widely for lysosomal enzyme defects patients with unusual clinical presentations.

With Dr. Maria Spatz at NINCDS in Bethesda, we studied prostacyclin formation by cultured endothelial cells from rat brain microvessel preparations. Noradrenalin and isoproterenol markedly stimulate prostacyclin formation. Further pre-incubation of cells with radiolabelled arachidonic acid followed by stimulation with a calcium ionophore reveals not only conversion into prostacyclin but also the formation of hydroxyeicosenoic acids. This indicates the presence of a lipoxygenase pathway in these cell cultures.

With Dr. Hanna Pappius, we studied the release of arachidonic acid and its metabolites following local brain injury in the rat. Within 60 seconds following a focal freezing lesion, arachidonic acid is released from membrane phospholipids and converted into prostaglandins F_2 alpha, E_2, and D_2. Nonsteroidal anti-inflammatory drugs block the prostaglandin formation but do not affect arachidonic acid release. Steroids have no effect on levels of arachidonic acid nor on prostaglandin synthesis. A hypothesis to explain the ameliorating effects of both steroidal and non-steroidal anti-inflammatory drugs on the widespread depression of local cerebral glucose utilization following brain injury implicates prostaglandins and biogenic amine neurotransmitters. To gain further insight into the disturbances in neurotransmitter release and turnover in brain following injury, high performance liquid chromatographic methods have been set up to measure serotonin, noradrenalin, dopamine, and their metabolites.

Within the context of long range studies on injured brain Dr. Pappius and her associates made considerable progress in the last year.

They completed studies on the effects of indomethacin on local cerebral glucose utilization in traumatized brain. Results show that the widespread depression of metabolism, thought to reflect functional depression of the focally lesioned rat brain, is to a large extent prevented by pre-treatment with indomethacin and also by giving indomethacin up to 24 hours after the lesion. These results suggest that prostaglandins are involved in mechanisms underlying the functional depression in traumatized brain.

Ibuprofen, another, more specific inhibitor of prostaglandin synthetase, had the same effect as indomethacin on local cerebral glucose utilization in traumatized brain, supporting the hypothesis that this effect is mediated by an inhibition of the prostaglandin system.

In other studies Dr. Pappius has shown that in intact brain indomethacin has a biphasic effect on blood flow: an initial depression is followed by a dramatic increase up to 180 per cent of normal after 24 hours. At the same time local cerebral glucose utilization is not affected. This does not represent an uncoupling of blood flow and metabolism, since the two parameters were still well correlated, but rather a resetting of the coupling mechanism at a new level.

In traumatized rat brain, studies were made of alpha-methyl-p-tyrosine, an inhibitor of catecholamine synthesis, and p-chlorophenylalanine, an inhibitor of serotonin synthesis. Preliminary results indicate that both these compounds prevent the widespread depression of local cerebral glucose utilization in traumatized brain. This suggests that both serotonin and catecholamines are involved in the functional depression seen as a consequence of injury.

On the basis of the above and other data, Dr. Pappius and I have developed a hypothesis to explain the mechanisms underlying functional disturbances in traumatized brain that links release of various biologically active compounds to dysfunction of synaptic transmission. Studies are in progress to test our working hypothesis.

Dr. Yvon Robitaille, Dr. Alain Beaudet, and Dr. Pappius are attempting to determine which cellular elements are responsible for a rim of high glucose utilization surrounding a freezing lesion. The two most likely possibilities are reactive astrocytes or proliferating capillary endothelial cells.

Dr. Pappius and Dr. Antoine Hakim are studying local cerebral glucose utilization in thiamine deficiency, hypercalcemia, and folate deficiency.

Dr. Hakim has begun to investigate focal metabolic events that occur in the brain during progessive thiamine deficiency. These precede the clinical sequelae and predict the specific distribution of the neuropathological lesions known to occur in advanced thiamine deficiency. During his studies he demonstrated specific areas of suppressed metabolic activity in models of B_{12} deficiency. Moderate folate deficiency appears to have no suppressive effect on cerebral metabolism. In view of the accepted association between these two vitamins, this is valuable information. He is now investigating the effect of vitamin D intoxication and its consequent hypercalcemia.

Dr. Hakim plans further work in this area to assess the association of focal cerebral acidosis in thiamine deficiency with the metabolic and histopathologic events in this deficiency and to investigate the effect that modifying this acidosis will have on the timing of these events.

In clinical studies by Dr. Hakim prospective evaluation of the timing of anticoagulation in embolic strokes was successfully completed as part of a multicentre trial. Results, to be published soon, show that early anticoagulation is preferable in this setting.

—Leonhard Wolfe, MD

Neurogenetics

Clinical services
The department of neurogenetics continues to provide consultations and counselling services to patients with a wide range of hereditary neurological disorders. From June 1, 1981 to May 31, 1982, 363 patients and family members were seen for genetic consultation and counselling. Many of these individuals were also included in some of our clinical research projects.

Research activities
Our research activities continue to be centered on two main areas: first, genetics of epilepsy and teratological effects of anticonvulsant medication, and second, studies of hereditary degenerative neurological disorders.

Genetics of epilepsy and related studies: Employing newer electro-encephalographic criteria and new methods of quantitative genetics, we have continued to analyze the data on seizures and EEG abnormalities in relatives of probands operated on for focal epilepsy. Epileptiform EEG abnormalities, particularly generalized epileptiform abnormalities, as well as photosensitivity, were found to be significantly increased in these relatives. Furthermore, these abnormalities were much more frequent in relatives of patients with temporal lobe removals than with other focal forms of epilepsy. This work was done with the help of Marina Straszak.

A study on numerical taxonomy in the surgical prognosis of temporal lobe epilepsy was carried out with Dr. Daniel Keene, Dr. Theodore Rasmussen, and Marina Straszak. A new sample of 100 surgical patients with at least a five-year follow-up was scored on the prognostic index, and significant differences were found between the successful and unsuccessful groups. We hope to improve the accuracy of the prognostic index by incorporating variables for newer diagnostic procedures, such as cable telemetry and CT scan and the history of seizures and EEG abnormalities in relatives.

In the coming year, we plan to increase the number of probands in our genetic studies on patients operated on for focal epilepsy. We are also planning to study the amino acid profiles in patients with various types of epilepsy and in their relatives, and to correlate these with the EEG findings. These studies will be carried out with the help of Dr. Najma Aslam Janjua, a postdoctoral fellow, and with Dr. Roberta Palmour of the Allan Memorial Research Institute.

Over 100 patients have now been included in the prospective study on the outcome of pregnancy in epileptic women. In the past year, we have analyzed the data on growth and development in the offspring, and have found a significant decrease in mean head circumference and weight, at birth and in later years. However, the Griffiths Developmental Quotient did not show any significant abnormalities and, in particular, there was no correlation with the head circumference. These studies are being carried out with Linda Dansky, a PhD student, and with Dr. Diana Willis of the Neonatology Unit of Royal Victoria Hospital. The analysis was done by Susan Wisebord.

Genetics of inherited neurological disorders

Studies on Friedreich's ataxia supported by l'Association canadienne de l'ataxie de Friedreich are continuing. These include cardiological investigations and catecholamine studies with Dr. André Pasternac, TRH stimulation and insulin receptor studies with Dr. George Tolis, and brainstem auditory evoked potentials with Dr. Margo Taylor. Catecholamines were found to be significantly elevated in Friedreich's ataxia patients, and brainstem auditory evoked potentials showed significant abnormalities. These findings were correlated with the severity and duration of the disease. Glucose tolerance curves were carried out in a French Canadian control group, and confirmed the significant abnormalities in relatives of Friedreich's ataxia patients, suggesting that abnormal glucose metabolism may be present in the carrier state. We hope to study serum catecholamine levels in the parents to determine if these are related to the presence of the Friedreich's ataxia gene.

Richard Nagy completed his MSc thesis on the syndrome of agenesis of the corpus callosum with sensorimotor neuronopathy. 237 patients with the syndrome in 144 sibships were included in the thesis. Detailed genetic and genealogical analyses confirmed autosomal recessive inheritance, and traced most of the patients to a common ancestral couple, who married in Quebec City in the 17th century. Epidemiological studies estimated the incidence of the condition in the region as 1 in 2500 births, with an estimated carrier frequency of 1/25. A computer program for analyzing the genealogical data was devised with the help of Neil Kovalski, a summer student.

The analysis of the data on the French-Canadian Tay-Sachs screening program was carried out by Paul Klodniski. Over 1200 individuals have now been screened. Another patient with this tragic disease was ascertained in a French Canadian family from Grand Falls, New Brunswick. Grand Falls is situated near the Quebec border and Temiscouata County, where two other families with the disease have been found, and two large screening clinics have already been held. It is hoped to extend the screening program to the general population of the region, where 1 in 13 individuals is estimated to be a carrier for this gene.

In the past year, we have studied two families with unusual presentations of juvenile Tay-Sachs disease, one with dystonia and another with a form of Kugelberg-Welander disease. These studies were carried out with Drs. David Meek, Sharon Parnes, Leon Wolfe, Frederick Andermann, Donald Baxter, George Karpati, and Stirling Carpenter.

The finding of abnormal amounts of dolichols in the urinary sediment of patients with cerebromacular degeneration or Batten's disease by Drs. NMK Ng Ying Kin and Wolfe has suggested the possibility of carrier detection in this disorder. We plan to screen a number of families with this disease in Newfoundland, where the gene frequency is known to be elevated.

Another new autosomal recessive syndrome studied in the past year was ataxia-oculomotor apraxia with Drs. Rami Morcos and Frederick Andermann, Drs. Yutaka Awaya and Yukio Fukuyama in Japan, Dr. Quais Ghanem in Dubai, and Dr. Paul Moe in Colorado.

We continue our family studies on myotonic dystrophy, including neuro-ophthalmological, EMG, cardiological, endocrine and secretor studies of the relatives. Anthony Glanz completed his MSc thesis on congenital myotonic dystrophy, and is studying medicine at the University of Toronto. We are also continuing family studies of patients with tuberous sclerosis and neuro-fibromatosis with Drs. Ralph Wilkinson, Frederick Andermann, William Feindel, and Jean-Guy Villemure.

—Eva Andermann, MD

Neuromuscular Research

During the year a number of research projects were carried out.

With Dr. Stirling Carpenter we demonstrated the presence of calcium paradox in skeletal muscle fibres. If calcium concentration is reduced in the extracellular space, damage to the surface membrane of muscle fibres develops, eventually leading to necrosis. The first sign of surface membrane damage is marked separation of the plasma membrane and basal lamina. The surface membrane becomes incompetent and calcium ions enter *en masse* into the muscle fibre, resulting in destructive changes. This phenomenon may be involved in the pathomechanism of damage to muscle cells in Duchenne dystrophy.

A calcium paradox-like phenomenon is probably also operative in peripheral axons, and experimental work to demonstrate this has been initiated. In fact, a calcium paradox-like phenomenon may exist in the axon during the pathogenesis of motor neuron disease. This will be explored by further experiments.

Studies concerning the gene expression in hamster dystrophy have continued. By repeated crushing of the sciatic nerves in dystrophic hamsters we were able to keep the denervated muscles free of necrosis and centronucleation up to 120 days-of-age. Subsequent reinnervation has reactivated necrosis and centronucleation, which proved that the effect of innervation in preventing necrosis in hamster dystrophy is not a time-locked phenomenon.

Pilot experiments suggest that pituitary ablation in the pre-necrotic stage can also prevent destructive features in hamster dystrophy. This result would be in keeping with previous reports in Duchenne dystrophy and mouse dystrophy where growth hormone deficiency was found to have a profound mitigating effect on the gene expression in these inherited muscle diseases.

We hope to exploit this avenue in therapeutic trials for Duchenne dystrophy in the near future.

Dr. Mario Armani, an MDAC post-doctoral research fellow, has shown that prolonged disconnection of motor nerve from skeletal muscle in guinea pigs has resulted in progressive loss of a number of spinal motor neurons and sensory neurons and dorsal root ganglia, as well as in a reduction in the size of their cell bodies. We are conducting experiments to ascertain the precise cellular mechanism of neuronal cell death in these situations and to establish whether administration of a trophic muscle extract to the nerve *in vivo* can counteract this neuronal attrition during prolonged nerve-muscle disconnection.

We are studying an unusual case of reducing body myopathy where muscle is overwhelmed by reducing bodies. Experiments are in progress to verify the nature of the accumulated material which may represent viruses or abnormal ribonucleoprotein material.

With Dr. Paul Holland and Jeffrey Charuk, we have begun to study a unique metabolic myopathy where impaired muscle relaxation appears to be caused by a genetically determined impairment of the ATPase activity of sarcoplasmic reticulum.

We have identified three patients with a unique form of juvenile GM_2-gangliosidosis due to hexosaminidase-A deficiency that presents as a form of juvenile spinal muscular atrophy. With Dr. Leon Wolfe and Dr. François Ng Ying Kin we will attempt to characterize further this unusual gene mutation.

We have discovered two further cases of adult polyglucosan body neuronopathy, which amplifies the clinical spectrum of the disease. With Dr. Wolfe and Dr. Ng Ying Kin, a systematic study of the urine from these patients will be initiated for the presence of oligosaccharides. Lectin cytochemical of the polyglucosan bodies is also being investigated in an attempt to identify the metabolic defect in this unusual nervous system disease.

With Dr. George Elleker, we have commenced a systematic screening of patients with suspected malignant hyperthermia by the *in vitro* caffein contracture test.

—George Karpati, MD

Neuro-ophthalmology

Using computer averaging techniques, we have been able to isolate and label an electroretinogram produced by pattern stimulation. We completed a study of 35 normal subjects and have commenced studies of patients suffering from a variety of optic nerve diseases to test the hypothesis that the pattern electroretinogram represents ganglion cell function. Concurrent visual evoked potential studies in these patients should determine whether visual evoked potential delays are due to pregeniculate or postgeniculate lesions depending upon whether the pattern electroretinogram is normal or abnormal.

With Dr. Athanasios Katsarkas we undertook a study of pursuit deficits and inability to suppress the vestibulo-ocular reflex by fixation in a group of patients suffering from neurological disorders. Failure of fixation suppression of the vestibulo-ocular reflex seems to be a more subtle sign of pursuit dysfunction than our ability to recognise deficient pursuit clinically.

Using the technique of an eye coil in a magnetic field, with Dr. Daniel Guitton we undertook a study of the eye movement abnormalities in Huntington's chorea. Saccadic dysfunction may prove to be an early and perhaps diagnostic sign of this disorder. With Dr. George Elleker we are also undertaking a study of patients with Adie's pupil to determine subtle neurological defects using sensory evoked potentials.

—Trevor Kirkham, MD

Neuropharmacology

Research in our laboratory reflects the special focus of the institute, the study of patients undergoing neurosurgical therapy for intractable epilepsy. Our pharmacological investigation begins with an evaluation of preoperative drug therapy and continues with specialized analysis of brain tissue excised at operation. We are attempting to identify specific abnormalities in actively discharging human epileptic brain. This may in turn result in new forms of drug therapy.

In many ways focal epilepsy is a uniquely human condition; certain aspects of this disease can be studied only in humans. The underlying abnormalities usually mature slowly over the course of many years, following some often forgotten brain injury or infection. It is thus difficult, well nigh impossible, to reproduce over the short period available in experimental animals the type of glial scarring and slight neuronal loss characteristic of human epileptogenic cerebral cortex. On the supposition that the defects inherent in focal human epilepsy are likely to be subtle and primarily biochemical in nature we have directed our attention to certain key neurotransmitters. Our *modus operandi* consists of using the routine electrical recording of the exposed cerebral cortex to identify actively spiking regions, which can then be compared with adjacent cortex that did not exhibit such epileptic activity. The latter is often located in the more anterior regions of the temporal or frontal lobe, and by anatomical necessity must be excised as part of the therapeutic procedure. The labelling of spiking and non-spiking cortex sites is the joint responsibility of the neurosurgeon and electroencephalographer. The carefully labelled tissues are then quickly processed for histopathological and neuropharmacological study. The precise localization of the epileptic lesions is carried out with Drs. André Olivier and Luis Quesney.

We have found that spiking cortex is characterized by relative increase in the activity of glutamate dehydrogenase, an enzyme that provides the essential link between the metabolism of glucose and free amino acids in brain. A defect in glutamic acid or its inhibitory product GABA is considered to be involved in the mechanism of epilepsy. Glutamine synthetase, responsible for the formation of glutamine, is a glial marker localized to astrocytes. The activity of this enzyme was elevated in astroglial scars, astrocytomas, and particularly in tuberous sclerosis, all conditions marked by a propensity to develop an active epileptic process. With Dr. Yvon Robitaille we used glutamine synthetase activity as a marker of the degree of cytological differentiation in both epileptic tissue and brain tumors. In over thirty tumors of various types studied with Dr. Jean-Guy Villemure we were able to establish a correlation between enzyme activity, degree of malignancy, and the incidence of epilepsy.

Our recent studies have involved the catecholamines, an important group of neurotransmitters recently shown to have a role in modulating epileptic bursts, especially in the temporal lobe. The activity of tyrosine hydroxylase, which controls reactions leading to the formation of the catecholamines, was found to be significantly increased in actively spiking cortex. With Dr. Tomàs Reader of the University of Montreal, we established facilities in our own laboratory to study

the binding of drugs to specific receptors in human epileptic brain. In the past year over 100 brain samples obtained from neurosurgical procedures were studied by the combined neuropathological and pharmacological approach. We are grateful for the expert technical assistance of Frank Miesnikowicz and the continued collaboration of Dr. Nico van Gelder.

Our clinical laboratory receives plasma samples from our own hospital, Seizure Clinic, and numerous other hospital centres in other parts of Quebec, including remote regions such as the Quebec Arctic. We have developed several new techniques, and in the past year have set up sensitive assays using high performance liquid chromatography and a microprocessor. Several of these assays are for drugs used for less common forms of epilepsy, particularly in children, which cannot be measured in the laboratories of other hospitals. We are now able to offer these specialized services. In collaboration with the MNI's department of neurogenetics we are also measuring free drug levels of antiepileptic drugs as part of a prospective study of the effects of such drugs on the outcome of pregnancy. These clinical tests are capably performed by Hélène Lacroix and France Boucher who maintain a high standard of accuracy, a fact borne out by the excellent marks they receive in the monthly quality control program run by the American Association of Clinical Chemists, in which our laboratory is an active participant.

—Allan Sherwin, MD

Research Computing

During the past year we have continued to develop new data handling and display techniques in collaboration with several other departments.

The new PDP-11/34 computer for the interpretation, display, and storage of PET images was integrated with its large disc and display processor and installed adjacent to the existing Positome III computer, connected to it with a high speed parallel link. This was acquired by funds from the MRC special program grant for PET research.

Scans performed on the Positome are now acquired and reconstructed with the older computer and then sent to the new one. Several terminals with TV monitors to display the PET scans are located in an adjacent room and in the Computer and Cone Laboratories. An information retrieval system for scans is integrated into this new system, which allows recall of scans by patient name, isotope, scan number, dates, or tape. The display program can display CT and PET images for correlation of the anatomical regions with metabolic rate, blood flow, and oxygen extraction. The display program now exploits the full resolution of the computer laboratory display allowing 16 128 by 128 pixel slices to be depicted at once.

The use of computer assistance in stereotaxic surgery continued this year. A patient undergoing brain biopsy or depth electrode implantation has a CT scan with a modified stereotaxic frame in place. The scans can then be displayed and the "target" identified on any section. Its coordinates with respect to the stereotaxic frame are then displayed.

Several changes have been made in the on-line monitoring of EEGs. Two patients may now be monitored simultaneously with the sections of the EEG record containing epileptic activity automatically identified. A method for the automatic analysis of EEGs recorded on ambulatory cassette recorders is being developed.

A similar monitoring system has been set up in the experimental neurophysiology laboratory to monitor the EEG of cats with experimental focal epilepsy. The system, which allows the recording and analysis of EEGs and single-cell activities from experimental animals, has been improved to allow the simultaneous display of more channels and a faster interaction.

We continue to quantify autoradiographs of rat brains for regional glucose metabolism and blood flow for the Donner and Cone Laboratories. A program to quantify the entire image by digitizing the film and transforming the data into a regional glucose metabolism colour-coded map has been developed. A microprocessor-based film digitizer built by Dr. Amami Kato, of the Cone Laboratory, is currently being interfaced to our central computer.

During the year Dr. Terence Peters was involved in an extensive evaluation of currently available NMR and digital subtraction angiography systems. We are looking forward with great interest to the installation of both these new imaging techniques in the next year.

—Christopher Thompson, MSc

William Cone Laboratory for Neurosurgical Research and the Positron Emission Tomography Unit

During the past year our research has concentrated on the following topics.

1. Positron emission tomography (PET)
The medical cyclotron began full operations in September 1981. Our radiochemical department, under the leadership of Dr. Mirko Diksic, has worked on production of newly synthesized radiochemical compounds such as ^{11}C-labelled BCNU (to study the pharmacokinetics of this anti-tumor agent) and ^{15}O-labelled nitrous oxide (to measure rCBF). The department has also devised a more efficient synthesis of ^{18}F-labelled fluorodeoxyglucose.

Christopher Thompson has completed installation of a dual processing system for PET data handling. This will facilitate processing of the rapidly accumulating clinical data.

Chris Thompson and Stephen Strother have made substantial progress on improving the quality and quantitation of PET imaging with the Positome III system.

Dr. Ernst Meyer and Dr. Devidas Menon have established an improved method for measuring rCBF using ^{15}O-labelled $C^{15}O_2$. Dr. Meyer has also completed a computer program for quantitation and simultaneous display in the terminal of rCBF, regional oxygen extraction fraction (rOEF), regional cerebral metabolic rate for oxygen ($rCMRO_2$), and regional cerebral blood volume in the terminal.

Dr. Alan Evans, Atomic Energy of Canada Ltd. (AECL), Steven Fishman, and Dr. Meyer have also completed a computer program for quantitation of rCMRGl using ^{18}F-labelled fluorodeoxyglucose (FDG).

In July 1982, the first AECL Therascan 3128, based on our original MNI BGO Positome system, was installed here to carry out a program of assessment. As a result of AECL's new computerized reconstruction program, the quality and quantitation of FDG images from Therascan 3128 is excellent. Upgrading of the testing program has been provided by installation of a radio-oxygen line and computer integration. We now have two positron devices operating simultaneously for clinical evaluation.

During the period from September 1, 1981 to August 31, 1982, 276 patients with stroke, brain tumor, epilepsy, and miscellaneous neurological diseases were investigated by PET studies.

The PET protocol for cerebral vascular diseases was established by Dr. Antoine Hakim, Dr. Joy Arpin, and Dr. Gérard Mohr (Notre Dame Hospital). This protocol is designed to measure biochemical changes during the evolution of cerebral ischemia and to evaluate the need for medical and surgical treatment in cerebrovascular disease.

A PET protocol for focal epilepsy is being devised by Dr. Pierre Gloor, Dr. Rachel Ochs, Dr. Jean Gotman, and Dr. André Olivier. Correlation between regional metabolic and rCBF changes and EEG abnormalities during the interictal state of EEG epileptic activity is being investigated.

A PET protocol for brain tumor has been established to investigate the pharmacokinetics in the tumor and peritumoral area of ^{11}C-labelled BCNU in relation to rCBF, $rCMRO_2$, and the regional cerebral metabolic rate of glucose (rCMRGl) changes in the tumor and peritumoral area. Preliminary results indicate that there is a marked dissociation between the regional glucose metabolic rate and the regional oxygen metabolic rate, indicating the presence of very abnormal glycolysis in the human malignant glioma. The initial uptake of ^{11}C-labelled 1,3-bis(2-chloroethyl-nitrosourea) BCNU in the tumor is proportional to the rCBF alteration. However, the ^{11}C-labelled BCNU breakdown compounds gradually accumulate in the tumor. The degree of later uptake of ^{11}C-labelled compounds appears to be proportionally related to the degree of disruption of the blood-brain barrier in the tumor area and can be locally enhanced by intravenous injection of 20 per cent mannitol in most cases. These protocols, after review and revision by our PET executive group, were approved by the Ethics and Research Review Committee.

2. Experimental research activities

In the past year we have continued to examine the pathophysiology of cerebral microcirculation and energy metabolic rate in cerebral vasospasm, cerebral ischemia, and brain tumor. The techniques used include fluorescein angiography of the brain, focal cerebral blood flow measurement by krypton-85 using mini-semiconductor detectors, and quantitative autoradiographic methods of rCBF and regional cerebral glucose metabolic rate (rCMRGl) using ^{14}C or ^{131}I-labelled iodoantipyrine and ^{14}C-labelled 2-deoxyglucose.

Cerebral vasospasm

Dr. Richard Leblanc has investigated the effects of the calcium channel blocker verapamil on the acute cerebral vasospasms produced by the subarachnoid injection of platelet rich plasma made to release putative spasmogens by treatment with ADP. Potent vasodilatory effects of verapamil were demonstrated on the large vessels at the base of the brain by direct observation through the operating microscope, and on the epicerebral circulation by means of fluorescein angiography and krypton^{85} microregional bloodflow studies using techniques developed in this laboratory over the past fifteen years. Dr. Leblanc plans to study the effects of other calcium antagonists and of prostacyclin in these models.

Acute focal cerebral ischemia

Dr. Masato Shibuya has investigated topographical changes of rCBF and rCMRGl in rat's brain following the occlusion of the middle cerebral artery with a quantitative autoradiographic method using ^{14}C-iodoantipyrine and ^{14}C-2-deoxyglucose. We have observed a significant reduction of rCBF in the

ipsilateral cerebral cortex and in the lateral part of the corpus striatum associated with mixed patterns of decreased and increased rCMRGl. In addition, we have also observed a significantly increased rCMRGl in the globus pallidus and substantia nigra accompanied by a slightly increased rCBF. Increased rCMRGl was observed in the ipsilateral subthalamic nucleus, nucleus accombens, olfactory tubercle, and lateral habenular nucleus. We are also investigating the possible role of putative neurotransmitters, such as dopamine, GABA, and substance P in the regulation of rCBF and rCMRGl in basal ganglia.

Effect of steroids in experimental brain tumor
Dr. Norio Arita investigated the effect of dexamethasone by determining rCBF and rCMRGl with autoradiographic techniques in the brain of rat implanted intracerebrally with A.A. ascites tumor. In the untreated animal, a 25 per cent reduction of rCBF and a 60 per cent reduction in rCMRGl were observed in the peritumoral brain after dexamethasone. A remarkable improvement of rCBF was observed not only in the peritumoral brain, but in all other regions where rCBF was previously reduced. By comparing the optical density, a similar improvement of rCMRGl was noted in the peritumoral brain. These results indicate that the peritumoral brain undergoes ischemia that is reversible after dexamethasone. The findings explain the rapid clinical resolution of focal neurological deficit so frequently noted after dexamethasone is given to patients with brain tumors.

Fate of BCNU breakdown products in tumors
We have used ^{11}C or ^{13}N-labelled BCNU for chromatographic analysis of brain tissue and tumor from tumor-implanted rats, and of plasma from patients undergoing PET scanning. Our initial observations indicate a short biological half-life of intact BCNU in the plasma, with a large quantity of BCNU breakdown product bounded with protein present in the tumor. We have also observed that the ratio of BCNU, BCU, and fraction bound to protein in the brain tumor is different from that in the normal brain tissue.

—William Feindel, MD

—Lucas Yamamoto, MD

Education

Since 1934 the Montreal Neurological Hospital has offered a post-basic program in neurological and neurosurgical nursing. In August 1982 the nursing department, in conjunction with the Ministry of Education, was proud to graduate its first French class. The program will henceforth be offered every year alternately in English and French.

Clinical Training Opportunities

Neurology

The Montreal Neurological Hospital, with 135 in-patient beds, and the Montreal Neurological Institute, with over 25 active research laboratories, provide a concentrated training centre for neurology and neurosurgery. A three-year residency training program at McGill in adult and pediatric neurology is designed to meet the requirements of the Professional Corporation of Physicians of Quebec, the Royal College of Physicians and Surgeons of Canada, and the American Board of Psychiatry and Neurology.

The program has two major goals. The first is to develop highly skilled clinicians who have had an above-average exposure to the neurosciences. To this end the program provides a wide variety of clinical and laboratory experiences. The program is also designed to train academic physician-investigators and teachers, and with this goal in mind graduating residents are encouraged to seek further training in one of the neuroscientific disciplines.

The McGill neurology residency program is available to medical graduates who have completed an approved internship and one year of training in internal medicine, or, alternatively, an approved clinical clerkship during the final undergraduate year and one year of straight medical or pediatric internship.

The program provides two years of clinical training and one year of laboratory training. Residents are assigned to different clinical or laboratory services every three to six months. While on clinical services, the residents assume graded responsibility for patient investigation and care under the supervision of the attending staff. Weekly clinical and neuroscientific conferences in each of the McGill teaching hospitals serve as a stimulus for further study. During the training program, residents may also take part in clinical research projects supervised by members of the staff. Every resident is expected to participate in the teaching of medical students and nurses.

It is usual for each resident to rotate through three hospitals in the course of his training. In one of these institutions he will spend a full year. Those in pediatric neurology will spend at least one year in the Montreal Children's Hospital.

The McGill neurology program is university-based, and includes the neurological services of four McGill teaching hospitals:

The Montreal Neurological Hospital, housed in the same building as the Montreal Neurological Institute, has 135 beds for neurology and neurosurgery. It has excellent support facilities in neuroradiology and clinical electrophysiology. There are extensive facilities for research in all the major branches of the neurosciences available within the institute. The MNH also provides neurological and neurosurgical services for the Royal Victoria Hospital.

The Montreal General Hospital has a neurology teaching unit of 15 beds in a 30-bed neurology and neurosurgery ward. A large consultation service provides the residents with experience in diagnosing and managing the neurological problems which develop on general and specialty medical and surgical services. An active neuroscience unit is located in the MGH Research Institute.

The Montreal Children's Hospital, a 300-bed institution, houses a 15-bed neurology unit with specially trained nurses and support staff. In addition, there is an active consultation service, and general neurology and specialty clinics are held weekly.

The Jewish General Hospital, a large general hospital with 650 beds, has a 23-bed neurology unit, a large consultation service, and neurology clinics.

In the laboratory year, residents are assigned to one or more of the many diagnostic or research laboratories of the teaching hospitals or research institutes. The laboratory options include, among others, electroencephalography, electromyography, neuropathology, neuroradiology, neuro-ophthalmology and neuro-otology.

Fellowships in the basic sciences and clinical laboratories offer opportunities for training and research lasting one year or more. Such research, additional to the clinical residency training program, may lead to an MSc or PhD degree awarded by the Faculty of Graduate Studies and Research of McGill University.

All inquiries should be addressed to:

Director
Neurology Training Program
Chairman's Office
Department of Neurology and Neurosurgery
McGill University
Montreal Neurological Institute
3801 University Street
Montreal, Quebec H3A 2B4

Neurosurgery

The residency training program in neurosurgery is directed by the staff of the department of neurology and neurosurgery of McGill University. While residents spend most of their time at the Montreal Neurological Hospital and the Montreal Neurological Institute, for six months to one year of their training they also rotate through the neurosurgical services at the Montreal General and the Montreal Children's hospitals, each with over twenty active beds and out-patient services. The length of the program varies depending on the resident's career goals and the qualifying specialty experience in medical and surgical disciplines. Residents with one year of internship and one year of general surgery should plan a minimum of four years of neurosurgical training. Additional time is usually needed for the resident to develop competence in a basic or clinical subject in preparation for an academic career in neurosurgery. Most trainees will spend twelve to eighteen months in one of the laboratory units of the institute working on basic studies. They will also spend thirty months rotating through the various neurosurgical services. Neuropathology, neuroradiology, and electroencephalography are considered important parts of the resident's training program, but not every resident will be able to include all three in his training period. All residents are expected to share in the teaching of medical students, nurses, and technicians.

Three residents are accepted each year.

Board Examination Requirements
The resident is expected to take the written examination of the American Board of Neurological Surgery — for self-assessment, at any time during his training program, and for credit, as soon as he becomes eligible.

Research
Twenty-five research laboratories at the Montreal Neurological Institute and several at the Montreal General Hospital Research Institute provide ample opportunity for residents to participate in research projects under the supervision of the neurosurgical and neuroscientific staff. Research can lead to an MSc or PhD degree in the Faculty of Graduate Studies and Research at McGill University.

Special Features
Wilder Penfield and William Cone started the neurosurgical training program at McGill University in 1928. Six years later the Montreal Neurological Institute, a combined hospital and research centre, was opened with 50 beds. In 1954 the hospital expanded to 135 beds for neurology and neurosurgery, and in 1978 a major addition to the institute and hospital, the Penfield Pavilion, was opened with enlarged research, teaching, and clinical areas. From the beginning the neurosurgical program had an international flavour, with MNI trainees coming from, and returning to, many countries. The first modern neurosurgical units in Norway, India, and China, to name only a few, were initiated by former residents of the Montreal Neurological Institute.

A vigorous neurosciences research community at the Montreal Neurological Institute reinforces the academic excellence of the residency program. The surgical treatment of epilepsy is an area of particular interest and expertise; a follow-up series of more than 2,000 surgical cases represents the largest group study of its kind. Computerized stereotactic surgery, advanced vascular surgery, and procedures using microneurosurgical methods are well developed.

The Montreal Neurological Institute has a reputation for innovation — it was the first neurological centre in Canada and one of the first three in North America to acquire the EMI head scanner. It was one of the first to acquire a body scanner, with which a high resolution spinal scanning program has recently been developed. It was the first medical centre in Canada, and one of a half-dozen in the world, to exploit positron emission tomography. The first bismuth germanate positron camera available for clinical research, developed by the MNI's research team, has been in use since 1978. A mini-cyclotron, the first medical cyclotron in Canada, was installed in 1981 to provide tracers for a wide range of metabolic studies on brain and muscle.

A knowledge of French is important for the resident, and many opportunities are provided to learn the language. French-speaking patients and staff members mix daily with the English-speaking staff. McGill's Faculty of Medicine, under whose auspices the residency program is run, is the oldest, the most widely recognized, and the most international of all Canadian medical schools. Montreal, a cosmopolitan city of two million people, offers a wide variety of cultural activities.

All inquiries should be addressed to:

The Director
Montreal Neurological Institute
McGill University
3801 University Street
Montreal, Quebec
H3A 2B4

Courses of Instruction in the Faculty of Graduate Studies and Research

In the Faculty of Graduate Studies and Research, courses are offered leading to the Master of Science and Doctor of Philosophy degrees. (See McGill booklet, "Faculty of Graduate Studies and Research.") Through the year the following elective courses are given for graduate students, fellows, and residents. They are open to undergraduates by arrangement.

Neurosciences Seminar
531-602D This is a course of weekly seminars given during the academic year and designed to present over a two-year period a concise, up-to-date review of the basic neurological disciplines. Members of the Montreal Neurological Institute, related McGill departments, and visiting neuroscientists.

Neurophysiology
531-611A Seminars and group discussion in neurophysiology. Professor Gloor and staff.

Neuroanatomy
531-610A Lectures together with medical undergraduates in Course *524-121B*, "Interdisciplinary Course in the Central Nervous System."
531-621A Seminars and group discussions in neuroanatomy. By special arrangement. Professor Lawrence and staff.

Clinical Conferences
531-630H Colloquium in clinical and basic aspects of the nervous system. Professor Feindel and staff.
531-631H Seizure and EEG conference. Professors Gloor, Andermann, Feindel, Olivier, Milner, and Ethier.
531-632H Clinical neurology conference.

Neurochemistry
531-640H Seminars in neurochemistry additional to the training provided in Course *531- 602H.* By special arrangement. Professors Wolfe and Pappius.

Neuropathology
531-650H Six or twelve months laboratory work in neuropathology.
531-651H Conference in neuropathology. Professor Carpenter and staff.
531-652H Slide session in neuropathology.

Neuroradiology
531-660H Practical instruction in techniques and interpretation.
531-661A Lecture demonstrations. Professor Ethier and staff.

Electroencephalography and Clinical Neurophysiology
531-670H Laboratory work in electroencephalography, minimum six months with active participation, seminars, and clinical conferences. Professor Gloor and staff.

Neuropsychology
531-680H Training in research methods for selected graduate students. Professor Milner and staff.

Post-Basic Program in Neurological and Neurosurgical Nursing

This program is designed to enhance the knowledge gained in basic nursing education. Its objective is improved nursing care of patients with a variety of neurological and neurosurgical conditions. The nurse is taught to apply new knowledge to total patient care, which involves not only attending to the patients' physical needs but also teaching them about their condition and helping them adapt to the changes brought on by the disorder.

Courses begin in March and September, and are limited to sixteen students. Learning experiences include actual patient care, lectures, demonstrations, laboratory visits, seminars, multidisciplinary discussions, self-teaching projects, and preparation of special studies. A new library facilitates the program. On completion of the course requirements a certificate is granted.

Eileen Flanagan began the post-basic program in neurological-neurosurgical nursing soon after the hospital opened in 1934. Since then the Montreal Neurological Hospital has had 1,107 graduates from thirty-four countries. To become a "Neuro nurse" is to enter a colleague relationship with other nurses who can share their experience and acquired knowledge to the benefit of patient care.

Publications

On October 7, 1982 Dr. John Vane, FRS, gave the MNI's K.A.C. Elliott Lecture in Neurochemistry on prostaglandins in health and disease. He was named a Nobel laureate in medicine a few days later.

Publications of the Staff of the Montreal Neurological Hospital and Institute 1981-1982

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*Finances

Montreal Neurological Hospital

Balance Sheet as at March 31, 1982

GENERAL FUND		1982	1981
Assets			
Cash		$408,761	$420,744
Accounts receivable, less provision for doubtful accounts		$1,382,571	983,218
Due from plant fund		—	79
Due from Quebec Department of Social Affairs		611,049	325,631
Inventory of supplies, at cost		172,525	164,846
		$2,574,906	$1,894,518
Liabilities			
Bank indebtedness		$700,000	$ —
Accounts payable and accrued liabilities		960,934	841,216
Due to plant fund		223,213	—
Due to Royal Institution for the Advancement of Learning			
Current account		437,799	1,597,074
Advances to cover prior years' deficit		10,683	10,683
Surplus (deficit)		242,277	(554,455)
		$2,574,906	$1,894,518
PLANT FUND			
Assets			
Cash		$804,492	$635,544
Short-term investments		—	400,000
Accrued interest receivable		—	16,521
Due from Montreal Neurological Institute		646	—
Due from general fund		223,213	—
Advance to Royal Institution for the Advancement of Learning, construction project (Note 2)		5,972,242	5,179,995
Fixed assets, at cost			
Equipment	$4,387,543		
Less accumulated depreciation	(1,599,823)		
		2,787,720	2,876,030
		$9,788,313	$9,108,090
Liabilities			
Bank loan		$1,300,000	$600,000
Accrued interest payable		—	3,213
Due to general fund		—	79
Due to Royal Institution for the Advancement of Learning		43,981	173,324
Restricted funds, construction project		5,325,200	5,240,934
Capital		3,119,132	3,090,540
		$9,788,313	$9,108,090

Statement of Operations
for the year ended March 31, 1982

	1982	1981
Income		
Quebec Department of Social Affairs (Note 1)	$10,932,405	$9,258,898
Revenue from patients	2,956,230	2,686,905
Other income	1,061,826	913,259
	14,950,461	12,859,062
Expenses		
Salaries and wages	9,956,015	8,810,273
Fringe benefits	811,270	529,532
Drugs, medical and surgical supplies	754,149	702,161
Services and supplies	2,853,938	2,826,701
	14,375,372	12,868,667
Surplus (deficit) for the year	$575,089	($9,605)

Statement of General Fund capital
for the year ended March 31, 1982

	1982	1981
Deficit at beginning of year	($554,455)	($545,380)
Deduct		
Prior years' adjustments related to medical specialists	314,178	—
Contribution from the Quebec Department of Social Affairs related to prior year	1,856	143,797
Surplus for the year	575,089	—
	336,668	(401,583)
Add		
Prior years' adjustments related to interns and residents	(70,783)	—
Salary adjustments related to prior year	—	(143,267)
Miscellaneous adjustments related to prior years	(23,608)	—
Deficit for the year	—	(9,605)
Surplus (deficit) at the end of year	$ 242,277	($ 554,455)

Statement of Plant Fund Capital
for the year ended March 31, 1982

Capital at beginning of year	$3,090,540	$2,781,664
Increase in plant capital	302,816	541,127
	3,393,356	3,322,791
Less depreciation on equipment	274,224	232,251
Capital at end of year	$3,119,132	$3,090,540

Notes to Financial Statements
March 31, 1982

1. *Quebec Department of Social Affairs*
   Income from the Quebec Department of Social Affairs includes the amounts approved to March 11, 1982. The Department may, subsequent to a review of the accounts of the Hospital, modify amounts previously approved which would either give rise to additional amounts becoming due to the Hospital or cause amounts to be subject to reimbursement to the Government. No provision has been made in the accounts for such eventualities.

2. *Construction project*
   The construction project has been authorized by Order-in-Council No. 3415-75 dated July 23, 1975 of the Province of Quebec for an amount up to $8,500,000 of which $3,250,000 is the responsibility of the Montreal Neurological Institute. The amount of $2,952,000 was paid by the Institute as its share of the work completed.

   The final phase of the project which involves the renovations of the original building together with its integration with the new Penfield Pavilion for a cost of $4,268,577 was approved April 2, 1980 by Decree No. 966-80 of the Province of Quebec.

3. *Contingent liabilities*
   Employees' accumulated sickness benefits, which are recoverable from the Department of Social Affairs when paid, amounted to approximately $718,000 at March 31, 1982. These sickness benefits are payable when an employee terminates his services and are expensed at that time.

   An action has been instituted against the Hospital for $375,000. In the opinion of management and legal counsel, the action is unfounded.

Auditors' Report

The Board of Directors,
Montreal Neurological Hospital

We have examined the balance sheet of the Montreal Neurological Hospital as at March 31, 1982 and the statements of operations, general fund capital and plant fund capital for the year then ended. Our examination was made in accordance with the mandate outlined in Schedule II of the Regulation adopted under the Act respecting health services and social services and with generally accepted auditing standards, and accordingly included such tests and other procedures as we considered necessary in the circumstances.

In our opinion, these financial statements present fairly the financial position of the Hospital as at March 31, 1982 and the results of its operations for the year then ended in accordance with the standards and accounting practices required by the aforementioned Regulation.

Montreal, Quebec
June 30, 1982

Charette, Fortier, Hawey and Cie
Touche Ross and Cie
Chartered Accountants

Montreal Neurological Institute

Statement of Income and Expenditure

		Year-ended March 31, 1982		Year-ended March 31, 1981
Opening Balance (Deficit)		$ (466,121)		$ (301,530)
Income				
External Grants for Research and Fellowships		2,390,834		1,349,240
Donations		556,530		465,691
Assignment of previous donations		1,685,394		506,921
Endowment Income		1,516,586		1,410,178
University Funds:				
GFT Clinical Staff:				
MNH/MNI	284,077		269,256	
Other salary support for teaching	150,609	434,686	142,304	411,560
		6,117,909		3,842,060
Expenditure				
Salaries				
University Funds:				
GFT Clinical Staff				
MNH/MNI	284,077		269,256	
Other salary support for teaching	150,609	434,686	142,304	411,560
MNI Funds:				
Staff				
GFT Clinical	366,685		331,570	
Other teaching	208,088		202,591	
Research	956,816		669,158	
Technical: External Grants	616,913		487,309	
Technical: MNI Funds	227,430		205,489	
Support	294,894		322,296	
	2,670,826		2,218,413	
Fringe Benefits	316,208	2,987,034	238,995	2,457,408
Materials and Supplies		527,020		536,629
Services		163,450		129,310
C		883,558		484,762
E		607,466		288,512
		5,603,214		4,308,181
Closing Balance (Deficit)		514,695		(466,121)

Endowments

1934 Rockefeller Endowment
1951 Donner Canadian Foundation Grant
1954 Lily Griffith McConnell Endowment
1957 Hobart Anderdon Springle Memorial Endowment
1958 Rupert Bruce Memorial Endowment
1959 Percy R. Walters Memorial Endowment
1960 William Cone Memorial Endowment
1963 Walter Chamblet Adams Memorial Endowment
1964 MNI Research Endowment Fund
1966 Izaak Walton Killam Memorial Endowment
1969 Sophie M.C. Letang Memorial Endowment
1972 Senator and Mrs. Lorne Webster Memorial Endowment
1973 G. Maxwell Bell Memorial Endowment
1974 Flora Campbell Memorial Endowment
1975 Cosgrove Multiple Sclerosis Research Fund
1976 Wilder Penfield Memorial Endowment
1978 William D. Munro Memorial Endowment
1980 Clive Baxter Memorial Endowment Research Fund

Fellowship Endowments
1948 Duggan Fellowship
1950 Lewis L. Reford Fellowship
1956 Dr. and Mrs. Charles F. Martin Fellowship
1966 Izaak Walton Killam Memorial Fund for Advanced Studies

Grants for Special Projects

April 1, 1981 to March 31, 1982

Association canadienne de l'ataxie de Friedreich
Dr. Eva Andermann

E.A. Baker Foundation for the Prevention of Blindness, CNIB
Dr. Trevor Kirkham

Medical Research Council of Canada Career Investigators
Dr. Brenda Milner
Dr. Leonhard Wolfe

Medical Research Council of Canada Grants
Dr. Alain Beaudet
Dr. Stirling Carpenter
Dr. William Feindel
Dr. Serge Gauthier
Dr. Pierre Gloor
Dr. Jean Gotman
Dr. Daniel Guitton
Dr. Paul Holland
Dr. Barbara Jones
Dr. George Karpati
Dr. George Kostopoulos
Dr. Brenda Milner
Dr. Hanna Pappius
Dr. Sergio Pena
Dr. Luis Quesney
Dr. Allan Sherwin
Dr. Leonhard Wolfe
Dr. Lucas Yamamoto

Medical Research Council of Canada Scholarships
Dr. Alain Beaudet
Dr. Jean Gotman
Dr. Daniel Guitton
Dr. Barbara Jones
Dr. George Kostopoulos
Dr. Yogesh Patel
Dr. Sergio Pena

Fonds de la recherche en santé du Québec
Chercheurs-boursiers
Dr. Robert Dykes
Dr. Paul Holland

Fonds de la recherche en santé du Québec
Supplément de traitement
Six MNI researchers

Muscular Dystrophy Association of Canada Research Grants
Dr. Stirling Carpenter
Dr. Paul Holland
Dr. George Karpati
Dr. Sergio Pena

Multiple Sclerosis Society of Canada Research Grants
Dr. J.B.R. Cosgrove

National Cancer Institute of Canada
Dr. William Feindel
Dr. Lucas Yamamoto

Savoy Foundation
Dr. Eva Andermann
Dr. André Olivier
Deborah Taylor

Montreal Neurological Institute Grants

Killam Fellows
Lee Friedman
Antonio Incisa della Rocchetta

Killam Scholars
Elaine Joy Arpin
Massimo Avoli
Alain Beaudet
Mirko Diksic
Robert Dykes
Serge Gauthier
Jean Gotman
Antoine Hakim
Barbara Jones
George Karpati
Rajendra Kumar
Donald Lawrence
Elizabeth Matthew
Rachel Ochs
Sergio Pena
Luis Felipe Quesney
Ivan (John) Woods

Donations to Special Funds 1981-1982

Donations to the Montreal Neurological Institute may be made to any of the following funds, or for other purposes as specified by the donor. Receipts for such contributions are valid for income tax purposes in Canada. Donations from the United States will also qualify for income tax purposes if cheques are made out to The Friends of McGill University Inc. and sent to PO Box 441, Elizabethtown, New York 12932 with the notation that they are for the Montreal Neurological Institute. McGill graduates making donations to the university Alumni Fund may indicate that these be credited to the Montreal Neurological Institute.

Alzheimer-Parkinson Research Fund
Rosemary Cameron (in memory of Dorothy Church)
Sergio and Zaida Canencia
Martin Goldwax
Mary Sharkey
Mr. and Mrs. Harold Smith (in memory of Mrs. Marchum Parkinson)
Wood River Donor's Choice
In memory of Claude Parant
In memory of Mason Sickles

Anesthesia Research Fund

Audette Multiple Sclerosis Research Fund
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William Cone Memorial Research Fund
The Harold Crabtree Foundation
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Dr. Saul Goldenstein
Lawrence McDougall
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Cecelia Oshinsky
Estate of the late Lillian Gamble
In memory of Mary Kay Ajersch
In memory of Avis Cone

Cosgrove Research Fund
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In His Name Society
Lillian Sandler
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In memory of Deane Elliott

Gordon Library Fund

Margo Henderson Fund for Research in Electromyography
In memory of Margo Henderson

Hospital Equipment Fund
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Mary Massabky Foundation Inc.

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McNaughton Neuroanatomy Research Fund

Francis McNaughton Neurological Research Fund
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Dr. George Karpati
Herméline Laramée
Lynn Co. Ltd.
Kate McGarrigle Wainwright

Personnel Department, The Gazette (in memory of Regeanald Staniland)
Allan Ross
John Ross
In memory of Joan Gall
In memory of William Ruel
In memory of Dora Zeesman

McRae Research Fund
In memory of Dr. Donald McRae

Montreal Neurological Institute Building Fund

Montreal Neurological Institute Neurosurgical Research Fund

Montreal Neurological Institute Staff Loan Fund

Multiple Sclerosis Clinical Relief Fund
Montreal Association for Multiple Sclerosis
Multiple Sclerosis Golf League

Muscular Dystrophy Research Fund

Neurogenetics Research Fund
Association canadienne de l'ataxie de Friedreich
Savoy Foundation

Neurological Research Fund
Jocelyn Burke
Margaret Carroll (in memory of Allan Porter)
Steve Cassar (in memory of Alice Therrien and Mrs. Atilla Therrian)
Dr. Joseph Evans
John Muth
President, officers, and personnel of Consolidated-Bathurst Inc. (in memory of André Massicotte)
In memory of Albert Castonguay and Yvette Castonguay
In memory of Jack Cullen
In memory of Irma Ingram
In memory of Wilbur Austin Johnston
In memory of Robert Locke
In memory of Michael Williams

Neuro-ophthalmology Research Fund
Canadian National Institute for the Blind
Jerry Merling
St. Nicholas Men's Club
Town of Mount Royal Oldtimers' Executive Hockey Club

Neurophysiology Research Fund

Neuroradiology Research and Teaching Fund
In memory of Alexander Varga

Nursing Funds
Eileen C. Flanagan Nursing Bursary Fund
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Bertha and Alice Cameron (in memory of Avis Cone)
Kathleen Daly
Caroline Robertson
Diane White
Women's Auxiliary, RVH

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Mr. and Mrs. Tom Francis (in memory of Mrs. J. Norman Ingerle)
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Reitman Research Fund
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Richard and Edith Strauss Canada Foundation
Stroke Research
In memory of L.H. Palmer

Spinal Cord Research Fund

H.L. Teuber Neuropsychology Research Fund
Dr. Brenda Milner
Laughlin Taylor

Third Foundation Brain Fund
Noreen Annett
Canadair Management Club (in memory of Leo Fournier)
Paul Casey
Dr. Chao Chen
Norman Damiana
Mr. and Mrs. Ray Drennan (in memory of George Wright)
Mildred Flynn
Rony Gabbay
Ronald Golden (in honour of Nancy Miller)
Groupe de l'Hôpital Champlain (in memory of Jean-Pierre Laberge)
Dr. Carlos Corona Ibarra
Linda Kaplan
Pierre Lamarre (in memory of Emélia Dupont)
Gabriel Lapointe Inc. (in memory of René Blais)
Pierre Leblond
Ida Lecker
José Mourelo
Rita Muirhead (in memory of Yvonne Dubuc)
N.H. McFetridge
Douglas Onions (in memory of Robert Elkin)
George Osborne
Cecelia Oshinsky
Pratt and Whitney Aircraft of Canada Ltd. Recreational Club (in memory of Mrs. Pineault)
Myrtle Richard (in memory of Tony Pirollo)
P. Sarnawsky
Hugh Seybold
Tyndale St. Georges
Emilian Strauss
Mr. and Mrs. Gary Tabat
F. Richard Terroux
Dr. George Tolis
Mr. and Mrs. G. Williamson (in memory of Eugénie Pineault)
Estate of the late Maurice Browns
In honour of Mr. and Mrs. J. Batist
In honour of Jeanne Cohen
In memory of Rachel Frishman
In memory of Egon Gemst
In memory of Arthur Mulherron
In memory of Alexander Varga

Thomas Willis Fund
Peter Leggat

Suggested Forms for Bequests to the Montreal Neurological Institute

Unrestricted
I give and bequeath the sum of _____ dollars (or designated property or portion of estate) to the Montreal Neurological Institute, McGill University, both the principal and income to be derived therefrom to be used in such manner as the Board of Governors of the said University shall from time to time determine.

Restricted only as to principal
I give and bequeath the sum of _____ dollars (or designated property or portion of estate) to the Montreal Neurological Institute, McGill University, to constitute part of its general endowment funds, the income to be derived therefrom to be used in such manner as the Board of Governors of the said University shall from time to time determine.

Restricted as to purpose
I give and bequeath the sum of _____ dollars to the Montreal Neurological Institute, McGill University, both the principal and the income to be derived therefrom to be used for the purpose of (stating purpose) in such manner as the Board of Governors of the said University shall from time to time determine.

For founding fellowships and student aid
I give and bequeath the sum of _____ dollars (or designated property or portion of estate) to the Montreal Neurological Institute, McGill University, for the purpose of founding in the said University one or more fellowships or bursaries to be known as "_____ Fellowship or Bursary," the net annual income from this fund to be awarded annually in such amounts, under such conditions, and to such recipients as may be determined from time to time in accordance with the directions of the Board of Governors of the said University.

For information and suggestions, contact:
Director
Montreal Neurological Institute
3801 University Street
Montreal H3A 2B4
Quebec
Telephone: (514) 284-4655

Statistics

Classification of Operations

April 1, 1981 to March 31, 1982

Craniotomy and craniectomy		
and excision of epileptogenic focus (lobectomy)	78	
and removal of cerebral tumor	70	
and removal of posterior fossa tumor	29	
and excision, clipping, or wrapping of aneurysm	21	
or intrasellar tumor	14	
and hypophysectomy transphenoidal for pituitary or intrasellar tumor	14	
and plastic repair of skull defect (plate, bone, acrylic)	9	
and correction Chiari malformation (plugging of central canal)	7	
and drainage of intracerebral hematoma	6	
and biopsy	5	
and drainage of subdural hematoma	5	
and cerebral vascular bypass anastomosis	4	
and drainage of extradural hematoma	4	
and plastic repair of dura, CSF rhinorrhea, or fistula	4	
and removal of arteriovenous malformation	4	
and removal of tumor of skull	4	
and excision of abscess	2	
and trigeminal rhizotomy, suboccipital	2	
and elevation of depressed skull fracture	1	
and excision of epileptogenic focus (hemispherectomy)	1	
and sequestrectomy for osteomyelitis	1	
and suboccipital glossopharyngeal and vagus nerves rhizotomy	1	
and trigeminal or seventh nerve massage or decompression	1	271
Trepanation		
and drainage of epidural, intracerebral, or subdural space	14	
and biopsy	2	
and insertion of ventricular catheter or drain	1	
Shunt Procedures		
ventricular caval (atrial)	20	
replacement or revision of shunt	18	
ventricular peritoneal	10	
removal of shunt	3	
lumbar subarachnoid peritoneal	1	
ventriculocisternostomy (Torkildsen's)	1	
Stereotaxic Procedures		
and ventriculography, PEG, angiography (localization)	10	
and introduction of depth electrodes	7	
and lesion (mechanical or neurolytic agent, including electrophysiological localization)	6	
and biopsy or drainage of cyst	3	
and placement of electrodes	2	98

Laminectomy, Hemilaminectomy		
and discoidectomy, lumbar, sacral	50	
and decompression or exploration of spinal cord or cauda equina for stenosis or dentate ligament section or spondylosis	25	
and spinal fusion with bone graft, autogenous or bone bank	15	
and discoidectomy, anterior approach, cervical (Cloward)	14	
and removal of tumor, extradural, metastatic bone, etc.	10	
and rhizotomy, dorsal	5	
and incision and drainage of intramedullary cyst (syringomyelia)	4	
and rhizotomy, torticollis	4	
and antero-lateral cordotomy, thoracic	3	
and removal of tumor, intramedullary	3	
and spinal fusion with wire, plate, or surgical simplex	3	
and removal of tumor, extramedullary, intradural	2	
and antero-lateral cordotomy, cervical	1	
and plastic repair of spina-bifida	1	
and removal or revision of dorsal column stimulator implant	1	
and repair of meningocele CSF leak, dural graft	1	
and rhizotomy, ventral	1	143
Sympathectomy		
and sympathetic ganglioneurectomy (dorsal)	1	1
Nerve Exploration		
and neurolysis, transplantation, or decompression or exploration	56	
and anastomosis or suture	3	
and excision of nerve tumor	3	
and avulsion or section	2	
and biopsy	1	
and excision of neuroma	1	
Artery Exploration		
and endarterectomy (patch graft)	25	
and exploration, carotid artery	1	
and ligation	1	
Wound Reopening		
and evacuation of hematoma	2	
and further removal of brain tissue	2	
and drainage of infection	1	
and removal of bone flap, tantalum plate, wire mesh, or acrylic	1	99

Miscellaneous		
muscle biopsy	63	
miscellaneous	15	
tracheostomy	15	
radiofrequency trigeminal rhizotomy	12	
radiofrequency percutaneous rhizotomy	3	
division or denervation sternocleido-mastoid muscle for torticollis	2	
radiofrequency percutaneous cordotomy	2	
chemonucleolysis L 4-5	1	
Radiological Procedures		
catheterization, brachial, carotid, femoral	239	
cervical angiography (venography), percutaneous, carotid, vertebral, subclavian	15	
pneumogram under anesthesia	13	380

Diagnoses
April 1, 1981 to March 31, 1982

Epilepsy	365
Cerebrovascular disease	215
Intracranial tumors and cysts	200
Functional psychosis and behavior disorders	158
Craniocerebral trauma	133
Radiculopathy due to protruded intravertebral disc	127
Subarachnoid hemorrhage	111
Multiple sclerosis	74
Cranial neuropathies	56
Migraine	50
Myelopathy (unspecified)	45
Hydrocephalus	44
Spinal trauma	39
Median neuropathy	36
Meningitis	19
Subdural hematoma	18
Parkinsonism	17
Peripheral neuropathy	16
Guillain-Barré syndrome	16
Myasthenia gravis	15
Motor-neurone disease	14
Intracranial aneurysms (not ruptured)	14
Syringomyelia	13
Arnold-Chiari malformation	12
Cerebrospinal fluid rhinorrhea	11
Muscular dystrophy	10
Ulnar neuropathy	8
Intracerebral abscess	6
Myopathy	3
Alzheimer's disease	3
Tuberous sclerosis	3
Myalgia	1

Causes of Death
April 1, 1981 to March 31, 1982

Cerebral hemorrhage	13	
Intracranial hemorrhage	1	
Subarachnoid hemorrhage	9	
Traumatic subarachnoid, subdural, extradural hemorrhage	1	
Occlusion of cerebral arteries	8	
Malignant brain tumor	14	
Intracranial trauma unspecified	2	
Others	31	79