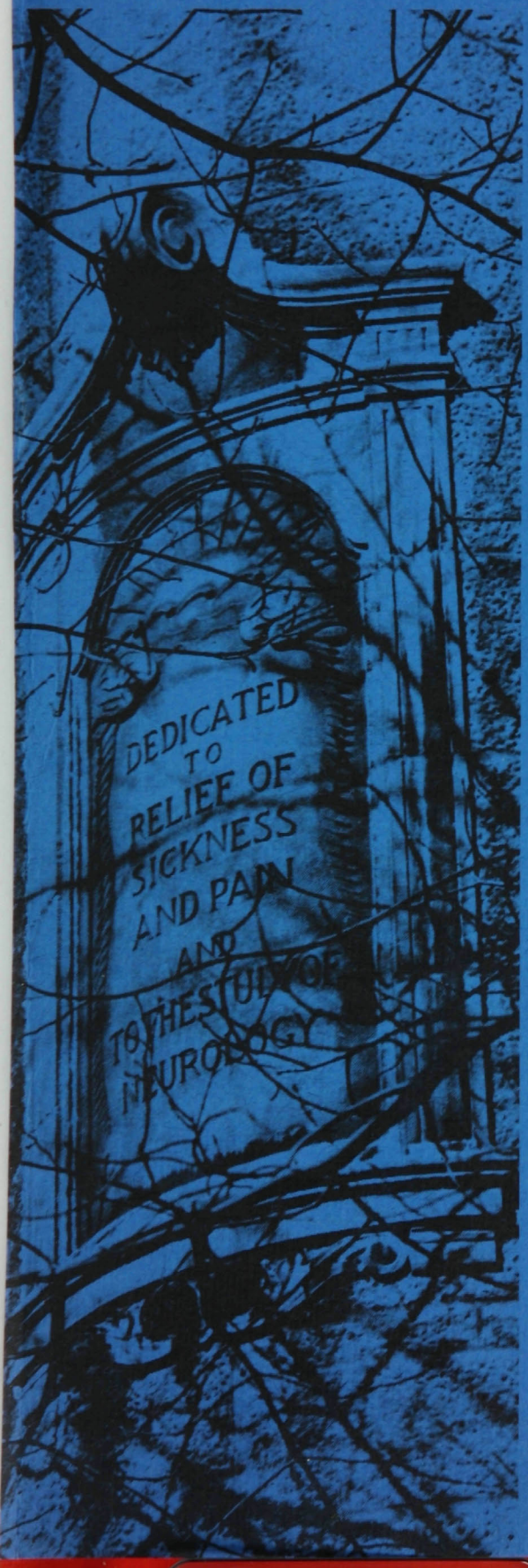
40th Annual Report

# MONTREAL NEUROLOGICAL INSTITUTE
# MONTREAL NEUROLOGICAL HOSPITAL




and the

DEPARTMENT

of

NEUROLOGY

and

NEUROSURGERY

of

McGill University

1974-75

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# Contents

## EDITORIAL NOTE

This Annual Report has always consisted of reviews provided by members of our staff in charge of certain areas of activity. The first nine reports published here have been given in part at our annual meeting. The others are added to highlight the work of the various departments, laboratories, conferences and meetings. The editing and printing of the report is arranged by Mrs. Rose Slapack with the help of Mrs. Joy Shannon, Dr. Allan Elliott, Mrs. Sophie Malecka and myself. The reporters are given a fair latitude. We always hope that they try to follow the advice from Ecclesiasticus, "Let thy speech be short, comprehending much in few words." Surprisingly, this often happens. We try also to strike a balance between too many tables and figures, which would be dull, and too many day-to-day trivia which would be boring. We are always impressed by the diligence and originality that the staff members bring to the work of their reports. Over the past 40 years these records have faithfully reflected what we as a group are doing or are constantly striving to do. Like its predecessors, it will be circulated to former Fellows, to officials in many departments of governments, to other hospitals and universities and to a large family of friends and patients of the Institute and Hospital who continue to provide encouragement and support for the activities which we have recorded here.

W.F.
Editor

## POSTSCRIPTUM

Despite the fact that we tried every reasonable manœuvre to get official government approval of the new construction program before our annual meeting in May (including waiting for Ascension Day — one day later) we heard nothing definite. As this Report goes into final proof we are taking Editorial license to record the welcome news — on July 23, 1975, Order-in-Council No. 3415-75 of the Government of Quebec was passed to authorize the financing and construction of the Wilder Penfield Wing. We shall be reporting more on this later, but meanwhile all those who contributed so much of their time, money and ideas toward this IIIrd Foundation of the Neuro will want to exclaim with us « *Jubilate, Jubilate* »!

W.F.

*The present Director of the Institute and Hospital, Dr. William Feindel, is flanked by the two former Directors, Dr. Theodore Rasmussen and Dr. Wilder Penfield on the occasion of the 40th Anniversary celebration on October 7, 1974.*

# Report of the Director

DR. WILLIAM FEINDEL

This 40th Annual Report records some highlights of the activities of the Montreal Neurological Institute, the Montreal Neurological Hospital and the Department of Neurology and Neurosurgery of the Faculty of Medicine of McGill University.

The individual reports from the many members of our staff indicate that this has been an exciting year. We celebrated our 40th birthday, with historical talks from the three successive Directors, a numerical birthday cake, trumpet fanfares and a pleasant brochure of Memorabilia to mark this occasion and to pay tribute to those in the past who have given so much to this institution.

Demands for Health Care Services have increased. The bed occupancy rate in the hospital was over 90%, an unusual figure. Surgical activities and general admissions have been higher than during any of the past five years. Our hospital budget showed an accounting surplus; a rare syndrome these days. This resulted partly from the increased patient referrals coming from Quebec, from other parts of Canada, and from the United States, to benefit from the new and revolutionary EMI brain scanner. This was the first and only device of its kind in Canada for the better part of last year and we provided a centralized referral service on a national basis which increased our hospital income. Other internal savings were related to the approval of new staff positions by the government, with the budget for these being allotted toward the end of the year before these positions could be filled. But much of the credit for this surplus must go to the Audit Committee of our Board of Directors, particularly Mr. Jean de Grandpré, our President, Mr. Colin Webster and Mr. Peter Leggat along with the auditors who worked with our own Budget Committee. In the present atmosphere of inflation, when our own governments seem at a loss to control their budget deficits, we are justified in basking a little in this fiscal sunshine, however transient it may prove to be.

On the Institute side as well we finished 1974 just under our budget estimates. This, however, was possible only because of unusual help from certain special project donations.

Another great satisfaction during the past year was the completion of Phase II of four phases of renovation and construction at the cost of half a million dollars. Authorized by Order-in-Council 73-3031 granted in August, 1973, this now gives us a safe and efficient area for radio-isotopic diagnosis, a pleasant women's lounge, an adequate area for stores and printing, a safe area for dangerous chemicals and, on top of all this, arranged by Mr. Marpole and the architects, a roof deck for our patients. We have started planning for an interphase, when the galleries on the east end will be enclosed and the space re-

cently vacated will be reallocated for the most urgent needs. A surprising freeze on all hospital construction made by the government early in January, imposed the constraint that we had to prove we had contained ourselves within 1% of our 1974 approved budget. Fortunately, the diligence of Mr. Geoffrey Thomas, our Director of Finance, and a long bilingual afternoon with the Deputy Minister of Social Affairs and his financial consultants, resulted in a February thaw. The protracted process of approval for the Penfield Wing thus goes forward.

From detailed reviews last year with government representatives, budget support has been approved for new staff positions including for the first time, psychiatric consultation service and urgently needed technical and clerical support in other areas. Our request for more nursing positions, despite what we considered a valid presentation of our needs, was not approved. Miss Caroline Robertson, our new Director of Nursing, is vigorously mustering new facts for another request. Over the past five years our staffing complement in nursing has become inadequate and out-of-date because of government directives, new contracts with the nursing federations, and modification of nursing patterns.

It has been an active year for our teachers in neuroscience, neurology and neurosurgery. There has been an overall expansion through all four years of the course in the undergraduate medical curriculum as detailed by Dr. Robb and Dr. Bertrand, and as Dr. Gloor notes we have had a large number of post-graduate students. The weekly neuroscience seminars, supported by the special funds of the Institute, have been excellent teaching models, providing inter-departmental contacts, bringing outstanding teachers and scientists from other centres and providing the best possible stimulation for students and staff members. We are pleased that Dr. Cronin has re-instituted an annual grant to subsidize these seminars.

We are still concerned, however, that the major financial support for the fulltime teaching of neurology, neurosurgery and the neurosciences at all levels, continues to come from the research endowment funds of the Institute. Partial support for our geographical fulltime teachers derives from a budget originally directed by the Provincial Government to the hospital, which is now channeled through the University and the Faculty of Medicine. But this amount has remained the same for more than five years, except for small annual increments, despite the increase in our teaching responsibilities with the new curriculum and with the expansion of the medical class from 135 to 165 students a year. We are thus very dependent upon research funds and our own scholarship funds, particularly the Killam Memorial Fund of the Institute, to take on younger teachers and scientists who will be able to bring with them stimulating new direction in our search for understanding the nervous system, and for instructing the medical students and residents in training. Some relief appears to be in sight

with the announcement of a recent substantial increase in Government grants for residency teaching to the four Quebec medical schools. Our portion of this, which will be based on the number of residents in the department of neurology and neurosurgery will, we hope, start a trend toward the development of more realistic support from the Faculty of Medicine for our fulltime teaching staff.

Recent visits by two former Fellows, Dr. John Stirling Meyer of Houston, an authority on cerebral vascular disorders, and Dr. David Hubel of Harvard University, renowned for his original research on the physiology of vision, emphasized again how distinguished so many of our former Fellows have become.

We have enjoyed again this past year the cooperation and help of many individuals and groups at the other McGill teaching hospitals, particularly the Royal Victoria Hospital, and of the administrative staff at the University. The presence of Principal Bell as Chairman of our Annual Meeting and of Dean Cronin as Chairman of the Hughlings Jackson Lecture hour reminds us of the close ties between the Institute, the Hospital and the University. We are delighted that Mr. Stuart Finlayson was also present at our Annual Meeting and rejoice at his recent appointment as Chancellor of the University. As the first President of the Corporation of the Montreal Neurological Hospital, established in 1963, Mr. Finlayson gave generously of his wisdom and support.

The Annual Meeting day, on May 8, was a traditional time to welcome many friends. We had two distinguished visitors this year. Professor Ragnar Granit, the Hughlings Jackson Lecturer, was formerly Director of the Nobel Institute of Neurophysiology in Stockholm and Nobel laureate for his distinguished research in the field of vision and motor control. Secondly, we had Dr. Donald Tower, a renowned neurochemist and former fellow of the MNI, now Director at the National Institute for Neurological and Communicative Disorders and Stroke at Bethesda.

*New Projects:*

Much of the international reputation of this institute and hospital derives from our sustained interest in research and treatment for epilepsy, which still remains one of the major unsolved problems in neurology. Another group of devastating neurological disorders is related to leaking or blocking of the blood vessels of the brain. Commonly referred to as "stroke", these disorders are the third most common cause of death, after cancer and heart disease. Until recently some advances had been made in their diagnosis and treatment, but the advent of the EMI scanner has brought a completely new approach to this difficult field. It now gives an immediate differentiation between haemorrhage and vessel blockage which, in the past, has been difficult. It allows us to study brain changes in a patient with a stroke over a period of hours, days or weeks with no risk or discomfort. Thus, for

the first time we have a means for accurate diagnosis and for evaluating new methods of treatment for stroke.

In the Cone Research Laboratory, over the past fifteen years, we have developed several original research techniques which allow us to study microcirculation — the smallest vessels — of the brain and to measure the blood flow in these vessels which are so important for the direct nourishment of the brain tissue. We have applied these methods experimentally, and in selected cases in the operating room, to great advantage. Recently, we have begun clinical trials with another unique device that measures blood flow in quite small areas of the brain by a method in which the patient breathes a microscopic amount of a radioactive tracer. This sophisticated instrument, which is called a positron emission tomograph (PET), has been developed by Dr. Yamamoto with the scientific team at the Brookhaven National Laboratory. A third device, the latest and most powerful model of an x-ray projection microscope, is operating in the Reford Room where it was installed last fall under the guidance of Professor Richard Saunders, formerly of Dalhousie University. This provides exquisite magnified pictures of the whole range of blood vessels of the brain from the largest ones on the surface to the very finest ones in the brain substance. Very few of these instruments have so far been available and our model is capable of analyzing the vessels in large areas of brain affected either by tumour or stroke.

Thus, on both the research and clinical side, we are concentrating on expertise and instrumentation for the investigation of the stroke problem. Our immediate task is to insure that these techniques and the important findings of our research teams can be applied effectively to help the patient at the bedside to recover from the effects of a stroke.

*Changes in Organization and in Staff:*

Recent directives about the Board of Directors of the hospital indicate that six of our board members can now extend their offices for another year; this will provide more stability. We regretfully accepted the resignation of Mr. Robert Cummings, who has given his loyal support as a member of the Board for the past two years. Dr. Roméo Ethier has been elected as representative of the Council of Physicians of the hospital. Mr. Yves Fortier, a member of the Board of Governors at McGill University, has been appointed as a new Director.

Last summer Miss Joy Hackwell indicated her wish to resign as Director of Nursing to return to study at McGill. We have been fortunate in attracting Miss Caroline Robertson as our new Director. She is well known in these parts, having graduated from the RVH Nursing School, taken the post-graduate course here in neurological nursing and worked on the MNH staff. For four years, she was Director of Nursing at the Sherbrooke General Hospital. Her report at our Annual Meeting, which is published here, indicates the strength of leadership which she is already providing.

Dr. Brian Younge, who has enthusiastically directed the Neuro-opthalmological Service during the past two years, has accepted an appointment at the Mayo Clinic. We wish him well. We welcome to the Neuro., to take over this special service, Dr. Trevor Kirkham. Dr. Kirkham has had an outstanding reputation in neuro-opthalmology in London and here at the Montreal Children's Hospital. His particular interest, disorders of eye movement, will relate well to the expert techniques that will be provided by another new appointment, that of Dr. Daniel Guitton. Dr. Guitton, after a doctorate in engineering, is now completing his second Ph.D. in neurophysiology on studies involving exact measurement of eye movement. Thus, this unit will be continuing its active clinical work and moving into a phase of research.

We are delighted that Dr. Joe Martin, at the Montreal General Hospital, Division of Neurology, and Associate Professor in our department, was awarded an Associateship of the Medical Research Council. He joins the distinguished company of Dr. Milner and Dr. Wolfe. At the post-graduate level, Dr. Robb and Dr. Baxter organized a most successful Thursday Lecture Series in neurology. Dr. John Woods continued as our representative on the RVH post-graduate board and Dr. Gloor supervised the increasingly busy activities here for the Faculty of Graduate Studies and Research in relation to the neurosciences.

The Faculty of Medicine has now formed a residency training committee responsible for the overall supervision of this programme in McGill teaching hospitals. Despite the increasing constraints and requirements, we have continued to have more applicants to our residency program than we can accommodate. During the past year, we have appreciated the enthusiasm and help of Dr. Ilo Leppik, President of the Fellows Society and of Dr. Michael Dogali, the senior resident, who carried out his duties and responsibilities with great aplomb. Because of their outstanding contributions, Dr. Michael Dogali and Dr. Ilo Leppik have been selected to receive the Wilder Penfield Award at the Annual Fellows Dinner in June.

All of us appreciate the many contributions of the residents, fellows and their wives to the character and life of this Institute during the past year.

A month or so ago, Mrs. Joy Shannon indicated her wish to resign as Director of Administrative Services of the hospital. We have accepted this with regret, since during the past three years Joy Shannon, with her many good works, has left her mark on the Neuro. She has championed the nursing staff and the women members of the staff and taken a kindly interest in everyone's problems. She continues as a member of the Board of Directors of the hospital, and we hope that she will be able to help, from time to time, in some of our special projects.

We are delighted that Mrs. Alphonsine Paré Howlett has agreed to take over on June 16 as Director of Administrative Services. She

is already known to many of you as the wife of one of McGill's most distinguished medical teachers, Dr. John Howlett, and as an energetic supporter of community projects, education, rehabilitation and women's affairs. She has contributed generously of her administrative talents as President of the Y.W.C.A. and Présidente des Femmes du Québec. Her executive ability has been recognized by the fact that she has been selected a number of times to initiate and organize para-medical and youth training projects for the Department of Social Affairs of the Government of Quebec. Her extensive experience in these areas and her sensitivity to social needs will, I believe, alert us at the Neuro to a wider role in the community and the province. The problem of psycho-social support, rehabilitation and follow-up for our patients with epilepsy, paraplegia and stroke, represent only three aspects where we provide expert and sophisticated acute treatment, but need to develop much better long term programs.

In regard to the Penfield Wing, architectural plans were completed in September. They have been approved by the Department of Social Affairs of the Quebec Government. Further approval is required at the level of the Treasury Board and by the Federal Government. In the meantime our needs for research and teaching space and for the upgrading of the old-fashioned and even unsafe hospital facilities become more desperate. The III and IV Phases of expansion and renovation will provide relief and will insure that the contributions of the Montreal Neurological Institute and the Montreal Neurological Hospital can continue at the level of excellence which it has so far managed to maintain. At the same time, construction of the Wilder Penfield Wing, with its enhanced resources for study and treatment in neurology, provides an excellent opportunity for the Governments of Quebec and of Canada to recognize the remarkable scientific and educational contributions which Dr. Penfield has made to Quebec, to Canada and to medicine throughout the world.

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Charles Olanow, M.D., F.R.C.P.(C)

*Adjunct Neurologists* ..... Albert Aguayo, M.D., F.R.C.P.(C)
Donald Baxter, M.D., C.M., M.Sc., F.R.C.P.(C)
Garth Bray, M.D., F.R.C.P.(C)
Morrison Finlayson, M.B., Ch.B., F.R.C.P.(C)
Peter Humphreys, B.Sc., M.D., C.M.
Mortimer Lechter, B.Sc., M.D.
Joseph Martin, B.S., M.D, F.R.C.P.(C)
Michael Rasminsky, B.A., M.D., Ph.D.
Leo Renaud, B.A., M.D., Ph.D.
Stanley Rothman, A.B., M.D., C.M.
William Sheremata, B.Sc., M.D., F.R.C.P.(C)
William Tatlow, M.D., M.R.C.P., F.R.C.P.(C)
Danica Venecek, M.D.
Gordon Watters, B.A., M.D.

*Honorary Consulting Neurosurgeon* ..... Jean Sirois, B.A., M.D.

*Consulting Neurosurgeons* ..... Claude Bertrand, B.A., M.D., F.R.C.S.(C)
Maurice Héon, B.A., M.D., F.R.C.S.(C) F.A.C.S.
Gérard Leblanc, M.D., F.A.C.S., F.R.C.S.(C)
Harold Rosen, B.Sc., M.D., C.M., F.R.C.S.(C), F.A.C.S.

*Adjunct Neurosurgeons* ..... John Blundell, M.A., M.D., M.R.C.P. (Lond.), F.R.C.S. (Eng.)
Robert Ford, B.A., M.D., F.R.C.S.(C)
Robert Hollenberg, M.D., F.R.C.S.(C)
Joseph Stratford, M.D., C.M., M.Sc., F.R.C.S.(C)

*Honorary Consulting Anaesthetists* ..... Harold R. Griffith, M.M., B.A., M.D., C.M., F.A.C.A., F.I.C.A., F.F.A.R.C.S. (Eng.), F.R.C.P.(C)

*Consulting Anaesthetist* ..... G. Frederick Brindle, B.A., M.D., C.M., F.R.C.P.(C)
Philip Bromage, M.B.B.S., M.R.C.P., L.R.C.P., F.F.A.R.C.S. (Eng.)

*Adjunct Physiologist (Anaesthesia)* ..... Kresimir Krnjevic, B.Sc., M.B., Ch.B., Ph.D., F.R.S.C.

*Consulting Radiologists* ..... Robert G. Fraser, M.D., F.R.C.P.(C)
Jean L. Léger, M.D.
Jean Vézina, B.A., B.M., M.D.

*Honorary Consulting Radiation Therapist* ..... Jean Bouchard, M.D., F.A.C.R., F.R.C.P.(C)

*Consulting Radiation Therapist* ..... John H. Webster, M.D. (Queens)

*Consultant, Employee Health Service* ..... Walter Gregory, M.D., F.R.C.P.(C)

*Consulting Executive Director* ..... Douglas MacDonald, B.Eng.

*Consultant in Microbiology* ..... S.I. Vas, M.D., Ph.D. C.R.C.P.(C), F.R.C.P.(C)

*Consulting Psychologist* ..... M. Sam Rabinovitch, Ph.D.

*Consultant in Veterinary Medicine* ..... Leslie Lord, B.Sc., M.Sc., D.V.M.

*Consulting Neuropharmacist* ..... Gordon S. Brooks, B.Sc.

# ADMINISTRATIVE STAFF OF THE MONTREAL NEUROLOGICAL HOSPITAL

| | |
|---|---|
| *President* | A.J. de Grandpré, Q.C. |
| *Director* | William Feindel, M.D. |
| *Administrative Consultant* | Charles S. Gurd |
| *Director, Administrative Services* | Mrs. Joy M. Shannon |
| *Administrative Assistant* | Winston Rochette |
| *Registrar* | Bernard Graham, M.D. |
| *Assistant Registrar* | Danica Venecek, M.D. |
| *Director of Nursing* | Miss Caroline Robertson, R.N., B.N., M.Sc. (App.) |
| *Director of Finance* | Geoffrey Thomas, B. Com. Cert. H.O.M. |
| *Director of Personnel* | Hector Heavysege |
| *Director, Social Service* | Miss Cynthia Griffin |
| *Planning Officer* | Harry Marpole |

## SUPERVISORY OFFICERS

| | |
|---|---|
| *Admitting* | Mrs. M. Bernard |
| *Dietician* | Mrs. Oresta Podgurny |
| *Employee Health Service* | Mrs. J. Mallory, R.N. |
| *Librarian* | Mrs. M. Boski, B.A., B.L.S. |
| *Medical Records* | Mrs. M. Duffie |
| *Publications* | Mrs. R. Slapack |
| *Services (Oxygen & Inhalation)* | Mr. Wilfred Garneau |

## NURSING STAFF

| | |
|---|---|
| *Director of Nursing* | Miss Caroline Robertson, R.N., B.N., M.Sc. (App.) |
| *Assistant Director of Nursing (days)* | Miss Irene MacMillan, R.N., B.A., (M.Sc. App.) |
| *Assistant Director of Nursing (nights)* | Miss Elizabeth Barrowman, R.N. |
| *Nursing Supervisors (nights)* | Miss Lillian McAuley, R.N.<br>Mrs. Margaret Smeaton, R.N. |
| *Nursing Supervisors (evenings)* | Mrs. Barbara Petrin, R.N.<br>Miss Cecilia Largo, R.N., B.Sc. |
| *Nursing Supervisors (days)* | Miss Annie Johnson, R.N.<br>Miss Anne Carney, R.N., B.N. |
| *Assistant Director of Nursing Education* | Miss Helena Kryk, R.N., B.N. |
| *Coordinator of Inservice Education Department* | Miss Geraldine Hart, R.N., B.N. |
| *Clinical Instructor* | Miss Elizabeth Roll, R.N., B.N. |
| *Operating Room Supervisor* | Miss Norma Isaacs, R.N., B.N. |
| *V.O.N.* | Mrs. Kathleen Douglas, R.N. |

## HEAD NURSES

Miss Mary Cavanaugh, R.N.
Miss Lucy Dalicandro, R.N.
Miss Marion Everett, R.N.
Miss Patricia Furlong, R.N.°
Mrs. Winsome Wason, R.N.
Mrs. Georgette Jotic, R.N.°
Miss Delta MacDonald, R.N.
Miss Noelene McGuire, R.N.
Miss Ursula Steiner, R.N.

°Operating Room

## THE WOMEN'S AUXILIARY OF THE ROYAL VICTORIA HOSPITAL

*Presidents* ..... Mrs. Robert B. Spence (to Apr. 1975)
Mrs. Theodore Rasmussen (from Apr. 1975)

*Chairman, M.N.H. Coffee Shop Committee* ..... Mrs. G.L. Cheesebrough

*Treasurer* ..... Mrs. Gordon Mathieson

## DEPARTMENT OF VOLUNTEERS OF THE ROYAL VICTORIA HOSPITAL

*Directors* ..... Mrs. Jean Little (to May 1975)
Mrs. Heather McFarland (from May 1975)

## CLERGY

Rabbi Mordechai Glick ..... *Jewish*
Reverend Father F.X. Johnson, S.J. ..... *Roman Catholic*
Reverend Father E. Messier, S.J. ..... *Roman Catholic*
Reverend S.M. McDowell ..... *United*
Reverend Lionel Temple-Hill ..... *Anglican*

# RESIDENT STAFF — JULY 1974 THROUGH JUNE 1975

*Senior Neurosurgical Residents* ..... Michael Dogali, M.D. (Duke)
July 1974 — March 1975
Arun Ginde, M.D. (Bombay)
from April 1975

## *NEUROLOGICAL SERVICES*

*Residents: 6 mos. on this service*

E. Bass, M.D. (McGill)
P. Bedard, M.D. (Laval)
L. Charron, M.D. (Sherbrooke)
L.H. Lebrun, M.D. (Montréal)
L. Terry, M.D. (Marquette)
B. Zumstein, M.D. (Zurich)

*Assistant Residents: 6 mos. on this service*

P. Augereau, M.D. (Paris)
P. Camfield, M.D. (Harvard)
S. Gauthier, M.D. (Sherbrooke)
L.H. Lebrun, M.D.
B. Rosenblatt, M.D. (McGill)
D. Schomer, M.D. (Michigan State)
J. Wasserman, M.D. (Jefferson)

*Royal Victoria Hospital Residents: 6 mos. on this service*

R.K. Jones, M.D. (Northwestern)
M.J. Kinosian, M.D. (Albany)

*RVH Rotators:*

J. Brunton, M.D.
F. Buckwold, M.D.
D. Danoff, M.D.
D. Doell, M.D.
L. Dragatakis, M.D.
E. Feller, M.D.
J. Gatewood, M.D.
J. Glaser, M.D.
J. Hammarsten, M.D.
W. Kocha, M.D.
T. Kottke, M.D.
H. Laryea, M.D.
H. Liberman, M.D.
T. McConnell, M.D.
D. Roy, M.D.
P. Tetrault, M.D.
P. Tousignant, M.D.
P. Wolfson, M.D.

*Montreal General Hospital Residents: 6 mos. on this service*

E. Bass, M.D. (EMG)
A. Bellavance, M.D. (Montréal)
L. Charron, M.D. (EMG)
J. Dawlings, M.D. (British Columbia)

*Montreal General Hospital Assistant Residents: 6 mos. on this service*

J. Allen, M.D. (Harvard)
J.A. Miranda, M.D. (Montréal)
J. Wasserman, M.D.
B. Zumstein, M.D.

*Montreal Children's Hospital Residents: 6 mos. on this service*

P. Camfield, M.D. (EEG)
A. Gagnon, M.D. (Laval) (EEG)
L. Terry, M.D.
K. Laxer, M.D. (California)

*Montreal Children's Hospital Assistant Residents: 6 mos. on this service*

J. Allen, M.D.
B. Bedard, M.D.
A. Bellavance, M.D.
B. Rosenblatt, M.D.
A. Trottier, M.D. (Ottawa)

*Jewish General Hospital Residents: 6 mos. on this service*

J. Rubin, M.D. (McGill)
R. Yufe, M.D. (McGill)

## *NEUROSURGICAL SERVICES*

*Residents: 6 mos. on this service*

H. Blume, M.D. (Wayne State)
M. Dogali, M.D.
A. Drake, M.D. (Chicago)
J. Epps, M.D. (Howard)
A. Ginde, M.D. (Bombay)
J. Musgrave, M.D. (Queen's, Belfast)

*Assistant Residents: 6 mos. on this service*

R. Branon, M.D. (Colorado)
J. Martinez-Leyva, M.D. (Mexico)
V. Smart-Abbey, M.D. (McGill)
J. Wells, M.D. (Tulane)

*Montreal General Hospital Residents: 6 mos. on this service*

A. Ginde, M.D.
H. Ortegon, M.D. (Yucatan)

*Montreal General Hospital Assistant Residents: 6 mos. on this service*

J. Martinez-Leyva, M.D.
J.-G. Villemure, M.D. (Laval)

*Montreal Children's Hospital Residents: 6 mos. on this service*

M. Lewin, M.D. (Cath. Univ. of Chile)
J. St. John, M.D. (Wayne State)

*Neurological Research:*

Moris J. Danon, M.D. (Istanbul)
Ilo Leppik, M.D. (Pennsylvania)

*Neurosurgical Research*

*Cone Laboratory:* P. Murray, M.D. (Dublin)

*Stereotaxic Laboratory:* Tyrone Hardy, M.D. (Howard)

*M.G.H. Lab.:* J. Epps. M.D.

## DEPARTMENT OF NURSING EDUCATION
## POST BASIC CLINICAL PROGRAM IN
## NEUROLOGICAL AND NEUROSURGICAL NURSING

*Class from Sept. 3, 1974 — Feb. 24, 1975*

Ben Hadj, Mrs. Madeline
Chamberland, Miss Marguerite
Cloutier, Miss Huguette
Dobuck, Miss Judy Marie
Donato, Miss Rose Marie
Ferrante, Miss Vincenza
Harvey, Miss Jane Ann
Pierrepont, Miss Jane Marie
Sellars, Miss Catherine Joan
Sieber, Miss Kay Louise
Songcharoen, Miss Manitda
Stauffer, Miss Thelma

*Class from Mar. 3 — Aug. 1, 1975*

Beauregard, Mrs. Diane
Bissonette, Miss Helene
Borozny, Miss Margaret
Crozier, Mrs. Julie
Daly, Miss Kathleen M.
Doughty, Mrs. Barbara
Fryer, Miss Joanne
Huwe, Miss Linda Mae
McDowell, Miss Joyce
McKinnon, Miss Lorraine I.
Palmer, Miss Donna
Pentheny, Miss Susan L.
Townsend, Miss Katherine
Vineis, Miss Barbara

# MONTREAL NEUROLOGICAL INSTITUTE AND McGILL UNIVERSITY TEACHING STAFF

*Department of Neurology and Neurosurgery, Faculty of Medicine*

| | |
|---|---|
| *Chairman of Department and William Cone Professor of Neurosurgery* | William Feindel |
| *Professors, Neurology* | Donald Baxter<br>Francis McNaughton<br>Preston Robb |
| *Professors, Neurosurgery* | Gilles Bertrand<br>Theodore Rasmussen<br>Joseph Stratford |
| *Associate Professors, Neurology* | Albert Aguayo<br>Frederick Andermann<br>J.B.R. Cosgrove<br>Irving Heller<br>George Karpati<br>Donald G. Lawrence<br>Joseph Martin<br>Allan Sherwin<br>Gordon Watters |
| *Assistant Professors, Neurology* | Garth Bray<br>Andrew Eisen<br>Morrison Finlayson<br>Bernard Graham<br>Israel Libman<br>Michael Rasminsky<br>Leo Renaud<br>W.F.T. Tatlow<br>Ivan F. Woods |
| *Lecturers, Neurology* | Eva Andermann<br>Michel Aubé<br>Peter Humphreys<br>Stanley Rothman<br>William Sheremata |
| *Associate Professor, Neurosurgery* | John Blundell |
| *Assistant Professors, Neurosurgery* | Carl Dila<br>Robert Ford<br>Robert Hansebout<br>André Olivier |
| *Lecturer, Neurosurgery* | Robert Hollenberg |
| *Assistant Professor, Neurosurgical Research* | Lucas Yamamoto |
| *Professor, Neurophysiology* | Pierre Gloor |
| *Assistant Professor, Neurophysiology* | Stanislav Prelević |
| *Assistant Professor, Clinical Neurophysiology* | Katherine Metrakos |
| *Lecturers, Neuroelectronics* | John Richard Ives<br>Christopher Thompson |
| *Professor, Neurochemistry* | Leonhard Wolfe |
| *Associate Professor, Neurochemistry* | Hanna Pappius |

*Associate Professor, Neuroradiology* ..... Roméo Éthier
*Assistant Professor, Neuroradiology* ..... Denis Melançon
*Lecturer, Neuroradiology* ..... Garry Bélanger
*Professor, Anaesthesia* ..... Richard Gilbert
*Associate Professor, Anaesthesia* ..... Davy Trop
*Assistant Professors, Anaesthesia* ..... Richard Catchlove
Mary Morris
*Lecturer, Anaesthesia* ..... Luis F. Cuadrado
*Associate Professors, Neuropathology* ..... Stirling Carpenter
Gordon Mathieson
*Professor, Neuropsychology* ..... Brenda Milner
*Lecturer, Neuropsychology* ..... Laughlin Taylor
*Lecturer, Clinical Psychology* ..... Clara Strauss
*Associate Professor, Neuroanatomy* ..... Donald G. Lawrence
*Assistant Professor, Neuroanatomy* ..... Allan Morton
*Lecturer, Neuroanatomy* ..... Charles Olanow
*Lecturer, Neuro-ophthalmology* ..... Brian R. Younge
*Assistant Professor, Neuro-endocrinology* ... Paul Brazeau

*Representative to the Council of the Faculty of Graduate Studies and Research*

Professor Pierre Gloor

## EXECUTIVE COMMITTEE OF THE MONTREAL NEUROLOGICAL INSTITUTE

William Feindel, M.D., *Chairman*

Gilles Bertrand, M.D.
Roméo Éthier, M.D.
Pierre Gloor, M.D.
Francis McNaughton, M.D.
Gordon Mathieson, M.D.
Preston Robb, M.D.
Leonhard Wolfe, M.D.
Mrs. Joy M. Shannon, *Secretary*

## EXECUTIVE STAFF OF THE MONTREAL NEUROLOGICAL INSTITUTE

*Director* ..... William Feindel, M.D.
*Assistant Director (Administrative)* ..... Mrs. Joy M. Shannon
*Assistant Director (Education)* ..... Preston Robb, M.D.
*Assistant Director (Research)* ..... Pierre Gloor, M.D.
*Executive Secretary* ..... Mrs. Sophie Malecka

*Bottom Row: Drs. C. Dila, R. Gilbert, H. Pappius, F. McNaughton, P. Gloor, A. Elvidge, W. Penfield, Professor Ragnar Granit (Hughlings Jackson Lecturer), Principal Dr. R. Bell, Dr. W. Feindel, Mrs. J. Shannon, Mr. S.M. Finlayson, Drs. D. Tower, T. Rasmussen, B. Milner, Miss C. Robertson, Dr. P. Robb.*

*Second Row: Miss G. Jaccarino, Drs. I. Woods, M. Aubé, I. Heller, B, Younge, J. Cosgrove, B. Graham, Mrs. M. Bernard, Dr. F. Andermann, Miss K. MacDonald, Drs. G. Mathieson, G. Karpati, L. Wolfe, Mr. G. Thomas, Dr. A. Elliott.*

*Third Row: Dr. E. Andermann, Mrs. M. Boski, Drs. E. Kuchner, J. Rubin, S. Gauthier, I. Yamamoto, J. Barnes. S. Carpenter, M. Danon, Miss S. Colby, Mr. S. Sohal, Drs. A. Sherwin, S. Prelevic, H. Zumstein. I. Quesney, R. Hansebout.*

*Fourth Row: Miss L. Dansky, Miss M. Jones, Drs. Ng Ying Kin, A. Trottier, J. Musgrave, A. Drake, N. Schaul, Mr. G. Ball, Drs. L.-H. Lebrun, M. Kinosian, B. Rosenblatt, L. Terry, D. Schomer, L. Foote, Mr. J. Gotman.*

*Fifth Row: Drs. A. Ginde, R. Branan, Mr. G. Leonard, Mr. C. Thompson, Drs. J. St. John, T. Hardy, J. Martinez-Leyva, P. Murray, B. Zumstein, J. Allan, P. Bedard, J. Wasserman, A. Bellavance, K. Laxer, I, Leppik, H. Blume.*

*Back Row: Mrs. V. Collymore, Mrs. A. Yu, Mrs. E. Domingo, Mrs. M. Edayangilil, Miss M. Everett, Mr. H. Parkinson, Miss G. Hart, Miss E. Roll, Mr. C. Aifantis, Mr. H. Romeo, Mr. B. Yule, Miss F. Cabugnason.*

*Third Row: Mrs. M. Wallace, Mr. L. Karabatsos, Miss S. Persaud, Mrs. G. Griffith, Miss M. Small-Holder, Miss J. Davis, Miss E. Barrowman, Miss A. Gauvreau, Mrs. G. Gyarmati, Miss M. Stewart, Miss J. Hutchinson.*

*Second Row: Miss P. Kerr, Mrs. G. Beauchamp, Miss W. Hawkins, Miss P. Van Der Heide, Miss L. Dalicandro, Mrs. N. Inoue, Mrs. R. Belgrave, Mrs. C. Aifantis, Mrs. V. Scott, Mrs. C. Belgrave, Mrs. O. Yacovitch, Miss N. McCuire, Miss B. Tugade.*

*Front Row: Miss M. Songcharoen, Mrs. M. Chance, Mrs. L. Gorman, Mrs. J. Mallory, Miss H. Kryk, Miss C. Robertson, Miss I. MacMillan, Miss D. MacDonald, Miss A. Shepherd, Miss A. Carney, Miss M. Levesque.*

# Neurology

DR. PRESTON ROBB

The report today relates to the problems of neurology in the four teaching hospitals of McGill, and to research and patient care at the Montreal Neurological Institute and Hospital.

*Clinical Services*

There were 1,134 patients admitted to the neurology services. As the presenting problem varies, so the result varies. Some patients leave happy, relieved of pain, with their illness arrested or cured. Others leave no better, but with an understanding of their illness and a knowledge that help is available when needed. Others go home to face an incurable illness. Others stay. Hopefully, all have been treated with kindness. The demands for diagnosis and treatment of neurological disorders continue to increase. This is being met partly by the investigation of more patients in the O.P.D. clinics of the R.V.H. or in the private offices of the M.N.H. We need our own diagnostic centre with increased facilities particularly for E.E.G., X-rays and CT scan.

There were 2,805 visits to the neurological outpatient clinics in the Royal Victoria Hospital where we now operate nine half-day clinics a week, each staffed by one or two neurologists and a resident. These include the clinics for multiple sclerosis and muscle disorders. At the weekly epilepsy clinic, several neurologists and five residents or fellows saw 1,391 patients. We are grateful to Doctors Venecek, Lechter, Remillard and Sheremata for helping with these clinics. We welcomed back Dr. Mary Jane Kinosian as neurology resident at the Royal Victoria Hospital and who has been invaluable also in the extremely busy emergency clinic. It is a particular pleasure to welcome Dr. Michel Aubé to the staff; one of our outstanding residents, he won the Penfield Award. With a special interest in cerebrovascular disease, he will strengthen and widen the scope of our work.

*Teaching*

Although we are still not satisfied, there has been a broadening at all levels in the teaching of neurology. We congratulate the Curriculum Committee for the improved allotment and the general coordination from the basic neurosciences to the bedside. We are particularly indebted to Dr. Donald Lawrence for his leadership. If they learn their lessons well, students leaving McGill should understand common disorders of the nervous system and move forward with neurology as it develops. Dr. Lawrence's course is followed by the introduction to clinical medicine given in all hospitals. The weekly bedside clinics in third year continue to be popular. A most gratifying aspect has been the elective students who came not only from McGill, but from across

Canada, the United States and the United Kingdom. With few exceptions they have been outstanding.

The four hospitals — the Montreal General Hospital, the Montreal Children's Hospital, the Jewish General Hospital and the Montreal Neurological Hospital — provide learning experience for our resident trainees. We have been fortunate with the high quality of residents and are grateful for their help. New directives from the Government of Quebec cause us grave concern. The Montreal Neurological Institute was founded partly by generous donations from the Rockefeller Foundation. We have received financial support from private American citizens and in the past we have had a training grant from the United States Government. Our program has always had American trainees. Canadians in turn have trained in the United States. The McGill Program has also trained neurologists and neurosurgeons from around the world. The contribution to world medicine has been considerable. We are now told that we can take on only 15% non-Canadian graduates. We understand the reason for this regulation but, at least in our case, we question the wisdom of it. If the influx of doctors into this country is to be controlled, it should be done by the Immigration Department and not at the level of a Residency Training Program.

Last year, cooperating with the McGill Centre for Continuing Medical Education, members of the staff of the Montreal General Hospital and the Montreal Neurological Hospital presented a series of lectures to residents and medical practitioners which was very well attended.

At the meeting of the American Academy of Neurology in Miami, I was warmed not only by the solar rays but by an inner glow of satisfaction as I listened to the papers presented by the McGill group. We have reason to be proud of the work of the team at the Montreal General Hospital led by Dr. Baxter, and the excellent work at this Institute. Our graduate students, residents and staff neurologists presented papers of fundamental importance in understanding the nervous system. The neuromuscular, neurophysiology, and neuro-immunology groups constitute well-rounded teams of physician-scientists. Having talked to others practising away from medical centres, I appreciate even more the importance of combining teaching and research with patient care.

We have many reasons to be grateful, those of us who are privileged to work here. There is a spirit of friendship and open interchange of ideas that make work a pleasure. We also have many reasons to be thankful to the nurses, secretaries, and indeed to all the members of staff who contribute to make this place what it is.

At the same time, we must not be complacent. We are very concerned about the slow progress of the long-needed addition. It has been a year of frustration over unnecessary bureaucracy. But it has been a year in which real progress has been made and to all who contributed to this, I would express my most sincere thanks.

# Neurosurgery

DR. GILLES BERTRAND

*Services*

Each year we anxiously await the computation of our operating room statistics by the supervisor since they are, in a sense, a measure of the health of the department. The calendar year 1974 has seen a healthy increase in our surgical activity of more than 10% over last year with 782 theatre cases, 651 of which were major operations. There was a 12% rise in the number (264) of major craniotomies, a figure which has rarely been exceeded since the beginning of the Institute. This is partly accounted for by an increased number of brain tumours and by a rise in the number of operations for the treatment of epilepsy and for pituitary tumours. The number of procedures carried out to remove herniated lumbar discs has continued to decline but the number of cervical discs has remained relatively high and there were more operations for complicated back and neck problems which necessitate a great deal of time and effort to investigate and treat.

The gradual change in the pattern of our activities no doubt reflects competition by other neurosurgical teams and by orthopaedists, and emphasizes the role of this Institute as a referral centre for special problems and sometimes as a place of last resort.

It is remarkable that the increase in the operating room workload has been possible in spite of a shortage of operating room nurses which now seems to have become a chronic condition and is widespread in other hospitals. The demands on Miss Norma Isaacs and her team have been enormous and we are all extremely grateful to them for their devotion and patience.

This year the infection rate was 0.9%, a slight increase over last year and the Infection Committee, under Dr. Robert Hansebout, has introduced more effective methods of reporting even suspected infections in an effort to determine the reasons for the increase and to better control these infections.

*Neurosurgical staff activities:*

Doctor Wilder Penfield was awarded the Johns Hopkins Alumni Association Heritage Award at the Johns Hopkins Alumni Banquet on November 8, 1974. The Award was presented by Dr. Lloyd Stevenson. Doctor Penfield also became an Honorary Member of the International Society of Neuropathology. In Milwaukee, Wisconsin, the Via Marsi Montessori School for Exceptional Children was renamed The Penfield Children's Center.

Doctor Theodore Rasmussen was visiting professor at the U.S. Naval Medical Center and the Washington Academy of Neurological Surgeons. He was the Dallas Phemister Lecturer at the University of Chi-

cago and gave the Charles Elsberg Memorial Lecture at the New York Society of Neurosurgery. He became president-elect of the Eastern Association of Electroencephalographers. He continues to be a member of the American Board of Neurological Surgery, and consultant to the Neural Sensory Prosthesis Committee, and to the Advisory Committee on Epilepsy of the N.I.N.D.S. in Bethesda.

Doctor William Feindel was elected President of the Medico-Chirurgical Society of Montreal. He is a member of the Organizational Committee for neurosciences of the World Health Organization in Geneva. He became president-elect of the American Academy of Neurological Surgeons. He is a member of the Conseil de la Politique Scientifique du Québec.

Doctor Robert Hansebout is a member of the Committee on Implants of the Canadian Standards Association and is Vice-President of the Association of Neurosurgeons of the Province of Quebec.

Doctor Davy Trop was elected to the Council of l'Association des Anesthésistes de la Province de Québec.

Doctor Gilles Bertrand was a guest speaker to the Neuroscience Institute of the University of Toronto in October 1974, and became Chairman of the combined Operating Room and Intensive Care Unit Committee.

*Research activities:*

All the members of the neurosurgical staff continue to be involved in a number of research projects, most of which are long term and have been mentioned before. Dr. Rasmussen is pursuing his studies on epilepsy and functional cortical localization, Dr. Feindel continues his work on cerebral circulation and, with Dr. Ethier and other members of the radiology team, the evaluation of the E.M.I. scanner.

Doctor Hansebout is studying the effect of steroids and cooling on cord injury and is actively involved in a cooperative study of pain problems with the help of our department of Anaesthesia, more specifically Dr. Catchlove, and also with Dr. Alec Ramsay of the Department of Psychiatry.

Cerebrovascular response to brain injury, and intracranial pressure monitoring in neurosurgical patients, are being analyzed by Dr. Dila who also continues his work on carotid amytal testing for speech and memory with Dr. Milner and her team.

In the Stereotaxic Laboratory, Mr. Richard Smith has just completed a beautiful histochemical atlas of the monkey brain, under Dr. Olivier's guidance. Dr. Olivier is also perfecting his methods of investigation of certain forms of epilepsy with chronically implanted electrodes and "stereoelectroencephalography". In the same laboratory, under Dr. Bertrand's direction, major improvements have been made to computerized stereotaxic brain mapping programs by Mr. Chris Thompson with the help of Mr. Dubuisson, Dr. Tyrone Hardy is mak-

ing full use of these maps in analysis of the physiological data collected during stereotaxic operations by Doctors Jasper and Bertrand.

In all the purely clinical activities and in many of the research projects, the role played by our resident staff has been paramount: to quote a verse from a famous M.N.I. song:

"For the doctors in white are the ones patients see
In the Ivory tower of Neurology"

I should like to praise their competence and judgment and to thank them all, particularly the senior residents, Dr. Alan Drake, Dr. John Musgrave and the chief resident, Dr. Mike Dogali and later Dr. Arun Ginde, for their devotion in shouldering the responsibilities of their services. I wish them all the best of luck in their careers.

# Graduate Studies and Research

P. GLOOR, M.D., Ph.D.

During the past year, there was a prevalent feeling that research was being performed under a cloud: there were forebodings of diminishing governmental support for research, worry that this problem would be compounded by escalating costs caused by inflation, and concern about the long-term future of medical research, for it is a common belief that recent graduates from medical school show little inclination to follow research careers.

To what extent has this rather pessimistic climate influenced our research activities and to what extent do these fears, after having lived with them for a while, appear justified? The answers to these questions are partially, but not wholly reassuring.

At this Institute, and within the broader context of the Department of Neurology and Neurosurgery, a number of areas of importance and excellence in neurological research have maintained their traditional strength over the past year, thanks to the enthusiasm and dedication of our research staff. Clinical and fundamental research in the field of epilepsy has been vigorous and has led to encouraging advances. We have in this Institute unique opportunities in the field of epilepsy research, since we can pool the resources and the expertise of neurologists, neurosurgeons, neuropharmacologists, neurophysiologists, neuropathologists, neurochemists and biomedical engineers, all of whom are closely collaborating in the investigation of the causes, mechanisms and treatment of convulsive disorders. Special mention should be made of Dr. Mathieson's renewed interest in the neuropathology of epileptogenic lesions, of Dr. Sherwin's increasingly precise measurement and understanding of the distribution and metabolism of anticonvulsant drugs, and of Mr. Ives' highly inventive applications

of biomedical engineering techniques to the investigation of complex seizure problems. At the more fundamental level, our experimental work in the Laboratory of Neurophysiology has advanced our knowledge of the neurophysiological mechanisms of generalized seizures, particularly with regard to the interaction of thalamic and cortical structures.

Research on the cerebral circulation and its disturbances in a variety of pathological states, which is being carried out in the Cone Laboratories of Neurological Research by Dr. Feindel, Dr. Yamamoto and their collaborators, has led to important advances in our understanding of the changes in microcirculation which occur with vascular occlusion, in relation to cerebral edema and during prostaglandin-induced vasospasm. Closely related work, carried out by Dr. Wolfe and his collaborators in the Neurochemistry laboratories, has clarified the synthesis and release of prostaglandins from normal and injured brain tissue. These studies have furthered our knowledge of the patho-physiology of many clinical conditions, particularly that of strokes. Lively interest in the repercussions exerted by a brain lesion upon the functional integrity of the brain is shared by Dr. Gloor and his collaborators in the Neurophysiology Laboratory, and by Dr. Pappius in the Neurochemistry laboratories, who are engaged in a study of the relationship between steroid hormones, cerebral edema and neuronal function.

The work carried out in the Cone Laboratories, complemented by these ancillary studies in Neurochemistry and Neurophysiology, provides an excellent scientific base for setting up a clinical research unit on strokes and cerebrovascular disease, a plan which our Director is now developing.

Our Neurochemistry Laboratories have contributed significantly to other aspects of neurological research. In collaboration with Drs. Frederick and Eva Andermann, Dr. Wolfe has identified a new form of juvenile Tay-Sachs disease in Lebanese families and was able to characterize it biochemically.

Study of neuromuscular disorders is another area in which concentrated efforts have been made. Electro-physiological techniques, histochemical methods, electron microscopy and clinical studies have been used in these investigations. Two teams within the Department of Neurology and Neurosurgery are in friendly competition in this area, one based here at the Montreal Neurological Institute, made up of Drs. Karpati, Eisen and Carpenter, whose recent interest was mostly directed towards understanding the pathogenesis of myopathies, and the other at the Montreal General Hospital where Drs. Aguayo, Bray and Rasminsky have continued their studies on peripheral nerve development and peripheral nerve physiology.

Dr. Brenda Milner and her collaborators in the Neuropsychology Department continue to develop refined techniques of analysis of cognitive function in man, particularly with regard to the specialized functions of the right and the left hippocampus in memory. This work

is of very great theoretical interest and is very important for our clinical work, especially in relation to the neurosurgical management of epileptic patients.

In reviewing the areas of excellence in research within the Department of Neurology and Neurosurgery of McGill University, the very exciting work in neuroendocrinology carried out by Drs. Martin, Renaud and Brazeau at the Montreal General Hospital should be mentioned. Their integration of fundamental techniques in endocrinology and electrophysiology is quite unique and full of promise. Their work on the neuronal mechanism of anterior pituitary control, and on a possibly more widespread role of hypothalamic releasing factors in cerebral function outside the hypothalamo-hypophyseal axis, is a most exciting development.

The expertise which our team of Biomedical and Computer Engineers have provided, in the investigation of epilepsy, stereotaxic surgery, blood flow measurement and EEG analysis, should also receive well-deserved recognition.

The above list of our research activities is by no means exhaustive, but should suffice to indicate the continued vigour and health of our research activities.

In reviewing these activities, it becomes evident that it is no longer meaningful to make a sharp distinction between clinical and fundamental research. As our understanding of disease processes increases, and as basic research techniques become more refined, the application of fundamental scientific methods to the investigation of clinical problems becomes more feasible and of ever increasing importance. To develop the necessary "feel" for this type of research, however, an investigator must not only be well trained in basic research techniques, but he must also have firsthand experience in clinical medicine. The need for medically trained manpower in research has never been greater and yet it seems to be increasingly difficult to attract young M.D.s into medical research. This is in part due to present day economic realities and to medical and research politics. It is difficult for a young M.D. to develop and sustain a budding interest in a research career if, from the early days of his training in the laboratory, the financial rewards are and remain consistently lower than those which he could expect if he were to pursue a purely clinical career. Added to this is the anxiety generated by the uncertainty whether a steady level of support for research can be expected from governmental sources. This problem of insecurity, both of personnel and of project support, is a continuing source of concern, even though there have been some signs that the Federal Government has realized that its recent level of support for medical research has been less than adequate in the light of present inflationary trends. The small steps it has undertaken to rectify some of the worst defects of this situation, however, are still insufficient to install within the research community the necessary feeling of confidence in the future required to sustain effective re-

search efforts on a longterm basis. Fortunately, the Medical Research Council of Canada is aware of the necessity for stimulating M.D.s to go into medical research careers and we may hope that it will be successful in convincing the Federal Government to channel enough money into the support of research trainees and of established research workers to assure them a level of income commensurate with their professional qualifications and with their important contributions to the community.

Like everyone else, we have been hard hit by inflation. Research costs have increased alarmingly. Some of the costs for supplies of research material underwent an increase of over 100% over a two year period; salaries must be kept adjusted to the increased cost of living; all this takes an ever larger bite out of our research budget, fed in part by MRC grants, but also to a considerable degree by our endowment funds. The perennial problem of insufficient research space in our Institute is still unsolved.

Post graduate training in the neurosciences is closely related to our research activities. The purpose of our postgraduate training program is to train physician-scientists and scientific workers in neurobiological disciplines closely connected to Clinical Neurology and Neurosurgery, to provide clinically relevant basic science information to our residents in training, and to provide such information also to physicians in practice as part of a large program in continuing medical education. Our research staff has been generous in providing such instruction both at formal and informal levels, at our rounds in the Neurosciences Seminars, at lecture series organized by the Centre for Continuing Medical Education of McGill University, and within the program set up by the Postgraduate Board of the Royal Victoria Hospital.

Our Department provides postgraduate training, within the Faculty of Graduate Studies and Research of McGill University, leading to the award of the M.Sc. or Ph.D. degree. At present there are 14 graduate students enrolled in this program, the highest number we have ever had. Traditionally our students have been recruited among M.D.s training in Neurology and Neurosurgery. Lately this trend has undergone some change. Presently only half of our graduate students are M.D.s. The others have various backgrounds in the natural sciences and often have enrolled as graduate students after having worked in one of our laboratories as scientific or technical collaborators. Graduate training in clinically oriented neurosciences raises problems when the recipient of this training is not himself an M.D.; thus we must be selective in accepting non-M.D.s into our graduate studies program. In many of the paraclinical disciplines of the neurosciences, however, there is a need for highly competent workers who should receive basic science training in areas closely related to clinical medicine. Our graduate program, we feel, fulfills this need.

# Administration

MRS. JOY M. SHANNON

Others will report on the scientific, financial and technical aspects of our operations, yet so many things that are worth mentioning happen from day to day and directly or indirectly affect the well-being of our patients.

When I began to think about my report, I couldn't entirely disassociate my thoughts from budgets, monthly statements and statistics. So I started to list assets as those things which have taken place that benefit the patients and staff, and liabilities as those things which we have not been able to accomplish or those things which have had or may have a negative effect on our hospital.

On the asset side of our balance sheet, we are pleased that the addition and renovations to the old building are finally complete. We now have a large, airy lounge for our nurses and other members of the female staff. Stores are able to function more efficiently in their new quarters and the staff and patients in Brain Scan are almost luxuriously housed. In addition, we have gained a pleasant sun roof for our staff and patients.

We are grateful for the continued support of the Women's Auxiliary of the Royal Victoria Hospital and the Neurological Hospital in both time and money, Mrs. Cheesebrough and Mrs. Boone making our Coffee Shop more attractive and to upgrading the quality and variety of food. We note another plus item — the wives of our Fellows donated the results of their very successful Book and Bake Sale to buy special wheel chair accessories.

The French Courses for the staff have been successful. Close to 100 employees from all departments are involved in the courses, ably conducted by mesdemoiselles Albessard and Dayan. We hope that these courses, which are subsidized by the hospital will continue next Fall.

In our Dietary Department, the purchase of meals from the Royal Victoria Hospital imposes limitations but, the capable and imaginative supervision of our dietician, Mrs. Podgurny, overcomes many of these. We are also planning to provide our patients with bilingual menus from our own printing shop.

The Hospital and Institute Library is an attractive quiet corner housing a fine collection. We appreciate Mrs. Boski and her assistant for their efficient and courteous services.

We are gradually re-decorating the wards and rooms and our patients are now cared for in freshly painted, cheerful areas. The hospital is clean. This should be taken for granted. But with the small staff allowed by our global budget, the results are impressive. A recent visitor stopped at my door and made one comment — "This is the cleanest hospital I have ever seen". This was gratifying to me and

certainly to Mr. Rochette who coordinates innumerable urgent demands each day, as well as routine services.

In the main floor corridor the excellent photographic work in the displays indicate the talent of Mr. Neil Robbins which is much appreciated as is his good-natured response to many requests at impossible deadlines.

On our balance sheet — what about liabilities? One is our inability to convince the Department of Social Affairs that we need more nurses for our specialized and demanding type of care.

We are concerned with the amount of time required for the ever-increasing demands from Quebec to provide information and statistics. We are even more concerned with directives which tend to force all hospitals into one mould. We must firmly resist this since excellent medical care cannot be dictated. It results from a sense of responsibility, initiative and imagination; qualities which are not in short supply in our hospital, nor indeed in any McGill Teaching Hospital.

Another liability item is the time involved in dealing with union problems, grievances and arbitration. It is certainly the responsibility of administration to provide staff with congenial working conditions and adequate, competitive salaries. There should be time, however, for some creative thinking; time to plan and initiate better ways of doing things and of utilizing resources more effectively. Only in this way can the quality of patient care be improved.

Nevertheless, to return to the asset side of this particular balance sheet and to end on an optimistic note, I believe we do show a surplus. Our Professionals' Advisory Council, which is now known as the Clinical Staff Advisory Council, have worked hard during the year. Their constructive suggestions have improved communications within the hospital. Thanks to the efforts of Mrs. Rose Slapack, an in-house newsletter is also helping to bring about a closer relationship between departments for understanding of mutual problems. Last fall we had a birthday party to celebrate the Fortieth Anniversary of the founding of the Institute and Hospital. It must have been a source of satisfaction to our Founder and first Director, Dr. Wilder Penfield, to contemplate forty years of service locally, nationally and internationally, combined with forty years of scientific achievement.

During the past year 18 young men and women from McGill University volunteered to come to the hospital in teams of two every weekday afternoon. Their youth, enthusiasm and good humour brought a bit of the normal outside world and a great deal of pleasure to our patients.

We were happy indeed to welcome back Miss Caroline Robertson as Director of Nurses. In a few short months she has solved many problems. She heads a dedicated group of whom we are immensely proud.

There are so many to whom I would like to pay tribute, for in the final analysis Hospitals are People. The most modern, well-equipped

building is useless without the efforts of the men and women who work in them.

I received a letter recently from Mauritius, that small country which was only a strange name to most of us until Expo '67. The letter was a real day-brightener and expresses my own feelings so well that I am going to quote from it:

"Dear Matron:

> I am a very good boy coming from a very noble family in my village. I am sure that you will think why I have written this letter at thirteen — it is because I want to be a doctor in your hospital if you will give me work like a doctor I will come to you whenever you like and I will not forget you even at my last breath of my life
>
> your obedient servant."

I too, will not forget you all and "even at the last breath of my life" I will be grateful for the opportunity of playing a role in this great hospital.

# Financial Report

MR. GEOFFREY F. THOMAS

A basic premise of the Ministry of Social Affairs is that hospitals are required to operate within an approved budget based on a percentage increase over the previous year. Year-end settlements are no longer being made. Fortunately, the Ministry has recognized the effects of inflation and other changing circumstances that have affected hospital operations since global budgeting was introduced in 1971.

I am happy now to report that 1974 was a very good year. Total operating expenditures came to $6,739,510, an increase of 19% over 1973, but 0.8% below the approved budget. Total income amounted to $6,956,526, an increase of 29.6% over 1973 and 2.4% over the approved budget. The net result is that the hospital has recorded its first operating surplus, amounting to $127,016, a remarkable feat in this inflationary period. The detailed financial statement will be found at the end of this Annual Report.

Arising from this favourable performance, the hospital now has an accumulated capital of $141,518, compared with an accumulated deficit of $563,031 in 1973. The hospital owes McGill University $67,383 for advances to cover previous years' deficits. But this amount has been reduced because the Ministry of Social Affairs, on the request of the Board of Directors, granted $52,566 to help reduce this long term debt.

In 1974, 2,211 patients were admitted and received 45,037 days

of care; and 2,212 patients were discharged with an average length of stay of 20.5 days. These statistics highlight again the continuing need for alternate facilities to care for patients no longer needing highly specialized care.

The recent announcement by the Minister of National Health and Welfare that the "Federal Government accepted in principle extending federal support to some health services beyond those covered at present" should be heartening news. It is well recognized that the key to reducing spiralling hospital costs is for the Federal Government to provide financial assistance for alternate and less costly health care. It does appear that cost-sharing offers the best protection for the provinces and the population, while satisfying the three paramount criteria of accessibility, universality and portability.

Several committees in various provinces have studied health care. There appears to be a consensus that the major need is for coordination, with less emphasis on the acute care sector and more on mental illness and tuberculosis which have been largely excluded from benefits of cost-sharing programs. Nursing home and ambulatory care are other areas needing recognition, so that a better balance of delivery of care and improvement of costs can be achieved.

In conclusion, I would like to thank the Board of Directors and the entire staff of this hospital for their support over the year. I look forward with confidence to the future.

# Department of Nursing

MISS CAROLINE ROBERTSON

In 1974 Quebec nurses have concerned themselves with the fulfillment of their truly unique functions, for we are the first nurses in the world to obtain in the Nursing Act, a legal definition of our roles. Therefore, "identification of health needs", "promotion of health", and "prevention of illness" are included in our responsibilities.

At the "Neuro", the nursing staff have undertaken to further assess patients on admission, and for most of the patients we now obtain a Nursing History. Upon this history, as well as medical orders, nursing care is planned. The nurses here are increasing their ability to follow through this plan in practice for more individualized and effective nursing.

It is one criterion for evaluation of an administrator that she may be absent for a period of time, and the work continues. Miss Joy Hackwell, the Director of Nursing, is such an administrator. Although she resigned on September 13th, 1974, to study further in the Master of Science Applied program at McGill University, Miss MacMillan, Miss

Barrowman, Miss Kryk, the Supervisors, Coordinators and Head Nurses continued to manage nursing care here effectively.

The turnover of full-time nurses increased in 1974 to 43 per cent. This restlessness and the resulting problems in recruitment, orientation and learning of neurological and neurosurgical procedures means that the stable staff continually bear an increasing load of helping others to perform. To all the nursing staff, I wish to say thank you for being here. To those of you who have continued to remain at the Neuro over the years, I wish to extend my warmest and grateful respect. You *are* the salt of the earth.

The following are some of the highlights of the year 1974.

The Study on Classification of Patients, on three units during the year, demonstrates that on the average 17% of our patient care days are ambulatory care, 43% are intermediate care, and 40% are high care. This can be compared with the study in three general hospitals, which shows 20-30% ambulatory care, 29-55% intermediate care, and only 12-24% high care. This comes as no surprise to the nurses who are giving the care, but does demonstrate the extra staff we need above a general hospital. We wish to refine this study to demonstrate the difference, if any, between neurological and neurosurgical patients.

The "Neuro" post-graduate course up to now has graduated 961 students from 36 countries. The value of this post-basic nursing course is equally important to the learners and the hospital personnel. The extensive theoretical background and the learning situation allow students to identify and to follow some aspects of nursing care which can be studied in depth and solved in different ways. With the variety of nursing backgrounds, their ideas create a forum for exchange. We have the benefit of the views, trends, and methods practiced in other centres of the world.

This year 57 students from the John Abbott C.E.G.E.P. were added to the student groups from Dawson College (108), McGill University (44), Valleyfield (48) and the University of Toronto (2). They all learn the nursing of high care patients with us. Many also return to nurse here for salary in the summer and thereby gain valuable experience in learning to set priorities for patient care and how a hospital functions. Although their learning times are staggered, we have only one nurse to coordinate these programs as well as our staff Inservice and Education program. There is increasing need for orientation of teachers and a sad lack of conference and library space.

We are proud to have a nurse contributing to the deliberations of the Board of Directors.

Mrs. Linda Robbins was awarded a bursary from the Eilen C. Flanagan fund and Miss Geraldine Fitzgerald and Miss Pearl Golding were awarded Provincial Committee on Improvement bursaries.

To the medical staff who have assisted us, through their teaching sessions and their liaison on the Nursing Committee, to find solutions for nursing and hospital problems, we give a special vote of thanks.

To all the other departments who assist in making a hospital function so that effective care is possible, our particular gratitude is expressed. When a non-nursing function is taken over from us, we are able to spend a little more time on nursing.

The Women's Auxiliary has given our department $1,000.00, and their generosity is truly welcome. Visual self-learning aids are being purchased.

The volunteer program initiated by Mrs. Shannon has brightened the patients' days considerably.

We adopted the metric system in 1974.

Because I am a new staff member, it is possible for me to state objectively that 1974 was fascinating in its challenge to apply the Nursing Act, that fortitude was needed to overcome the problems of turnover, and that faith in each other's ability to perform together as a group will assist us in providing effective care in 1975.

# Social Service

*Director* ..... Miss Cynthia Griffin, B.A., M.S.W., P.S.W.

*Social Workers:*

Miss Ann Chant, B.A., M.S.W., P.S.W.
Mrs. Saroj Gupta, B.A., M.S.W., P.S.W.
Mrs. Irena Liebich, B.A., M.S.W., P.S.W.
Miss Kathleen Macdonald, B.A., B.S.W., P.S.W.
Miss Noella Vaillancourt, B.A., M.S.S.

Chapter 48 of the 1971 Statutes of Quebec has continued to colour our thinking, planning, expectations, and fears, as we struggle with the problems and growing pains of our new dual allegiance. Officially, the social workers of our department are now part of the Hospital Division of the Ville Marie Social Service Centre (VMSSC) with which 15 of the hospitals of the English sector are affiliated; however, in accordance with the Contract of Service signed by representatives of the hospital and of social service centre, we shall continue to work *in* the hospital with the same multi-discipline hospital staff and with the same patient population. Financially, we are responsible in two directions: (1) to the social service centre for social workers' salaries and benefits and for expenses such as staff development and staff transportation; (2) to the hospital centre for secretarial staff, office space, equipment and operating expenses.

As we have observed VMSSC gradually taking shape, one of our chief concerns has been that it would evolve into a monolithic, bureaucratic structure which would set priorities and develop programs and policies without consultation with those in the field. In an effort to ensure that appropriate social services will be available for patients

in the future, and to provide input into the social service centre at all stages of planning, members of our staff have been participating actively on task forces, committees, study days, and workshops; this must continue, even though releasing workers for such activities creates dilemmas. Certain tasks, however, can be delegated and we have come to rely increasingly on our efficient, serene chief secretary, Mrs. Manon Gagnon who, with her assistant, handles with skill and forbearance so many patient and staff demands. We would like to pay special tribute to the V.O.N. and their liaison in our hospital, Mrs. Kathy Douglas. The devoted and conscientious nursing services of the V.O.N. to patients in their homes have enabled many of our chronically-ill and terminally-ill patients to remain in their home environments.

It has been necessary for us to release a staff member for union activities; Miss Noella Vaillancourt has been acting as a Consultant in Labor Relations with the Association of Medical Social Service Workers and also as Vice-president of Le Cartel des Organismes Professionnels de la Santé. She has recently been liberated full-time to negotiate the new contract but, fortunately, VMSSC has been able to provide a temporary replacement.

Yearly statistics show that our out-patient to in-patient ratio is remarkably constant; 1974 was no exception, with twice as many out-patient as in-patient cases. This we judge to be due to the needs of patients with diagnoses such as epilepsy, multiple sclerosis, and brain tumours. For most patients in these groups, the portion of their time as in-patients in this ultra-specialized hospital is short compared with the months, years, or decades during which their related medical, social and psycho-social problems affect their own and their families' lives.

Although we approach the concept of centralized control within the social service centre with caution and concern, we are convinced that in certain areas centralization could have distinct advantages for us in the delivery of service. For example, the appalling scarcity of adequate extended care facilities, particularly for our young and middle-aged chronically-ill patients, has continued unabated. With centralization, we can hope to see the creation of a central pool of resources to which social service staff of all hospitals will have access. The social service centre could also serve as a focal point for joint projects in research, for implementation of a system of uniform and meaningful statistics and for development of staff and student training programs for all social workers throughout the Ville Marie Social Service Centre network.

We acknowledge with great gratitude the contributions of hundreds of hours of service in the clinics by the Royal Victoria Hospital volunteers and generous donations from organizations such as the R.V.H. Women's Auxiliary, the Multiple Sclerosis Association and In His Name Society, to provide for special needs of marginal-income patients.

I wish to express my sincere thanks to Miss Kathleen Macdonald

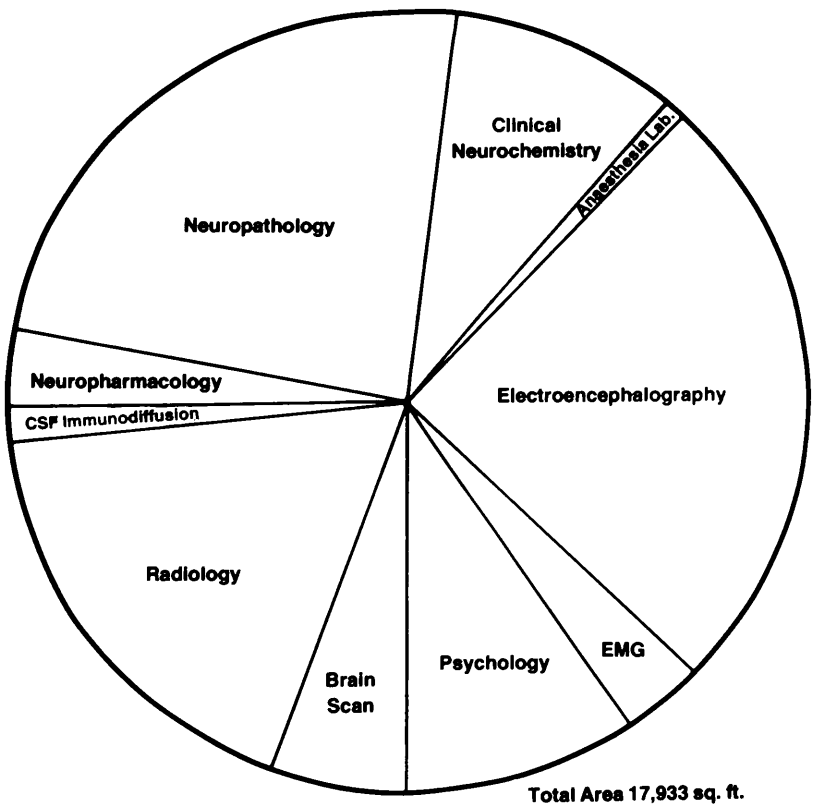
for her unfailing support and willingness to assume additional responsibilities during my absences.

As we look forward to collaboration with multi-discipline staff in the hospital, with our social service centre colleagues and with other community groups, we believe that, in the long run, our dual allegiance should provide better services and resources for our patients.

# Clinical Laboratories & Departments

DR. GORDON MATHIESON

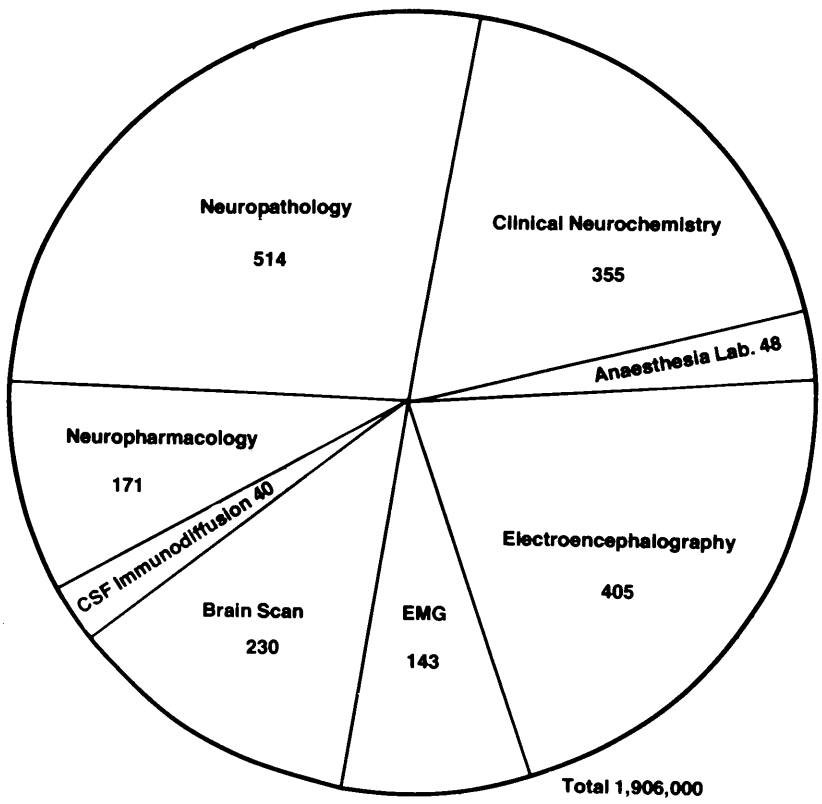
There are just over 133,000 square feet of space in the present building. Of this, about 18,000, or 13.4% of the total space, are occupied by the Clinical Laboratories. These laboratories have the common function of providing information for the diagnosis and treatment of our patients, but they are diverse in respect of methods, size, personnel, complexity of equipment, and cost of operation. The total 18,000 square feet is roughly comparable with the total bed space area of 17,000 square feet. Figure 1 shows the relative space allocation of the laboratories involved. The size of individual laboratories is no measure of their clinical importance. A tiny 210 square feet of floor




**Relative Space Allocation of Clinical Laboratories, 1974**

space houses the Anesthesia Laboratory in which are carried out vital blood gas analyses and electrolyte monitoring, for the most seriously ill patients. On the other hand, laboratories blessed with more space do not luxuriate in idleness.

In 1954, the Canadian Association of Pathologists, in association with the Federal Government, established a system, refined during the ensuing years, to record the productivity of laboratory technicians. This is now enshrined in Statistics Canada's "Schedule of Unit Values for Clinical Laboratory Procedures". We use the short term "technical units". Each unit is estimated to represent one minute of the technologist's working time on any given procedure. Such technical units are applicable to eight of our ten clinical laboratories. The total workload for calender 1974, according to this Schedule, was about 1.9 million technical units. Figure 2 shows the numbers of units (to the nearest thousand) generated by the individual components of our Clinical Laboratory complex. Radiology does not use the Technical Unit System, nor is it applicable to Clinical Psychology. Of the other laboratories, EEG and Neuropathology account for almost half the technical workload. There has been considerable misunderstanding about the implications and limitations of this system although, from the onset, the published Schedule has, in its foreword, insisted that the method was not a cost accounting system. Confusion has also arisen because of the establishment of what are referred to as "Professional Units of Work" in collective agreements between the Syndicate of Laboratory Phy-




Technical Work Units Generated (to nearest thousand), 1974

sicians, and the Government of the Province of Quebec. These have been set up purely for remunerative purposes.

While faithfully reported in our statistical returns, these accumulations of units are an inadequate measure of what we have done in the Clinical Laboratories over the past year. Even though laboratory medicine seems to lend itself to a bastard form of accountancy such a simplistic statement as: "So many tests done at such and such a cost equals so much contributed to medical care", does not fairly estimate the value of service to patients. Moreover modification of the Schedule has not kept pace with the increasing sophistication of procedures carried out, for example, in our EEG Laboratory.

The preparative work of the technologists is interpreted by laboratory physicians and non-medical professional staff. There are 9 of these who may reasonably be called full time, and they are assisted by 15 part time. The latter almost invariably carry a heavy load of direct clinical responsibility.

Some departments have special problems. The avalanche in radiological investigation triggered by computerized axial tomography continues to gather momentum. The psychologists' lack of adequate working space must still be emphasized.

In Neuropathology we are increasingly aware of a decline to 49.5% in our autopsy rate. This is a sensitive matter. A detailed and thoughtful study of cases with a fatal outcome is commonly considered to be one of the hallmarks of a hospital providing first rate medical care. Steps have been taken to rectify this and to raise our rate to or above its previous level of about 80 percent.

The proper forum for assessment of effective patient care is the Committee for the Evaluation of Medical Acts, in which the laboratories are strongly represented, and upon which the relevant hospital law insists a pathologist be a constant member. As the practice of medicine acquires a more and more complex technology, the need for constant two-way communication between bedside and laboratory bench becomes more insistent. The principle involved was enunciated more than forty years ago by our founder. We will not forget it now.

# Neuro-Anaesthesia

*Senior Consultant* ..... R.G.B. Gilbert, M.B., B.S., F.R.C.P.(C)
F.F.A.R.C.S., F.A.C.A., C.S.P.Q.

*Anaesthetist* ..... Davy Trop, M.A., M.D., M.Sc., F.R.C.P. (C)
F.A.C.A., C.S.P.Q.

*Assistant Anaesthetists* ..... Jennifer A. Barnes, M.B., Ch.B., C.S.P.Q.
Richard F.H. Catchlove, M.B., B.S., M.Sc.
F.F.A.R.C.S.
Luis F. Cuadrado, M.D., D.A.B.A., C.S.P.Q.
Mary E. Morris, M.D., F.R.C.P.(C), Ph.D.
C.S.P.Q.

Fellows: 6 mos. on this service:
Q. Haxuan, M.D. (Saigon)
J. Linteau, M.D. (Montreal)
F. Takacs, M.D. (Alberta)

Doctor Richard G.B. Gilbert resigned as Head of the Department on September 1, 1974 and was replaced by Doctor Davy Trop.

The following citation appeared in the minutes of the meeting of the Council of Physicians of October 1974.

"It is my purpose here to record in the minutes of this Council a note of appreciation for the contributions and leadership that Doctor Richard G.B. Gilbert has made to this Hospital and Institute. In 1950, he joined the staff of the hospital as Associate Anaesthetist after distinguished service in the R.A.M.C. and as Chief Anaesthetist of the Reddy Memorial Hospital. In 1955, he became anaesthetist to the hospital and in 1957, he was appointed Associate Professor and Chairman of the Department of Anaesthesia at McGill University. In 1964, he was made Professor and until 1970, he continued as Head of the Department of Anaesthesia at McGill University. He spent a year during 1970-1971 on sabbatical leave at the University of Montpellier and returned as Head of our department of anaesthesia until September 1974.

"Doctor Gilbert has provided outstanding leadership in Anaesthesia, postoperative and respiratory care which has reached a new level of excellence and safety. As a teacher, he is superb. As a host, connoisseur of the fine art of living, and as a friend there is no equal. He has been constantly frustrated by the lack of research facilities but in spite of this, he has been able to develop and introduce new techniques. We are fortunate that he will continue to work with Doctor D. Trop and the team which has so ably supported him during his years."

Doctor Elizabeth Wilkinson resigned in July 1974 to head the department of Neuro-anaesthesia at the Barrow Neurological Institute in Phoenix, Arizona. Doctor Wilkinson joined our department in July 1970 as a Fellow in Anaesthesia. In 1971, she became an Assistant Anaesthetist to the hospital and was appointed an Assistant Professor at McGill University. She demonstrated special interests to the field of medical education and directed a committee on medical education

at the Faculty of Medicine of this university. During the years she spent in the department, she was an invaluable associate. We wish her the best in her future career in the United States.

Doctor Richard F.H. Catchlove joined us early in September. His previous training in the neurophysiological field and his interests in pain have already proven to be of great value to the department.

Provincial policies in the medical field have affected us heavily. For the first time, this hospital was left without a resident in anaesthesia for a period of six months and one can forecast that this situation will return in the future. This has forced us to reconsider many aspects of our clinical practice related to continuous presence in the operating rooms and to the consulting activities we have in the intensive care unit, the wards and the pain centre. Our research activities which were already scanty had to be restricted even more.

Fortunately, we were able to call on a new group of health professionals, namely the anaesthetic technicians. These CEGEP graduates of which we have three, have been of great assistance; without them, it would have been simply impossible to cope with the daily clinical work. They have become so essential that we feel their number should be increased to provide service 16 hours a day, 7 days a week.

The load of administrative work has increased enormously in the last few years making our office facilities inadequate. We have tried, by relocating secretaries and staff, to take advantage of every square foot of space. However, it is obvious that new space should be allocated to this department if it is to remain efficient.

Space limitations are affecting our growing Pain Centre. For a few months it was based in the psychiatric research building of the A.M.I. This proved to be inconvenient so the Centre is sharing space now with the R.V.H. Pain Clinic in the out-patient department of the R.V.H. We hope this will only be a temporary arrangement as we would much prefer to concentrate the two aspects of patient care, consultation and treatment, at the M.N.H. Doctor A. Ramsay has joined the Centre as a permanent consultant and has been of great assistance in planning its future direction.

A liaison between our department and the Rehabilitation Institute was established during the year. Dr. D. Trop has been appointed as a consultant at the Institute where he will see patients with pain and spastic conditions.

During the year 1974, 1484 anaesthetics were given, 657 for surgical procedures and 827 for radiological investigations. This amounted to 5,502 hours. 357 blocks were performed. The inhalation therapy department gave more than 3,000 treatments to patients.

The activities of the anaesthetic laboratory are reported under Clinical Laboratories and Departments.

# Neuroradiology

*Radiologist* ..... Roméo Éthier, B.A., M.D.

*Associate Radiologist* ..... Denis Melançon, B.A., M.D.

*Assistant Radiologist* ..... Garry Bélanger, B.A., M.D.

*Teaching Fellow* ..... Saul Taylor, M.D. (Toronto)

*Fellows:*
Dan Galloway, M.D. (Oklahoma)
Jacques Lesage, M.D. (Montréal)

*Neurosurgery residents:* 4 mos. on this service
Howard Blume, M.D.
Alan Drake, M.D.

*RVH Rotators:* 4 months on this service
A. Albert, M.D.
S. Fam, M.D.
D. Hammond, M.D.
R. Kloiber, M.D.
R. Lisbona, M.D.
R. Patton, M.D.
D. Spring, M.D.

*MGH Rotators:* 4 months on this service
L. Keighan, M.D.
W. Tam, M.D.

*MCH Rotator:* 4 months on this service
J. Bar-Ziv, M.D.

*Observers:*
L. Bilaniuk, M.D.
G.W. Boles, M.D.
W.H. Cooper, M.D.
D. Dochterman, M.D.
A. Frias-Guillot, M.D.
L. Kaseff, M.D.
D'Arcy Lawrence, M.D.
J. Miller, M.D.
M. Molot, M.D.
G. Wortzman, M.D.

*Chief Technician:*
Joan Broadley, D.S.R., R.T.R.

This has been a most productive and frantic year. The output of the department increased by 13% despite a 16% reduction in our pneumograms and a 13% reduction in our angiograms. This is due to the advent of Computed Tomography which has revolutionized the practice of Neurology and which has changed the whole pattern of Neuroradiology. The reduction in special procedures will be greater in the future. However, because of the type of patients referred here, the decrease in number of special procedures will not be as dramatic as in other centres using this new technique.

We had the pleasure of organizing and hosting the first International Symposium on Computed Tomography at the end of May. The meeting, despite a mail strike, was well attended and most successful. The X-ray department was involved in 20 other major meetings during the year. We had a constant flow of visitors and many observers who came to learn about this new approach in the diagnosis of neurological diseases. A research program was established and, with the fine cooperation of Drs. Sherwin and Leppik and Mr. Thompson, we could correlate the blood levels of opaque medium with the enhanced visualization of lesions shown on the EMI scan after the intravenous administration of opaque medium.

We operate the EMI Scanner 12 hours per day but despite this we can no longer cope with the ever-increasing demand. We now have a two-to three-month waiting list and it has become imperative that a second machine be installed soon.

With the help of the department of photography, an exhibit of Computed Tomography and Computed Angio-Tomography was prepared. This won the first prize at the Canadian Association of Radiologists' Annual Meeting and the Bronze Medal at the American Roentgen Ray Society Annual Meeting.

Another record year was achieved; 15,430 examinations were carried out, including 2480 EMI scans. One third of our load comes from out-patients. It becomes apparent that it is impossible to stay within the budget unless we deny patients the right to our services.

This successful year could only be achieved with the remarkable cooperation of the entire staff of the X-ray department and the collaboration of our anaesthetist colleagues.

# Neurochemistry

*Honorary Consultant* ..... K.A.C. Elliott, M.Sc., Ph.D., Sc.D., F.R.S.C.

*Neurochemist and Medical Research Council Associate* ..... Leonhard S. Wolfe, M.Sc., Ph.D., M.D., F.R.C.P.(C)

*Associate Neurochemist* ..... Hanna M. Pappius, M.Sc., Ph.D.

*Assistant Neurochemist, Clinical* ..... Irving H. Heller, M.D., C.M., M.Sc., Ph. D., F.R.C.P. (C)

*Visiting Professor* ..... J. Lindsley Foote, Ph.D.
Western Michigan University

*Fellows:*
N.M.K. Ng Ying Kin, B.Sc., Ph.D., (Wales), Research Fellow.
Jean Marion, B.Sc., Medical Research Council Studentship.

*Head Technician* ..... Mrs. M. Rostworowski

*Technicians, Research*
Mrs. R. Lau
Mr. M. McHugh
Mrs. P. Skelton
Mrs. H. Szylinger

*Clinital*
Mrs. M. Liénard-Boisjoli
Mrs. E. Rossin-Arthiat
Mrs. H. Seni

## DONNER LABORATORY OF EXPERIMENTAL NEUROCHEMISTRY

1. *Neurological Diseases* (Dr. L.S. Wolfe, Dr. Ng Yin Kin and Associates)

Research is continuing on the abnormalities in glycoprotein metabolism in several of the gangliosidoses. The urinary oligosaccharides and glycopeptides have been chemically characterized in 5 patients.

These substances likely originate from erythrocyte stromal glycoproteins as well as from IgE. We are encouraged by recent reports confirming our findings by other research groups. In certain cases of gangliosidoses defects have been observed in the catabolism of specific glycoproteins in addition to glycolipids.

Collaboration with Dr. Eva Andermann and Dr. Frederick Andermann has led to the discovery of two Lebanese families with the juvenile form of Tay Sachs disease. The enzymatic differences from other $G_{M2}$-gangliosidoses is being investigated using radioactively labelled $G_{M2}$-ganglioside as substrate.

Much time has been spent on development of methods and measurement of leukocyte peroxidase activity in cases of non-gangliosidotic cerebro-mascular degeneration (ceroid-lipofuchsinosis). We have failed to confirm a deficiency of this enzymatic activity reported by Armstrong and coworkers. The reasons for this are unclear but what is clear is that the assay is not useful for specific diagnosis or carrier identification at the present time.

2. *Acetylcholine assay* (Dr. J. Lindsley Foote, Dr. Orval Mamer and Dr. L.S. Wolfe)

A gas chromatographic-mass spectrometric method for the specific assay of picomole amounts of acetylcholine has been set up using deuterated acetylcholine as internal standard. Most of the problems have been overcome and collaboration with the Department of Neurophysiology (Dr. Neil Schaul and Dr. P. Gloor) will proceed on the measurement of cortical acetylcholine release after white matter lesions which produce slow wave activity in the EEG.

3. *Studies on brain prostaglandins* (H.M. Pappius, L.S. Wolfe and Associates)

The endogenous biosynthetic capacity for $PGF_{2\alpha}$ and $PGE_2$ of cerebral cortex from rat, cat and human has been studied utilizing gas chromatography-mass fragmentography. $PGF_{2\alpha}$ is the predominant prostaglandin synthesized though quantitative differences between species and brain regions exist. Little catabolic activity was found. Various catecholamines greatly accelerate prostaglandin synthesis. Prostaglandin synthesis in brain is compartmentalized and exogenously added precursor is only minimally converted to prostaglandins.

Preliminary results indicate that biosynthetic capacity of cerebral tissues surrounding areas of trauma is increased. The mechanisms involved are under active investigation.

With Jean Marion extensive investigations of the incorporation of arachidonic acid into brain lipids are in progress. The primary object of these studies is to identify the complex membrane lipid precursors for prostaglandin synthesis *in vivo*.

A study of cerebrospinal fluid levels of $PGF_{2\alpha}$ in normal and neurological conditions has been completed. Levels are increased in seizure

patients, following neurosurgery, and more markedly in meningoencephalitis and stroke.

Collaborative studies with Dr. Yamamoto on a possible role of prostaglandins in the genesis of cerebral vasospasm continues. A new observation that is being followed up is the precipitation of platelet aggregation *in vivo* by infusion of arachidonic acid.

4. *Studies on cerebral edema* (Dr. H.M. Pappius and Associates)

A collaborative project with Dr. N. Schaul is in progress, designed to correlate the effects of steroids and of the diuretic, furosemide, on cerebral edema and on neuronal function as reflected in the EEG. This is an effort to confirm, with more sophisticated techniques and larger groups of animals, the earlier observations of Drs. Pappius and McCann which suggested that the clinically beneficial effects of steroids cannot be adequately explained on the basis of their effect on cerebral edema. The EEG is recorded in unanaesthetized cats before and 24 hours following a freezing lesion and the record is subjected to spectral analysis using the PDP-12 computer. The cats are killed 24 hours after the lesion is made and the extent of edema determined. Both the EEG and the chemical analysis are done without knowing whether the animals have been injected with saline, dexamethasone or furosemide. On the completion of the study it will be possible to establish whether dexamethasone has, in fact, an effect on the EEG abnormalities associated with freezing lesions and, if so, whether this effect correlates with its effect on cerebral edema. Furosemide has been shown experimentally to diminish cerebral edema in cats much more effectively than dexamethasone but is thought to have little clinical effect in patients with brain edema. Thus the results with furosemide-treated cats will help to elucidate to what extent edema actually contributes to the neurological disturbances usually ascribed to it.

Studies with Drs. Hansebout and Kuchner on changes in water and electrolyte content of injured spinal cord and the effect of steroid therapy and cooling on these changes are continuing.

Dr. L.S. Wolfe was M.R.C. Visiting Professor at the University Hospital, University of Western Ontario last May and was the Maitland Baldwin Lecturer at the Department of Neurology, Queen's University in October. Other positions held by Dr. Wolfe this last year were: President, Montreal Physiological Society; Advisory Board, International Congress on Prostaglandins; Member Priorities Selection and Review Committee of the M.R.C.; Council of the International Society for Neurochemistry; Deputy Chief Editor, Journal of Neurochemistry; and Chairman of Symposium on Prostaglandins and the Nervous System at the Vail Conference in Colorado in March. Dr. H.M. Pappius participated at a Symposium on Fluid Environment of the Brain at Bar Harbor in September and lectured in the Neurosciences Program, University of Toronto, in November.

# Electroencephalography and Clinical Neurophysiology

*Consultant* ..... Herbert Jasper, O.C., Ph.D., D.ès Sci., M.D., C.M., F.R.S.C.

*Electroencephalographer and Clinical Neurophysiologist* ..... Pierre Gloor, M.D., Ph.D.

*Associate Electroencephalographer* ..... Frederick Andermann, B.Sc., M.D., F.R.C.P.(C)

*Assistant Electroencephalographers* ..... Eva Andermann, M.D., C.M., M.Sc., Ph.D.
Michel Aubé, B.A., M.D., F.R.C.P.(C) (from Jan. 1, 1975)
Andrew Eisen, M.D., M.R.C.S., L.R.C.P., F.R.C.P.(C) (Until Dec. 31, 1974)
Ivan Woods, M.B., B.Ch., B.A.O., M.Sc. F.R.C.P.(C)

*Biomedical Engineer* ..... John Ives, M.Sc.

*Computer Systems Engineer* ..... Christopher Thompson, M.Sc.

*Assistant Computer Engineer* ..... Jean Gotman, E.S.E., M.E.

*Fellows:* 6 mos. on this service
Michel Aubé, M.D.
Pierre Bourgeau, M.D. (Montréal)
John Musgrave, M.D.
Alberto Rhi-Sausi, M.D. (Nuevo Leon)
Claude Roberge, M.D. (Laval)*
Michel Vanasse, M.D. (Montréal)

*Chief Technician* ..... Mrs. K. Crystal, R.N.

*One year on this service

*Clinical Service Functions*

In 1974, 3,722 examinations were performed in the EEG laboratory, slightly fewer than last year. A little more than half of the patients examined were hospitalized at the MNH. The number of electrocorticograms taken in the operating room during surgical treatment of cerebral seizures was 58, the same number as in the preceding year. Though these numbers seem to indicate that there has been no increase in the workload, this is contradicted by the steady increase in time-consuming and complex procedures. More than 20% of the recordings during the year exceeded a duration of 2 hours. This reflects the diagnostic complexity of the problems investigated in our laboratory, which often require very searching examinations using highly sophisticated techniques. In this respect, our laboratory is quite unique, a feature which is not readily apparent from statistics expressed only in terms of the bare number of recordings or in terms of technical units, especially since the latter make no distinction between a standard EEG recording and much longer and highly specialized EEG examinations which may take several hours or even a whole day.

The workload imposed by these special procedures has, however, been kept within manageable limits by the highly efficient monitoring system using multiplexing and cable telemetry techniques devised by Mr. John Ives, our Biomedical Engineer. This system is connected to our Computer Laboratory, which allows us to store temporarily EEG data derived from 16 channels. On command by a button pressed by either the nurse or the patient the stored EEG can be written out on a standard EEG apparatus with a 2-minute delay thus ensuring for example that the entire duration of an epileptic seizure can be recorded from its start. This system is acceptable to the patient, because it scarcely interferes with his mobility on the ward. It allows one to collect EEG data outside normal working hours, e.g. at night or on weekends, without any personnel in overtime work, and it makes it possible to reduce an otherwise often unwieldy amount of data and to selectively record the most diagnostically useful information, such as seizure discharges. This system has been particularly helpful in the workup of seizure patients considered for neurosurgical treatment, especially in the case of those explored with stereotaxically implanted depth electrodes.

A new technical development also instituted by Mr. Ives has been the introduction of a hair-fine sphenoidal electrode which can safely be left embedded in the tissue at the base of the skull for several days and which allows us to obtain better and repeated sphenoidal electrode recordings with less discomfort and risk to the patient.

These new technical developments, especially that of the cable telemetry monitoring system, have allowed us to provide better diagnoses and to increase the work output of the laboratory without any significant increase in technician time, thus in fact effectively increasing the number of working hours of the equipment without increasing the working hours of personnel. Because these methods were new and experimental, no financial support for these activities was provided from the hospital budget; since they were not covered by the terms of reference of any research grants, no support from any funding agency such as MRC was received either. This work was in fact supported on a shoestring budget derived from our own funds, but we hope that some outside support can be marshalled in the future for transforming our present system which is still merely a prototype into a more permanent system, and for extending and streamlining it.

One major drawback of the present arrangement is that patient monitoring on the computer receives a low priority, because the computer was acquired for research purposes and not for clinical service functions. We hope funds can be found to purchase a small computer to be devoted entirely to clinical EEG work.

*Research Activities*

1) *Computer analysis of clinical electroencephalograms* (J. Gotman, P. Gloor, C. Thompson, J. Ives and D. Skuce)

Our work on computer analysis of the clinical EEG has expanded into the area of interictal epileptogenic abnormalities. Mr. Gotman has developed a highly sophisticated program of automatic recognition of epileptogenic spikes and sharp waves. The computer is programmed to produce a map showing the topographical distribution of these discharges; it also classifies them in a number of diagnostically useful categories. This program should soon reach the stage where its clinical usefulness and validity can be tested.

2) *Studies on the pattern of secretion of pituitary hormone in relation to sleep stages.* (Dr. I. Woods in collaboration with Dr. G. Tolis, of the Dept. of Endocrinology of the Royal Victoria Hospital)

Using the EEG radiotelemetry system, a study has been initiated to determine the pattern of pulsatile release of a number of pituitary hormones in response to hypothalamic stimuli which vary in relation to the sleep cycle as determined from continuous all night EEG recordings. In this study which is in its initial stage an attempt will be made to establish normal patterns of hormone release and their disturbances in a variety of pathological conditions.

*Miscellaneous*

We are glad that Dr. Michel Aubé has joined our staff as Assistant Electroencephalographer. He replaces Dr. Andrew Eisen who wished to be relieved of his duties in the EEG laboratory in order to devote himself more fully to his ever increasing responsibilities in the EMG Laboratory.

Dr. Frederick Andermann has been elected President, and Dr. Theodore Rasmussen has been designated President-Elect of the Eastern Association of Electroencephalographers. Dr. Andermann was invited to speak on the management of epileptic patients at the meeting of the Royal College of Physicians and Surgeons in January 1975.

Dr. Pierre Gloor was invited to participate in a workshop on complex partial seizures and their treatment sponsored by the International League against Epilepsy, held at Carefree, Arizona in November 1974. The purpose of this workshop was the preparation of a book dealing with various aspects of complex partial seizures.

We express our thanks to Mrs. Katherine Crystal, R.N., our Chief Technician, to our technical and nonprofessional staff for their dedicated work, as well as to Mr. Edward Pudoziunas and Mr. Gordon Evans in the Neuroelectronics Laboratory for their unfailing assistance in solving many technical problems.

# Electromyography Laboratory

*Head* ..... Andrew Eisen, M.D., M.R.C.S., L.R.C.P. F.R.C.P.(C)

*Fellows* ..... Kenneth Laxer, M.D. (California) (July-Dec. 1974)
John Dawlings, M.D. (British Columbia) (Jan.-June, 1975)

*Technician* ..... Margo Henderson

Eleven hundred and ninety-four examinations were carried out in 1974, a 9.1% increase over the previous year. Our techniques have been extended to include the estimation of the number of functioning motor units within a muscle. More recently, in collaboration with Dr. K. Laxer, a method has been developed for measuring central conductivity in man. The results of this work, which are in press, were presented at the 27th American Academy of Neurology.

In close cooperation with Drs. George Karpati and Stirling Carpenter, a number of animal experimental projects were completed. It was shown that, in the rat, the administration of reserpine which, by depleting normal dopaminergic mediated inhibitory influences upon the lower motor neuron, caused excessive muscle activity. This resulted in an alteration of the contractile and histochemical profiles of both slow and fast twitch muscles. This work was presented at the 3rd International Congress of Muscle Diseases, Newcastle-upon-Tyne, England (Sept. 1974). The motor unit profile of two chronically induced myopathies was studied. Tetrabenazine (a congenor of reserpine) results in a myopathy characterized by necrosis, regeneration and hypertrophy of muscle fibers. Six weeks after aortic ligation the rat soleus demonstrates regeneration without necrosis. In both models the motor unit count was found to be normal, a finding in keeping with the results of our previously published work on the motor unit profile in acute ischemic myopathy.

Experimental myotonia, and "reversed trophism" i.e. the influence that muscle has upon nerve, are the subjects of on-going research.

# Experimental Neurophysiology

*Consultant* ..... Herbert Jasper, O.C., Ph.D., D.ès Sci., M.D., C.M., F.R.S.C.

*Neurophysiologist* ..... Pierre Gloor, M.D., Ph.D.

*Assistant Neurophysiologist* ..... Stanislav Prelević, M.D.

*Biomedical Engineer* ..... John Ives, M.Sc.

*Computer Systems Engineer* ..... Christopher Thompson, M.Sc.

*Assistant Computer Systems Engineer* ..... Jean Gotman, Engineer, E.S.E., M.E.

*Fellows:*

Graham Ball, M.Sc. (Manitoba)
Ernest Kratzenberg, M.D. (Nancy)
Luis Felipe Quesney, M.D. (Cath. University, Santiago)
Neil Schaul, M.D. (Downstate)
Douglas Skuce, M.Sc. (McGill) Killam Scholar
Hildegard Zumstein, M.D. (Zürich)

*Laboratory Supervisor* ..... Susanne Schiller, R.N.

*Chief Electronics Technician* ..... Edward Puodziunas

*Assistant Electronics Technician* ..... Gordon Evans

*Research Projects*

(1) *Studies on an animal model of generalized corticoreticular epilepsy* (Drs. L.F. Quesney, E. Kratzenberg, H. Zumstein and P. Gloor)

The role of thalamocortical connections in the genesis of bilaterally synchronous discharge in generalized penicillin epilepsy of the cat was investigated further. It has been found that subcortical sites, such as the midline and intralaminar nuclei of the thalamus or the putamen from which spindle triggering or recruiting can be produced upon electrical stimulation, are very potent in triggering bilaterally synchronous spike and wave discharges in feline generalized penicillin epilepsy. The incidence of triggering of such discharges from specific thalamic nuclei, although not zero, is much less. Discharges cannot be triggered from the brainstem reticular formation nor from the amygdala. Depth recordings in the thalamus showed that the thalamus in some way participates in the spike and wave discharge, either in the form of rhythmic slow waves or spike and wave activity.

It became therefore difficult to determine whether spike and wave discharge in the cortex is a reflection of abnormal volleys arising from the thalamus or is due to abnormal responses of cortical neurons to normal or abnormal thalamic volleys. Experiments in which a weak penicillin solution was applied to widespread cortical areas of both hemispheres, spike and wave discharge could easily be triggered from midline and intralaminar thalamic sites even though the thalamic electrogram showed no evidence for epileptiform abnormality. It is therefore likely that the cortical spike and wave discharges represent an abnormal response of cortical neurons to thalamocortical volleys normally involved in spindle triggering. This abnormal cortical response seems to be dependent upon a mild diffuse epileptogenic condition of the cortex.

(2) *Effect of prostaglandins on feline generalized penicillin epilepsy* (Drs. L.F. Quesney, P. Gloor, L.S. Wolfe and Mr. S. Jozsef)

The model of generalized penicillin epilepsy was used to determine whether prostaglandins $PGF_{2\alpha}$ and a prostaglandin $E_2$ analogue may affect epileptic activity, especially since some clinical reports have suggested that prostaglandins used for the induction of abortion in the first trimester of pregnancy may be epileptogenic. It was found that the prostaglandin analogue given intramuscularly or intravenously

significantly *reduced* epileptic activity. Intracarotid infusion of prostaglandin $F_{2\alpha}$ also produced a marked diminution of epileptic activity. Toxic doses of $E_2$ analogue failed to produce epileptic activity, but produced bilaterally synchronous high voltage slow waves. These studies therefore gave no evidence that prostaglandins exert an epileptogenic action or potentiate an underlying latent epileptogenic condition.

(3) *Neurophysiological studies on pathological delta waves* (Mr. Graham Ball, Dr. Neil Schaul and Dr. P. Gloor)

Previous work carried out in this laboratory had shown that delta waves are neuronally generated by radially oriented cortical generators and that they are related to single cell unit activity. Only white matter lesions or lesions in the reticular formation of the brainstem seem to produce polymorphic delta waves. Purely cortical lesions do not. During the past year these studies have been extended to include an analysis of changes observed when edema develops in white matter in response to a localized cortical freezing lesion. Polymorphic delta activity can be recorded from cortex overlying edematous white matter, but is less pronounced and somewhat less continuous than with a destructive white matter lesion. Evidence was found that this delta activity is accentuated by certain anesthetics, hypoxia or hyperoxia. Cortex over edematous white matter generating such delta waves seems to show a deficient desynchronizing response to reticular formation stimulation, although there is no total lack of responsiveness. The present work is continuing in an attempt to define more clearly the conditions under which white matter edema is associated with delta waves and whether a defect exists in the ascending cholinergic connections to cortex generating polymorphic delta waves, as suggested by the fact that similar delta waves can be produced by lesions of the brainstem reticular formation and by the observation that the arousal response in cortex over edematous white matter appears to be deficient.

Another aspect of pathological delta waves presently being investigated in collaboration with Dr. Hanna Pappius is their possible responsiveness to the action of adrenal cortical steroid hormones and the relationship of such a response to changes in cerebral edema or to changes in cerebral electrolytes.

(4) *Electrophysiological study of amygdaloid afferents in the cat* (Drs. S. Prelević and M. Burnham)

This study has now been completed and is ready for publication. It has demonstrated that neocortical areas in the cat which are homologous with the temporo-insular cortex of man, heavily project to the lateral, basal and central nuclei of the amygdala. Impulses originating in these cortical areas produce predominantly excitatory responses of amygdaloid neurons, followed very frequently by secondary inhibition probably mediated by recurrent collateral pathways. There is a lack of topographic organization of these projections from neocortex to the

amygdala. The findings are of importance in furthering our knowledge of the pathways through which temporal cortical inputs reach amygdaloid neurons and in demonstrating that the effects thus exerted are predominantly excitatory in nature. They also contribute to a better understanding of some aspects of temporal lobe epilepsy and clarify some more fundamental aspects of temporal cortical and amygdaloid physiology.

(5) *Artificial intelligence* (Mr. D.R. Skuce)

Mr. Skuce has written a paper ("An English-like Language For Qualitative Scientific Knowledge") which summarizes his work of the last few years. The paper has been accepted for the Fourth International Joint Conference on Artificial Intelligence, to be held in Tbilisi, Georgia (USSR). The language permits the expression of about 50% of the knowledge contained in a typical biological and medical text, with complete unambiguity and great economy. He is continuing to work on the remaining difficulties, the most serious of which is the description of change.

# Neuropathology

*Neuropathologist* ..... Gordon Mathieson, M.B., Ch.B., M.Sc., F.R.C.P.(C)

*Associate Neuropathologist* ..... Stirling Carpenter, A.B., M.D.

*Fellows:* 6 mos. on this service

Arun Ginde, M.D. (Bombay)
Eugene Kuchner, M.D. (Chicago)*
Yves Lapierre, M.D. (Montréal)
Albert Larbrisseau, M.D. (Montréal)
Kathleen Meagher-Villemure, M.D. (Montréal)
Hector Ortegon, M.D. (Yucatan)
Jeffrey Rubin, M.D. (McGill)
James St.John, M.D. (Wayne State)
Antonio Trottier, M.D. (Ottawa)
Jean-Guy Villemure, M.D. (Laval)
Robert Yufe, M.D. (McGill)

*Chief Technicians:*

Barbara Nuttall, B.A., A.R.T.
John Gilbert, R.T.

*1 year on this service

*A. Research Activities*

During the past year while on sabbatical leave Dr. Mathieson carried out an extensive and detailed study of the pathological substratum of focal seizures, based mainly upon the surgical material of which this Institute has such a rich collection. The 503 consecutive patients selected for surgical therapy during the decade 1961-70 were the subject of detailed analysis. Special attention was paid to cases without convincing histopathologic abnormality, a problem that has puzzled and discouraged us for some years. The role of birth injury and of febrile convulsions of early life in the genesis of atrophic lesions of the frontal and temporal lobes has been analysed. The results of this study have now been published in *Advances of Neurology* Volume 8.

A second study of the pathological aspects of epilepsy, this time confined to temporal lobe structures, covering 857 patients treated surgically between 1928 and the end of 1973, was presented at an International Workshop on Complex Partial Seizures at Carefree, Arizona in November 1974. The results of this study and its discussion at the workshop are in press.

Dr. Carpenter continues his active program of investigation of nerve and muscle disease both on his own and in collaboration with Drs. Karpati and Eisen. The findings in myopathy in the rat induced by tetrabenazene, in which there is neurogenic overdrive, suggests that the muscle changes result from energy deficits. Studies are also in progress on 2, 4, D-induced myotonic myopathy in the rat and the guinea pig. The effect of experimental ischemic myopathy on nerve fiber diameter is being investigated in collaboration with Dr. Eisen.

Application of the resources of the electron microscope laboratory to the elucidation of disease in man includes an analysis of the pathogenesis of the different forms of polymyositis, an exact morphologic description of Duchenne muscular dystrophy, a study of polyglucosan bodies in axons of peripheral nerves and in spinal cord, and sensory nerve changes in Werdnig-Hoffman disease.

The work of Dr. Carpenter and his collaborators has been presented at the American Academy of Neurology, the American Association of Neuropathologists, the Third International Congress of Muscle Diseases and the Seventh International Congress of Neuropathology. The support of the Medical Research Council of Canada and the Muscular Dystrophy Association of Canada is acknowledged.

*B. Teaching Responsibilities*

In the undergraduate field, Dr. Carpenter has given several lectures in his special fields of interest, while Dr. Mathieson continues to take part in the Disciplinary Course in Pathology 1A and 1B. At the graduate level, teaching concentrated on residents rotating through the department. Twice weekly diagnostic sessions in histopathology have been held in an attempt to give our residents a broad exposure to the speciality in the short time available. In addition, Dr. Carpenter holds a weekly session on gross neuromorphology with the residents in the General Pathology program in the Pathological Institute. Residents in the Clinical Training programs usually come to us for a period of 6 months, and within that time, it is difficult to provide progressive responsibility and freedom of decision-making which are essential to sound learning at this level. Providing such a learning environment is a challenge both now and for the years to come.

*C. Hospital Service Function*

During calendar 1974, there were 117 deaths in the Montreal Neurological Hospital. Of these, 58 were the subject of detailed autopsy examination. Thirteen of these fatal cases came under the jurisdiction

of the coroner and were, therefore, the subject of examination at the Medico-Legal Institute. As discussed in the report on the Clinical Laboratories in general, earlier in this volume, we are concerned at the decline in our autopsy rate and are making strenuous efforts to improve this situation, while avoiding adding to the inevitable distress of relatives on the occasion of the death of a patient. The number of surgical specimens examined, at 594, shows a considerable increase over the previous year. Examinations of CSF cytology by the SayK sedimentation technique at 223 were more than double the previous year's total.

# Neuro-Isotope Laboratories

*Director* ..... William H. Feindel, B.A., M.Sc., M.D., C.M., D.Phil., D.Sc., F.R.C.S.(C), F.A.C.S., F.R.S.C.

*Assistant Director* ..... Y. Lucas Yamamoto, M.D., Ph.D., (Hokkaido)

*Senior Brain Scan Technician* ..... Mrs. Cornelia Schofield, R.T.N.M., M.S.R., F.S.R.

*Assistant Brain Scan Technicians* ..... John Fodor, Shafi Hosain, B.S. (Osmania)

In the Brain Scan Laboratory, the total number of examinations for 1974 was 9,278, a 28% increase compared to 1973 when there were 7,265. The assessment of the Med II Gamma Camera digital computer system has continued and it has provided useful information for assessment of cerebral hemodynamic study. There has been a great increase in diagnostic work for patients with strokes. Dr. Yamamoto and the staff were most active in planning the new area to provide adequate facilities for safe handling of radioactive materials and better conditions for patient control. The transfer took place during the spring of 1975.

## THE WILLIAM CONE LABORATORY FOR NEUROSURGICAL RESEARCH

*Director* ..... William H. Feindel, B.A., M.Sc., M.D., C.M., D.Phil., D.Sc., F.R.C.S.(C) F.A.C.S., F.R.S.C.

*Assistant Director* ..... Y. Lucas Yamamoto, M.D., Ph.D., (Hokkaido)

*Medical Research Council Trainees* ..... Patrick Murray, M.D. Leon J. Ravvin, M.D.

*Physicist* ..... Ernst Meyer, M.Sc., (Zurich)

*Research Assistant* ..... Andrea Duszczyszyn, B.Sc., (Loyola)

*Electronic Technician* ..... George Lootus

Studies on important aspects of the cerebral circulation were continued and extended during the past year with the support of the Medical Research Council of Canada, the Cone Memorial Fund and the Pillow-Vaughan endowment. The application of the two new techniques which we have developed in our laboratories over the past decade, fluorescein angiography and measurement of local cerebral blood flow by miniature detectors, has continued to be very productive in a number of new areas.

Work continues on the following research projects which were started in 1974.

1. *Definition of focal cerebral ischemia at selected time intervals and during reflow.*

In this study by Dr. Leon Ravvin, which will be presented for his Ph.D. thesis, the distribution and size of an ischemic zone were shown at selected time intervals following occlusion of the middle cerebral artery at various sites in 45 dogs and 3 monkeys. This provided information on the degree of collateral flow during and after occlusion which has obvious relevance to the problem of "stroke".

2. *Effects of experimental hypotension on focal ischemia.*

This study showed clearly a watershed zone in the territory of the middle cerebral artery and a specific geographic distribution of the ischemic zone following occlusion of the middle cerebral artery.

3. *Effects of hypercapnia on normal and focal ischemic lesions.*

When the $pCO_2$ level exceeded 70 mm Hg, the red vein phenomenon was noted, probably due to physiological shunting at the precapillary level. With values over 85 mm Hg of $pCO_2$, smaller subarachnoid and subpial haemorrhages and leakage of fluorescein dye were noted. This was not present, however, with hypotension.

4. *Analysis of cerebral blood flow after anastomosis between extracranial and intracerebral arteries.*

This project is being pursued by Dr. Patrick Murray using our methods of vessel display and CBF measurement. Significant retrograde flow was noted by way of the collateral circulation about the ischemic zone. This is the first investigation of the microcirculatory effects directly on the brain following these surgical anastomoses which have been increasingly used in patients with complete occlusion of the carotid or cerebral vessel.

5. *Analysis of cerebral vasospasm and the role of prostaglandins.*

Experiments have been completed on the effects of several types of prostaglandins in producing vasoconstriction in the small cerebral arteries. The fact that these substances are derived from blood and platelets and also after cortical stimulation suggest that they can be

significant in the regulation of normal vasomotor tone and in states of disturbances of this tone.

6. *Changes in the cerebral microcirculation following focal cold injury over the cortex.*

In collaboration with Dr. Pappius' group in Neurochemistry, we have examined the qualitative and quantitative changes in the cerebral microcirculation in the cat brain. Preliminary results indicate that the blood flow in the small epicerebral arteries below 150$\mu$ in diameter, in capillaries and in the cortical veins, can be completely arrested in an area subjected to cold injury. Indomethacin in this experimental model favoured a re-establishment of the by-pass flow with significant reduction in the number of aggregated platelets. These findings have an important bearing on the production of cerebral oedema, since the freezing lesion has been widely applied as an experimental model, and on the possible development of therapeutic agents for cerebral oedema in patients.

7. *Progress in methodology of microregional cerebral blood flow.*

Improvement in the original computer program for on-line analysis of Xenon clearance curves has been made during the past year particularly in relation to the identification and elimination of shunting or tissue peaks in the curves. This work which is being carried out by Mr. Ernst Meyer toward a Ph.D. has refined the accuracy of the cerebral blood flow measurement. Further development also of the Cadmium Telluride (CdTe) Detectors and the Lithium drifted Silicon (LiSi) Detectors for measuring a gamma emitting tracer clearances has been continued. At present these detectors are unique in providing measurement of focal cerebral blood flow but the technology of their production is complex. Dr. Yamamoto presented a paper on this topic at the Nuclear Science Symposium in Washington, D.C. in December 1974.

# Neurological Research

## LABORATORY FOR NEUROPHARMACOLOGY

| | |
|---|---|
| *Head* | Allan L. Sherwin, B.Sc., M.D., C.M., Ph.D., F.R.C.P.(C) |
| *MRC Fellow* | Ilo E. Leppik, M.D. (Pennsylvania) |
| *Technicians* | Christine D. Harvey, B.Sc., M.Sc.<br>Shirley Fayle, B.Sc. (Biol)<br>Catherine A. Cotter, B.A. |
| *Summer Medical student* | John McAuliffe |

The focus of attention in our laboratory continued to be the distribution of anticonvulsant drugs in human brain. The observations along with data on drug binding by plasma proteins were collated by Mrs. Harvey in the form of an M.Sc. thesis. Dr. John Armstrong completed his studies and submitted a Ph.D. thesis entitled *Studies of the Brain Isoenzyme of Creatine Kinase.* He plans to join the staff of the Research Institute of the Hospital for Sick Children in Toronto.

Dr. Leppik developed a new experimental model in the rat, which permits the determination of optimal protective levels of combinations of various anticonvulsant drugs under steady state conditions similar to those employed in the therapy of epilepsy. The ratios of phenobarbital and diphenylhydantoin found most effective in this model correlated well with the actual plasma levels in a group of successfully controlled seizure patients. Studies of other drug combinations are planned. Dr. F. Andermann collaborated in a number of studies of drug interactions involving anticonvulsant drugs in patients with epilepsy.

We have continued to study the patients with absence seizures diligently followed by Dr. Robb at the Montreal Children's Hospital. This includes the first serial study of nordiazepam (Tranxene®) levels in children.

The anticonvulsant drug monitoring service was widely utilized by neurologists in the Montreal area. In addition, regular samples were received from Newfoundland, the Maritime Provinces and other parts of North America. Some 4000 samples were assayed by gas liquid chromatography, an increase of 25% over the previous year. Dr. Sherwin was co-editor of a book on the clinical pharmacology of antiepileptic drugs and was elected to the board of directors of the International Bureau for Epilepsy with headquarters in London, England.

## LABORATORY FOR NEUROMUSCULAR RESEARCH

*Head* ..... George Karpati, M.D., F.R.C.P.(C)

*Research Fellow* ..... Jak Danon, M.D. (Istanbul)

*Technicians* ..... Miss Carol Allen, B.Sc.
Miss Donna Hughes
Mr. Steven Prescott

In 1974 we dealt with 196 muscle, 86 nerve and 99 skin biopsies. This is a vast increase over the previous year. Many of these biopsies originated at the Montreal Children's Hospital and the Jewish General Hospital. Our research activities included the following topics:

1) *Experimental tetrabenazine-induced myopathy in the rat.*

In this model muscle damage may be caused by excessive drive of certain muscle fibers due to pharmacological manipulation of the nervous system. Muscle destruction in this model may have relevance to certain forms of human neuromuscular disease.

2) *Myotonic myopathy in the guinea pig and rat.*
Intermittent intraperitoneal injection of 2,4-dichlorophenoxyacetic acid causes severe myotonia and necrotic myopathy in proximal muscles. In addition, in the guinea pig, massive neutral lipid accumulation in muscle fibers is also present. Pathophysiology of this unusual muscle lesion is being investigated by chemical and morphological methods.

3) *Experimental auto-allergic myositis (EAM).*
An intensive effort is made to produce an inflammatory myopathy by injecting skeletal muscle homogenates (or a component of muscle) into suitable animal hosts. We hope that comparison of immunologic and morphologic features of EAM with human disease will enable us to understand many obscure features of the latter.

4) *Polyglucosan-body neuropathy.*
A peculiar form of a mainly motor neuropathy is being studied in two sisters. Numerous axons in the sural and some intramuscular nerves harbour large or small PAS positive bodies, which resemble Lafora bodies.

5) *Werdnig-Hoffman disease (WHD).*
In sural nerves these patients have pronounced Wallerian degeneration. This could mean that sensory neurons are pathologically involved in WHD or that in sural nerves motor fibers are also present. This latter possibility is being investigated in patients undergoing sural nerve biopsy.

6) *Duchenne dystrophy.*
Possible diurnal variation of muscle destruction in this disease (as suggested by Dr. Carpenter) is being studied. Serum creatine phosphokinase will be determined as an index of muscle destruction at various times of the day and in relation to recumbency and exercise.

7) *Reinnervation of skeletal muscle.*
Denervated guinea pig soleus will be reinnervated by a primarily sensory nerve. The degree of "trophic" protection of muscle provided by a mainly sensory nerve will be studied and hopefully will provide understanding of the nature of the trophic effects of peripheral nerves upon skeletal muscle.

Dr. Jak Danon has completed a year of hard work and exciting research projects in this laboratory. Drs. Andrew Eisen and Stirling Carpenter continue to be excellent partners in neuromuscular research.

Dr. Karpati was guest lecturer at the Chicago Rehabilitation Institute of Northwestern University in Chicago and invited participant at a Microsurgery Symposium in New York City where he spoke on the

subject of "Long-term neuronal regulatory influence of nerve upon muscle."

## MULTIPLE SCLEROSIS LABORATORY

J.B.R. Cosgrove, M.D., M.S., M.Sc., F.R.C.P.(C)
William Sheremata, B.Sc., M.D., F.R.C.P.(C)

*Post-Doctoral Fellow* ..... Dr. Henry Triller, Ph.D.

*Graduate Student* ..... Ms. Susan Colby, B.Sc.

*Chief Technician* ..... Alan Sazant, B.Sc.

The laboratory continues to pursue the question of altered immune responses in multiple sclerosis. Comparison of results using the techniques of lymphoblast transformation and MIF production in response to nervous system antigens continues to be investigated. A preliminary report was given at the American Academy of Neurology 1975 meeting. Serial studies of sensitization to nervous system antigens in multiple sclerosis patients continue. Studies of immunity to viral antigens in multiple sclerosis are beginning and a preliminary report will be given at the 1975 Canadian Neurological Society meeting. Efforts to develop a simple assay system to detect delayed hypersensitivity with results immediately available continue. As a result a useful assay system of "direct cell migration" has been developed. Results using this system will also be reported at the forthcoming Canadian meeting. Studies of T and B lymphocyte populations in multiple sclerosis have also been initiated. Reports of progress in all these fields were given at recent meetings of the Canadian Neurological Society, the American Neurological Association and the American Academy of Neurology. Information obtained supports the hypothesis that cellular hypersensitization to nervous system antigens is important in both the Guillain-Barré syndrome and in multiple sclerosis.

Generous support by the Medical Research Council and the Multiple Sclerosis Society of Canada continues to enable us to pursue our investigations, but budgeting problems remain acute. It is hoped that support by these agencies will enable an experimental treatment program of transfer factor therapy in multiple sclerosis to be initiated during the next few months.

# Neuroanatomy

*Neuroanatomist* ..... Donald G. Lawrence, B.Sc., M.D., C.M., F.R.C.P.(C)

*Advisory Neuroanatomist* ..... Francis McNaughton, B.A., M.Sc., M.D., C.M., F.R.C.P.(C)

*Teaching Associates* ..... Allan Morton, M.D., Ph.D.
Charles Olanow, M.D., F.R.C.P.(C)

*Technicians* ..... Giovanni Gaggi
Janet Robbins, B.A.

The research activities of the Laboratory of Neuroanatomy have gradually increased over the past year. Two studies of the motor system in the rhesus monkey have been completed. One, based upon silver impregnation methods, has shown that contrary to generally accepted knowledge, there are no direct ascending projections from the red nucleus to the thalamus. The other, a behavioural study, provides evidence that direct connexions from the motor cortex to motoneurones in the spinal cord form an essential anatomical substrate for discrete movements such as the type of finger movements one makes when removing an object from a narrow crevice. Since such connexions are present in man in even greater abundance than in monkeys, it is likely that they make an important contribution to the type of manual dexterity that enables me to write this report. Anatomical studies are underway using the more recently introduced axonal transport methods for tracing neuronal connexions. The initiation of this work was greatly helped by the advice of Dr. Jacques Courville and the information Dr. Lawrence obtained while attending a symposium on the use of axonal transport for studies of neuronal connectivity, held in Gwatt-Thun, Switzerland in July 1974. The methods consist of radioautography, in which the course and destination of axons are outlined by orthogradely transported radiolabelled amino acids incorporated into cell organelles, and the localization of neuronal cell bodies by labelling them with horseradish peroxidase, an enzyme transported retrogradely along axons. Mrs. Janet Robbins has had to suspend her studies towards an advanced degree but she is helping on a part time basis with the radioautography.

The major teaching responsibility of the laboratory continues to be the CNS Course, in the organization and running of which the efforts of Miss Delaney and Mr. Gaggi are most appreciated. In addition to his teaching contributions to this course, Dr. Lawrence gave a series of lecture-demonstrations of the gross anatomy, including dissection of the brain to neurology and neurosurgery residents in September. As one of the neurology associates of the Montreal General Hospital, he also takes part in the teaching of clinical neurology to the resident staff and to medical students.

# Neuro-Ophthalmology

BRIAN R. YOUNGE, M.D.

The Neuro-Ophthalmologic service at the Montreal Neurological Hospital continued to be active. The following points are noted.

A computerized system of records retrieval for diagnostic information has been established. In the future this could include all consultations seen in Neuro-Ophthalmology throughout McGill.

Several papers for publication in the scientific literature are being prepared by Dr. Younge and the residents, based on this computerized record system. These papers will include 4th nerve palsies, Adie's pupillotonia, venous sheathing in multiple sclerosis, and the Moebius syndrome.

The Neuro-Ophthalmology Conference in Montreal was held in Montreal in March of this year with an attendance of approximately 225 people. The meeting was well received.

A photographic collection of abnormal ocular disorders, both in general as well as in neuro-ophthalmology is being assembled in conjunction with our ocular photographer, Mr. Barclay Mason. A teaching collection of eye movement disorders on 16 mm. movie films has also been assembled.

# Neurophotography

*Neurophotographer* ..... C.P. Hodge, R.B.P., F.B.P.A., A.I.M.B.I.

*Assistants* ..... Neil Robbins
Judy Little

*Graphic Illustrator* ..... Madeleine Hartell

The past year was an extremely active one for our department. In addition to the routine work, Judy Little prepared 150 photomacrographs (a final total of 500 prints) for a thesis by Mr. Richard Smith. Neil Robbins produced over 100 photographs for a thesis by Dr. Tyrone Hardy.

A ten-minute sound movie on quadriplegia was produced for the nursing department by Neil Robbins.

There were three operations and 71 experiments with cerebral fluorescein angiography requiring a total production of 14,000 slides.

Mr. Charles Hodge had sick leave for special treatment at the Mayo Clinic and we welcome his return here after a successful recovery.

# Tumour Registry

ARTHUR R. ELVIDGE, M.D.

During 1974, 335 cases of tumour and tumour suspect, directly and indirectly involving the nervous system were processed by the Tumour Registry. Of these 124 were new and 211 were re-admissions; 140 (102 new cases and 38 re-admissions) were verified by pathological examination and autopsy.

There were 109 operations, 78 new cases and 31 re-admissions. Of these 61 were treated by Roentgenotherapy, 40 new and 21 re-admissions. The number of mortalities was 52 and autopsy was performed on 10. Clinic visits numbered 102.

Mrs. Guthro who has done excellent work as secretary of the Tumour Registry for many years, has retired and is succeeded by Mrs. Dimichele of the Central Tumour Registry of the Royal Victoria Hospital, who is working part-time until a successor has been trained and appointed.

# Library

MARINA BOSKI, B.A., B.L.S.

The big problem with which the Library staff had to contend throughout the past year was lack of space. The shelves had reached their holding capacity, with volumes jammed tightly together, while additions to our periodical and monograph holdings continued to come in: 250 volumes for Library and 80 books for the various departments.

The only solution left was to store our less frequently used materials outside the hospital. The Director gave his permission, and a financial subsidy, to store our historical collection of books and collected papers, as well as the periodicals published before 1940, in the warehouse operated by the Canadian National Railways. The conditions there were found suitable as to atmosphere and temperature, and the Library staff packed and delivered to C.N. 1,350 volumes of materials to await the completion of the new wing. The storage area within the hospital previously occupied by the old materials, was used for periodicals dating to 1945 or earlier, except that Brain and Archives of Neurology beginning with the 1930's were kept in the library.

Within the library, pre-1950 books will shortly be weeded out by the Library Advisory Committee and the collection will then be spread out in the available space. However, it appears now that the resulting space will be filled again by the end of 1977 at the latest.

The Librarian experienced considerable difficulties during 1974.

There were seemingly unwarranted delays by book stores in filling orders, together with errors in billing, wrong books sent and duplication of orders. All this caused inconvenience, especially to staff engaged in research.

Miss Harriet Williamson came out of retirement from her position as secretary to the Director of the Montreal Children's Hospital to help us on a volunteer basis, one day a week. Miss Hiroko Ozaki, our temporary cataloguer, left at the end of August on completion of our recataloguing. All books dating since 1950 are now classified according to the National Library of Medicine classification and the card catalogue is an up-to-date and reliable guide to the collection.

The Librarian is planning to catalogue individually the supplements to some periodicals, e.g. Acta Neurologica Scandinavica; EEG and Clinical Neurophysiology, beginning with 1965. It will also now be possible to devote more time to departmental collections, bringing their catalogues up to date and taking inventories.

# Montreal Neurological Society 1974-75

*President* ..... Dr. Normand Giard

*Vice-President* ..... Dr. Gordon Watters

*Secretary-Treasurer* ..... Dr. John Woods

This year, meetings were held once a month from October 3, 1974 to May 22, 1975. The meetings were hosted by the Montreal Neurological Hospital, Notre-Dame Hospital, Montreal Children's Hospital, Sacré-Coeur Hospital, Montreal General Hospital, Hôtel Dieu Hospital and Ste-Justine's Hospital. Following the meetings, the membership was entertained at brief social periods provided by the host hospitals.

Papers read before the Society were as follows:

DR. BARRY ARNASON, Department of Neurology, Massachusetts General Hospital, Boston, Mass.: "Nerve growth factor and its relationship to brain tumours".

NOTRE-DAME HOSPITAL: Members of staff. "Serum anti-lymphocytaire et sclérose en plaques". "Stéréoencéphalographie et stéréoélectroencéphalographie dans l'investigation du malade épileptique".

DR. K.M. LAWRENCE, Department of Child Health, Welsh National School of Medicine, Cardiff, Wales: "Spina Bifida — its early detection and prospects for prevention".

SACRÉ-COEUR HOSPITAL: Members of staff. "Aspect clinique et thérapeutique de l'ischémie cérébrale transitoire". "Diagnostique et théra-

peutique des anévrysmes de la partie postérieure de l'hexagone de Willis".

DR. J. OCHOA, Department of Neurology, Dartmouth, New Hampshire: "Pathologic changes in acute and chronic nerve compression".

HÔTEL-DIEU HOSPITAL: Members of staff. "Ataxia telangiectasia".

DR. DOROTHY KRIEGER, Mount Sinai School of Medicine, New York, N.Y.: "The C.N.S. Etiology of Cushing's Disease".

STE-JUSTINE'S HOSPITAL: Members of staff. "Participation multidisciplinaire (métabolisme, génétique, immunologie) dans certaines affections neuropédiatriques".

The Annual Dinner of the Society was held on May 22, 1975 at the Cercle Universitaire, Cité du Havre.

DR. JOHN S. MYERS, Baylor College of Medicine, Houston, Texas was the guest speaker: "Measurement of regional cerebral blood flow in the diagnosis of Migraine, Epilepsy and Dementia".

The Society officers for the 1975-76 year are:

*President* ..... Dr. Gordon Watters

*Vice-President* ..... Dr. Jules Hardy

*Secretary-Treasurer* ..... Dr. John Woods

# Fellows' Society

*President* ..... Ilo Leppik, M.D.

*Vice-President* ..... Jean-Guy Villemure, M.D.

*Secretary-Treasurer* ..... James St. John, M.D.

Many events to enrich the souls and sharpen the wits of the residents and fellows were held this year. The R.V.H. pool provided a scenic setting for the welcoming party for the newcomers in July.

In the fall, meetings assessing the training programs produced some constructive suggestions on how to improve the rotations.

Informal seminars with visiting professors, Drs. Kurt West, Sidney Peerless and James Toole, were scheduled as part of their visit to the M.N.I. The annual skating party and hockey game was well attended and, as usual, the nurses won with the help of some lavishly disguised male defectors. A sugaring-off party given by Drs. Fred and Eva Andermann was a great success.

Dr. David Hubel was the guest speaker for the Fellow's Day lecture and the events concluded with a dinner party at the Royal St. Lawrence Yacht Club.

We wish to thank former fellows for their generous financial and moral support and trust this will continue.

The Officers for 1975-76 are:

*President* ..... Howard Blume, M.D.
*Vice-President* ..... Donald Lee Schomer, M.D.
*Secretary-Treasurer* ..... John Wells, M.D.
*Representative on the Board of Directors* ..... Jean-Guy Villemure, M.D.
*Post-Graduate Representative* ..... Neil Schaul, M.D.

# The Montreal Neurological Women's Society

1974-75

*President* ..... Joan Kuchner
*Vice-President* ..... Peggy Leppik
*Secretary* ..... Margo Smith
*Treasurer* ..... Brenda Murray

A varied calendar of events during the year was enjoyed by the Montreal Neurological Institute Women's Society and their families. A pool party welcomed new and old friends and whetted appetites for forthcoming activities. Members and their families gathered at Elm Terrace Farms for an August hayride and corn roast. This was followed by a general meeting in September which was held in Mrs. William Feindel's home. A cider tasting party in October at the home of Mrs. Ilo Leppik provided an opportunity for the women, their husbands and friends to sample a variety of Quebec ciders.

The months of November and December were a busy time. During this period the group was privileged to see a studio rehearsal preview of Les Grands Ballets Canadiens "Tam Ti Delam", and was subsequently invited back to attend a Company class. At a warm and joyous children's party given by Dr. and Mrs. William Feindel in their home, all were enchanted by the marionettes, three delightfully animated children's classics by Mrs. William Feindel. The following week the bake sale successfully raised money for use toward the purchase of special wheel chair accessories for the hospital.

In February the MNI Women's Society, together with the Fellow's society, hosted the traditional ice skating party and doctor-nurse hockey game. Also during February the group met at the home of Mrs. George Karpati to view and discuss a CBC film on working mothers. In March a tour of the CBC radio and TV studio by members and their families revealed some of the background of these media. A gala sugaring-off party given by Dr. and Mrs. Frederick Andermann at their country home heralded spring. To round out the year the traditional potluck supper was held at the home of Mrs. Theodore Rasmussen.

Throughout the year an active quilting group has been industriously plying their needles with beautiful results.

Many members worked to make each event a rewarding one but special thanks are due to Mrs. Gordon Mathieson who edited the Femmemni Newsletter, Mrs. Christopher Thompson, telephone committee chairwoman, Mrs. Irving Heller and Mrs. Allan Sherwin, welcoming committee co-chairwomen, Mrs. William Feindel and Mrs. Theodore Rasmussen, advisors, Mesdames Donald Lawrence, Jeffrey Allen, Alan Drake, John Wells, Hector Ortegon, who arranged special activities, and all those who graciously welcomed the group into their homes.

Officers for 1975-76 are:

*President* ..... Peggy Leppik
*Vice-President* ..... Betty Blume
*Welcoming Committee Chairwomen* ..... Sue Catchlove, Nicole Thompson
*Secretary* ..... Jeanne Branon
*Treasurer* ..... Jenny Ortegon

# Clinical Training Opportunities

## NEUROLOGY

The Department of Neurology and Neurosurgery of McGill University offers opportunities for clinical training in Neurology in a program which involves the four major McGill Teaching Hospitals — The Montreal Neurological Hospital, the Royal Victoria Hospital, the Montreal General Hospital, and the Montreal Children's Hospital — and the Jewish General Hospital.

Residency training is available at three levels and is open to graduates who have completed a year of interneship and a year of Internal Medicine at approved hospitals:

Assistant Resident (1 year)
Resident (1 year)
Teaching Fellow (1 year)

The Assistant Resident and Resident appointments are each divided into two six-month periods, with rotations arranged among the McGill Hospitals.

The Teaching Fellow appointment offers a third year of clinical experience open to candidates who have completed their earlier training in this Department.

Laboratory training fellowships are available in Electroencephalography, Clinical Neurophysiology, Clinical Neuropharmacology, Neuropathology and other branches of experimental neurology. Appointments are usually made for periods of twelve months, though some appointments may be for six-month periods.

Other Departmental Laboratories of the M.N.I., M.G.H., or M.C.H. will accept Fellows for graduate training by individual arrangement. Residents and Fellows may attend the graduate courses listed below by individual arrangement.

A limited number of training stipends are provided by the Quebec Ministry of Social Affairs and from Institute funds.

Appointments are usually made about one year in advance, with July 1st. the usual starting date.

Applications for all the above appointments should be made to the Program Director for Neurology, Montreal Neurological Institute, 3801 University Street, Montreal H3A 2B4, P.Q.

## NEUROSURGERY

The Department of Neurology and Neurosurgery of McGill University offers opportunities for clinical training in Neurosurgery in three of the major McGill Teaching Hospitals, the Montreal Neurological Hospital, the Montreal General Hospital and the Montreal Children's Hospital.

The initial appointment is normally made to one of the Institute's Laboratories for a six or twelve-month period. An interneship and/or a year of general surgical training in an approved hospital is required.

The Assistant Resident appointments are divided into six-month periods with rotation among the three Neurosurgical Services at the Montreal Neurological Hospital and the Neurosurgical Service at the Montreal General Hospital. The Resident appointments, six and twelve months in duration, are rotated among the McGill Teaching Hospitals listed above.

The various Departmental Laboratories will accept Fellows for graduate training by individual arrangement. Residents and Fellows may attend the graduate courses listed below by individual arrangement.

A limited number of training stipends are provided by the Quebec Ministry of Social Affairs and from Institute funds.

Appointments are usually made about one year in advance, with July 1st. the usual starting date.

Applications for all the above appointments should be made to the Director, Montreal Neurological Institute, 3801 University Street, Montreal H3A 2B4, P.Q.

# Courses of Instruction

## UNDERGRADUATE

The Department of Neurology and Neurosurgery cooperates closely with the Departments of Medicine, Surgery, Pathology, Anatomy and Radiology in their undergraduate teaching. Thus the teaching of neurology, neurosurgery, neuropathology, neuroanatomy and neurological radiology is carried out as part of the regular course planned by the Chairman of each of the above departments. See McGill booklet "Faculty of Medicine". Electives are available in clinical and laboratory subjects.

## GRADUATE

In the Faculty of Graduate Studies and Research, courses are offered leading to the degree of Master of Science and Doctor of Philosophy. See McGill booklet "Faculty of Graduate Studies and Research".

Throughout the year, the following elective courses are given for graduate students, Fellows and members of the house staff, and are open to undergraduates by arrangement.

### NEUROSCIENCES SEMINAR

G531-602H This is a course of weekly seminars, given during the academic year, designed to present over a 2-year period a concise, up-to-date review of the basic neurological disciplines. Mondays, 4:30 — 6:00 p.m. Professors Gloor, Wolfe, Feindel, and other members of the Department of Neurology and Neurosurgery, and related McGill Departments.

### NEUROPHYSIOLOGY

6531-610A Lectures, together with undergraduate Neurology and Neurosurgery Course 2A "Anatomy and Physiology of the Central Nervous System".

G531-611A Seminars and group discussions in Neurophysiology, Professor Gloor.

### NEUROANATOMY

G531-621A Seminars and group discussions in neuroanatomy. By special arrangement. Professor Lawrence.

### CLINICAL CONFERENCES

G531-630H Colloquium in clinical and basic aspects of the nervous system. Wednesdays 8:30 p.m. monthly during the academic year. Staff and Visiting Lecturers.

G531-631H Seizure and EEG conference — alternate Thursdays 4:30

p.m. Professors Gloor, Andermann, Rasmussen, Milner and Ethier.

### NEUROCHEMISTRY

G531-640H Seminars in Neurochemistry in addition to that provided in Course G531-602H. By special arrangement. Professors Wolfe and Pappius.

### NEUROPATHOLOGY

G531-650H Six or twelve months laboratory work in Neuropathology.

G531-651H Conference in Neuropathology, alternate Thursdays, 4:30 — 5:30 p.m.

G531-652A Neurological histopathology, an introduction. Ten sessions of 2 hours, course limited to 8 participants. Time to be arranged. Professor Mathieson.

### NEURORADIOLOGY

G531-660H Practical instruction in techniques and interpretation.

G531-661A Lecture demonstration (3 months in the fall), Mondays 4:30 — 5:30 p.m. Professors Ethier and Melançon.

### ELECTROENCEPHALOGRAPHY AND CLINICAL NEUROPHYSIOLOGY

G531-670H Laboratory work in Electroencephalography (minimum-6 months with active participation, seminars and clinical conferences). Professor Gloor.

### NEUROPSYCHOLOGY

G531-680H Training and research methods for selected graduate students. Professors Milner and Staff.

THE MONTREAL NEUROLOGICAL INSTITUTE AND HOSPITAL
AND THE
DEPARTMENT OF NEUROLOGY AND NEUROSURGERY
OF McGILL UNIVERSITY

# Publications

1974-1975


*AGUAYO, A.J., PEYRONNARD, J.M., ROMINE, J.S., TERRY, L.C. and BRAY, G.M.: Schwann cell responses to axonal loss during nerve development. International Congress Series No. 334, Excerpta Medica, Amsterdam, 1974.

*AGUAYO, A.J., TERRY, L.C., BRAY, G.M. and MARTIN, J.B.: The effects of nerve growth factor antiserum on axon-Schwann cell populations of developing unmyelinated nerve fibers. Journal of Neuropathology and Experimental Neurology, v. 33, 1974, p. 186.

ANDERMANN, E. ANDERMANN, F., CARPENTER, S., KARPATI, G., GRIMES, D. and WOLFE, L.S.: Juvenile Tay Sachs disease (late onset $GM_2$ gangliosidosis) in two Lebanese families. Clinical Research, v. 22, 1974, p. 738A. (Abstract).

ANDERMANN, Eva, SCRIVER, Charles R., GOLD, Raynold, WOLFE, Leon, PATRY, Georges, LAFONTAINE, Raymond, GEOFFROY, Guy and ANDERMANN, Frederick: Tay Sachs screening program in a French Canadian population. Suggestive evidence for polymorphism of the Tay Sachs gene. Canadian Journal of Neurological Sciences, v. 1, 1974, pp. 261-262. (Abstract).

ANDERMANN, E., JACOB, J.D., CARPENTER, S., KARPATI, G., WOLFE, L. and ANDERMANN, F.: Cerebromacular degeneration in Quebec and Newfoundland. Genetic, neurochemical and demographic observations. American Journal of Human Genetics, v. 26, 1974, p. 10A. (Abstract).

ANDERMANN, E., DANSKY, L. and METRAKOS, J.D.: The interaction of genetic and environmental factors in patients operated for focal epilepsy. Electroencephalography and Clinical Neurophysiology, v. 38, 1975, p. 38. (Abstract).

ANDERMANN, Eva, ANDERMANN, Frederick, JOUBERT, Marie, MELANÇON, Denis, KARPATI, George and CARPENTER, Stirling: Three familial malformation syndromes of the central nervous system: agenesis of the corpus callosum and anterior horn cell disease; agenesis of the cerebellar vermis; and atrophy of the cerebellar vermis. In: Malformation Syndromes, Birth Defects Original Article Series edited by Daniel Bergsma, Amsterdam, Excerpta Medica, v. 11, #2, 1975.

ANDERMANN, Frederick and REMILLARD, Guy M.: Dystonic movements and blood thyroxine. The New England Journal of Medicine, v. 290, 1974, p. 576.

ANDERMANN, F., ANDERMANN, E., CARPENTER, S., KARPATI, G. and WOLFE, L.:Late onset $GM_2$ gangliosidosis in two Lebanese families. American Journal of Human Genetics, v. 26, 1974, p. 10A. (Abstract).

ARMSTRONG, J.B., LOWDEN, J.A., and SHERWIN, A.L.: Automated fluorometric creatine kinase assay. Measurement of 100-fold normal activity with serum dilution. Clinical Chemistry, v. 20, #5, 1974, pp. 560-565.

BERTRAND, Gilles: The battered root problem. Symposium on the Lumbar Spine. Orthopedic Clinics of North America, v. 6, No. 1, 1975, pp. 305-310.

BERTRAND, G., OLIVIER, A. and THOMPSON, C.J.: Computerized display of

stereotaxic brain maps and probe tracts. Acta Neurochirurgica, v. 21, 1974, pp. 235-243.

BESSON, J.M., CATCHLOVE, R.F.H. FELTZ, P. and LeBARS, D.: Further evidence for post synaptic inhibitions on lamina V dorsal horn interneurons. Brain Research, v. 66, 1974, pp. 531-536.

*BRAY, G.M.: Binding of tritiated-ouabain as a measurement of sodium potassium transport in peripheral nerve and muscle. Canadian Journal of Neurological Science, v. 1, 1974, p. 257.

*BRAY, G.M. and AGUAYO, A.J.: Regeneration of peripheral unmyelinated nerves. Fate of the axonal sprouts which develop after injury. Journal of Anatomy, v. 117, 1974, pp. 517-529.

*BRAY, G.M. and AGUAYO, A.J.: Ouabain-binding sites in normal and dystrophic skeletal muscle. Clinical Research, v. 22, 1974, p. 754A.

*BRAY, G.M. and AGUAYO, A.J.: Ouabain-binding sites in normal and dystrophic skeletal muscle. International Congress Series No. 334, Excerpta Medica, Amsterdam, 1974.

*BRAY, G.M., RASMINSKY, M. and AGUAYO, A.J.: Quantitative ultra-structural and physiological studies of spinal nerve roots from dystrophic mice. Clinical Research, v. 22, 1974, p. 754A.

*BRAZEAU, P.: Les implications médicales d'une science nouvelle — la neuroendocrinologie. Science Forum, v. 7 (3), 1974, pp. 22-25.

*BRAZEAU, P. and GUILLEMIN, R.R.: Somatostatin: Newcomer from the hypothalamus. New England Journal of Medicine, v. 290, 1974, p. 963.

*BRAZEAU, P., RIVIER, J. and MARTIN, J.B.: Prolonged activity of acylated-CYS$^3$-$H_2$- Somatostatin analogs on Na-pentabarbital induced and spontaneous (pulsatile) GH secretion. Clinical Research, v. 22, 1974, p. 729A.

*BRAZEAU, P., RIVIER, J., VALE, W. and GUILLEMIN, R.: Inhibition of growth hormone secretion in the rat by synthetic somatostatin. Endocrinology, v. 94, 1974, pp. 184-187.

*BRAZEAU, P., VALE, W., GUILLEMIN, R. and BURGUS, R.: Isolation of SomatoSTATIN (a somatotropin release inhibiting factor) of ovine hypothalamic origin. Canadian Journal of Biochemistry, v. 52, 1974, pp. 1067-1072.

*BRAZEAU, P., VALE, W. and GUILLEMIN, R.: Trans-hypothalamic effects of drugs of abuse on the secretion of pituitary hormones. In: Narcotics and the Hypothalamus, E. Zimmerman and R. George, eds. New York, Raven Press, 1974, pp. 109-119.

*BRAZEAU, P., VALE, W. and GUILLEMIN, R.: Acylated Des- (Ala$^1$-Gly$^2$) Somatostatin analogs: prolonged inhibition of growth hormone secretion. Behavioral Biology Research Communications, v. 60, 1974, pp. 1202-07.

*BRAZEAU, P., VALE, W., RIVIER, J. and GUILLEMIN, R.: Biological potency of synthetic somatostatin in the oxidized and reduced form on the inhibition of secretion of growth hormone. Life Sciences, v. 14, No. 2, 1974, pp. 351-357.

*BRAZEAU, P., RIVIER, J., VALE, W. and GUILLEMIN, R.: Further biological studies with somatostatin and various analogs. Endocrinology, v. 94, 1974, p. A-155. (Abstract).

CARPENTER, Stirling, KARPATI, George, ANDERMANN, Frederick and GOLD, Reynold: Giant axonal neuropathy. A clinically and morphologically distinct neurological disease. Archives of Neurology, v. 31, 1974, pp. 312-316.

CATCHLOVE, Richard F.H., BESSON, Jean Marie, LeBARS, Daniel and BLANCHET, Françoise: Effets du $CO_2$ sur les activités unitaires des cellules de la couche V de Rexed de la corne dorsale de la moëlle du chat. C.R. Acad. Sc. Paris, t. 279, 1974, pp. 1023-1026.

CHAD, D. and SHEREMATA, W.: A case of myoclonus restricted to a body segment and originating in the spinal cord. St. Mary's Hospital Medical Bulletin, Montreal, v. 16, 1974, pp. 266-272.

DANSKY, Linda, ANDERMANN, Eva, ANDERMANN, Frederick and SHERWIN, Allan: The outcome of pregnancy in epileptic women. Canadian Journal of Neurological Sciences, v. 1, 1974, pp. 264-265.

DILA, Carl J. and PAPPIUS, Hanna M.: Cerebral water and electrolytes. An experimental model of inappropriate secretion and antidiuretic hormones. In: Vasopressin, I: Chemical and Clinical Aspects, J.D. Glickson, et al, editors. New York, MSS Information Corporation, 1974, pp. 143-156.

EISEN, Andrew and DANON, Jak: The mild cubital tunnel syndrome. Its natural history and indications for surgical intervention. Neurology, v. 24, #7, 1974, p. 608-613.

EISEN, Andrew, KARPATI, George, CARPENTER, Striling and DANON, Jak: The motor unit profile of the rat soleus in experimental myopathy and reinnervation. Neurology, v. 24, #9, 1974, pp. 878-884.

EISEN, Andrew, KARPATI, George and CARPENTER, Stirling: Reserpine induced alteration of physiological properties and histochemical fiber types in rat skeletal muscle. Experimental Neurology, v. 46, 1975, pp. 554-565.

FEINDEL, William, ÉTHIER, Roméo, YAMAMOTO, Lucas and THOMPSON, Christopher: Computerized transverse x-ray tomography of the brain. Annals of the Royal College of Physicians and Surgeons of Canada, v. 7, 1974, p. 52.

FEINDEL, William, YAMAMOTO, Y. Lucas and HODGE, Charles, P.: Fluorescein angiography and microregional cerebral blood flow measurements during the surgery of arteriovenous malformations. Proceedings of the Symposia of the Fifth International Congress of Neurological Surgery, Tokyo, October 7-13, 1973. Excerpta Medica, International Congress Series No. 320, 1974, pp. 191-199.

FEINDEL, W.: The influence of cerebral steal: demonstration by fluorescein angiography and focal cerebral blood flow measurement — pathophysiological aspects. In: Cerebral Angiomas — Advances in Diagnosis and Therapy, ed. by H.W. Pia et al. New York, Springer-Verlag, Chap. IV, 1974, pp. 87-99.

FEINDEL, W., ETHIER, R., GLOOR, P. and YAMAMOTO, L. The role of the EMI scan in focal epilepsy. Presented at the 9th meeting of the Canadian Congress of Neurological Sciences, Saskatoon, June 1974. (Abstract).

FEINDEL, W.: Life and Work at the Montreal Neurological Institute. In: The McGill You Knew, ed. E.A. Collard, Don Mills, Longman Canada Ltd., Chap. 19, 1974, pp. 151-154.

FEINDEL, W., YAMAMOTO, Y.L. and WOLFE, L.S.: The possible role of serontonin and prostaglandins in the pathogenesis of cerebral vasospasm. Presented at 7th International Symposium on Cerebral Circulation and Metabolism, Aviemore, Scotland, June 1975.

FEINDEL, William: Factors contributing to the success or failure of surgical intervention for epilepsy. In: Advances in Neurology, v. 8, Neurosurgical Management of the Epilepsies. Dominick P. Purpura, J. Kiffin Penry and Richard D. Walter, editors. Raven Press, New York, 1975, pp. 281-298.

*FELTZ, P.A. and RASMINSKY, M.: A model for the mode of action of GABA on primary afferent terminals: depolarizating effects of GABA applied iontophoretically to neurons of mammalian dorsal root ganglia. Neuropharmacology, v. 13, 1974, pp. 553-563.

*FINLAYSON, M.H.: Electron Microscopic observations in trichinosis. IIIRD International Congress on Muscle Disease, Excerpta Medica 334, 1974, pp. 169-170.

*FINLAYSON, M.H., and BILBAO, J.M.: Guillain-barre syndrome. Electron Microscopic and cytochemical investigation. VIITH International Congress of Neuropathology. Akademiai Kiado, Budapest, 1974, p. 85. Abstract.

*FINLAYSON, M.H., BILBAO, J.M. adn LOUGH, J.O.: The pathogenesis of the neuropathy in dimorphous leprosy: electron microscopic and cytochemical studies. Journal of Neuropathology and Experimental Neurology, v. 33, 1974, pp. 446-455.

*FINLAYSON, M.H., BILBAO, J.M. and LOUGH, J.O.: Electron microscopic and cytochemical findings in leprous neuropathy. Journal of Neuropathology and Experimental Neurology, v. 33, 1974, p. 189. (Abstract).

GLOOR, P., GOTMAN, J., RAY, W.F., THOMPSON, C.J. and SKUCE, D.R.: Clinical evaluation of a method computer analysis of EEG. American Electroencephalography Annual Meeting, Seattle, 1974.

GLOOR, P.: Contributions of electroencephalography and electrocorticography to the neurosurgical treatment of the epilepsies. In: Advances in Neurology, v. 8, Neurosurgical Management of the Epilepsies. Dominick P. Purpura, J. Kiffin Penry and Richard D. Walter, Editors. Raven Press, New York, 1975, pp. 59-105.

GOTMAN, Jean, GLOOR, Pierre and RAY, Walter F.: A quantitative comparison of traditional reading of the EEG and interpretation of computer-extracted features in patients with supratentorial brain lesions. Electroencephalography and Clinical Neurophysiology, v. 38, 1975, pp. 623-639.

GUBERMAN, A. and GLOOR, P.: Cholinergic drug studies of generalized penicillin epilepsy in the cat. Brain Research, v. 78, 1974, pp. 203-222.

HOBERGER, C.P., YAMAMOTO, Y.L., THOMPSON, C.J. and FEINDEL, W.: On-line measurements of microregional cerebral blood flow. Proceedings of the Canadian Medical and Biological Engineering Society, Montreal, 1974.

HUNTER, Alasdair G.W., ROTHMAN, Stanley, J., HWANG, Wei Sek and DECKELBAUM, Richard J.: Hepatic fibrosis, polycystic kidney, colobomata and encephalopathy in siblings. Clinical Genetics, v. 6, 1974, pp. 82-89.

IVES, J.R., THOMPSON, C.J., GLOOR, P., OLIVIER, A. and WOODS, J.F.: Multi-Channel EEG Telemetry-Computer Monitoring. Biotelemetry, 2nd International Symposium, Davos, Switzerland May 1974. P.A. Neukomm, Editor, Karger, Basel, v. 2, 1974, pp. 216-218.

IVES, J.R., THOMPSON, C.J., GLOOR, P., OLIVIER, A. and WOODS, J.F.: The on-line computer detection and recording of spontaneous temporal lobe epileptic seizures from patients with implanted depth electrodes via a radio-telemetry link. Electroencephalography and Clinical Neurophysiology, v. 26, 1974, p. 205.

KARPATI, G., CARPENTER, S., MELMED, C. and EISEN, A.A.: Experimental ischemic myopathy. Journal of the Neurological Sciences, v. 23, 1974, pp. 129-161.

KARPATI, George, CARPENTER, Stirling, EISEN, Andrew A., WOLFE, Leon S. and FEINDEL, William: Multiple peripheral nerve entrapments. An unusual phenotypical variant of the Hunter syndrome (Mucopolysaccharisodis II) in a family. Archives of Neurology, v. 31, 1974, pp. 418-422.

KARPATI, George, CARPENTER, Stirling, MELMED, Calvin: Morphologic abnormalities of skeletal muscle mitochondria produced by *in vivo* uncoupling of oxidative phosphorylation. Excerpta Medica, International Congress Series No. 33, 1974, pp. 13-14.

KARPATI, G., EISEN, A.A. and CARPENTER, S.: Subtypes of the histochemical type T muscle fibres. Journal of Histochemistry and Cytochemistry, v. 23, 1975, pp. 89-94.

KARPATI, G., CARPENTER, S., ENGEL, A.G., WATTERS, G., ALLEN, J., ROTHMAN, S., KLAMEN, G. and MAMER, O.: The syndrome of systemic cornitine deficiency. Neurology, v. 25, 1975, pp. 16-24.

*KELLY, J.S. and RENAUD, L.P.: Physiological identification of inhibitory interneurons in the feline pericruciate cortex. Journal of Neurophysiology, v. 37, 1974, pp. 1144-1155.

*KELLY, J.S. and RENAUD, L.P.: Physiological identification of inhibitory interneurons in the feline pericruciate cortex. Brain Research, v. 79, 1974, pp. 9-28.

KRYGER, M., QUESNEY, L.F., HOLDER, D., GLOOR, P. and MacLEOD, P.: The sleep deprivation syndrome of the obese patient. A problem of periodic nocturnal upper airway obstruction. American Journal of Medicine, v. 56, 1974, pp. 531-539.

*LAL, S., ETTIGI, P., MARTIN, J.B., TOLIS, G., BROWN, G.M., GUYDA, H. and FRIESEN, H.G. Central catecholamine receptor agonists and anterior pituitary secretion. Clinical Research, v. 22, 1974, p. 732A.

*MARTIN, J.B.: Pulsatile GH secretion in the unanesthetized rat. Effects of stress, morphine and somatostatin (SRIF) on the response. Proceedings of the 56th Annual Meeting of the Endocrine Society, 1974, p. A-154.

*MARTIN, J.B.: The role of hypothalamic and extrahypothalamic structures in the control of G.H. secretion. Proceedings of the NIH Publication #74-612, 1974, pp. 223-249.

*MARTIN, J.B.: Regulation of the pituitary-thyroid system. In: Endocrine Physiology, MTP International Review of Science. Physiology Series One, Volume 5. S.M. McCann, ed. London, Butterworth's, 1974, pp. 67-108.

*MARTIN, J.B.: Inhibitory effect of somatostatin (SRIF) on the release of growth hormone (GH) induced in the rat by electrical stimulation. Endocrinology, V. 94, 1974, pp. 497-503.

*MARTIN, J.B., HARRIS, C.H. and DIRKS, H.J.: Evidence of growth hormone deficiency in the Munich-Wistar rat. Endocrinology, v. 94, 1974, pp. 1359-1363.

*MARTIN, J.B., LAL, S., TOLIS, G. and FRIESEN, H.G.: Inhibition by apomorphine of prolactin secretion in patients with elevated serum prolactin. Journal of Clinical Endocrinology and Metabolism, v. 39, 1974, pp. 180-182.

*MARTIN, J.B., and BROWN, G.M.: Corticosterone, prolactin and growth hormone responses to handling and new environment in the rat. Psychosomatic Medicine, v. 36, 1974, pp. 241-247.

*MARTIN, J.B., LAL, S., TOLIS, G. and FRIESEN, H.G.: Role of dopaminergic mechanisms in regulation of growth hormone and prolactin secretion in man. Neurology, v. 24, 1974, p. 387.

*MARTIN, J.B., RENAUD, L.P and BRAZEAU, P.: Pulsatile growth hormone secretion. Suppression by hypothalamic ventromedial lesions and by long-acting somatostatin. Science, v. 186, 1974, pp. 538-540.

*MARTIN, J.B., TANNENBAUM, G., WILLOUGHBY, J.W., RENAUD, L.P. and BRAZEAU, P.: Functions of the central nervous system in regulation of pituitary GH secretion. Proceedings of the International Conference on Hypothalamic Releasing Factors, Milan, Italy, Oct. 14-16, 1974. Excerpta Medica, Amsterdam, 1975.

*MARTIN, J.B. and RENAUD, L.P.: Hypothalamic and extrahypothalamic regulatory mechanisms for hypothalamic hormone secretion. Proceedings of the Conference on Neuroendocrine Integration, Ann Harbor, Michigan, April 17-19, 1974.

McNAUGHTON, Francis L. and RASMUSSEN, Theodore: Criteria for selection of patients for neurosurgical treatment. In: Advances in Neurology, v. 8, Neurosurgical Management of the Epilepsies. Dominick P. Purpura, J. Kiffin Penry and Richard D. Walter, Editors. Raven Press, New York, 1975, pp. 107-138.

McNAUGHTON, Francis L.: Headache and Other Head Pain. Otolaryngology, v. V, Chap. IIN, 1974, pp. 1-25.

MATHIESON, Gordon: Pathologic aspects of epilepsy with special reference to the surgical pathology of focal cerebral seizures. In: Advances in Neurology, v. 8, Neurosurgical Management of the Epilepsies. Dominick P. Purpura, J. Kiffin Penry and Richard D. Walter, Editors. Raven Press, New York, 1975, pp. 107-138.

MELMED, C.A., KARPATI, G. and CARPENTER, S.: Experimental mitochondrial myopathy with ragged red fibers. Neurology, v. 24, 1974, p. 353.

MENDELSON, J., PORTNOY, J. and LIBMAN, I.: Meningococcal meningitis: an atypical case. Canadian Medical Association Journal, v. 3, Sept. 21, 1974, pp. 549-550.

MILNER, B.: Frontal lobes. Third Theme in 17th International Symposium of Neuropsychology, Puyricard (France), June 25-29, 1972. Neuropsychologia, v. 13, 1975, pp. 129-133.

MILNER, Brenda: Psychological aspects of focal epilepsy and its neurosurgical management. In: Advances in Neurology, v. 8, Neurosurgical Management of the Epilepsies. Dominick P. Purpura, J. Kiffin Penry and Richard D. Walter, Editors. Raven Press, New York, 1975, pp. 299-321.

MYLES, S. Terence, YAMAMOTO, Y.L., WOLFE, L. DUSZCZYSZYN, A., FEINDEL, W. and HODGE, C.: Effects of Prostaglandin $E_1$ and ethanol on the cerebral circulation. Annals of the Royal College of Physicians and Surgeons of Canada, v. 7, 1974, p. 51.

NG YING KIN, N.M.K. and WOLFE, Leonhard S.: Oligosaccharides accumulating in the liver from a patient with $GM_2$- gangliosidosis variant O (Sandhoff-Jatzkewitz disease). Biochemical and Biophysical Research Communications, v. 59, #3, 1974, pp. 837-844.

PAPPIUS, Hanna M.: Fundamental aspects of brain edema. Handbook of Clinical Neurology, P.J. Vinken and G.W. Bruyn editors, Amsterdam, North-Holland Publishing Co., v. 16, Part I, 1974, pp. 167-185.

PENFIELD, Wilder and MATHIESON, Gordon: Memory. Autopsy findings and comments on the role of hippocampus in experiential recall. Archives of Neurology, v. 31, 1974, pp. 145-154.

PENFIELD, Wilder: Introduction: "The physiology of epilepsy". In: Advances in Neurology, v. 8, Neurosurgical Management of the Epilepsies. Dominick P. Purpura, J. Kiffin Penry and Richard D. Walter, editors. Raven Press, New York, 1975, pp. 1-9.

PENFIELD, Wilder: la escuela española de anatomia el tributo de un discipulo agradecido a cajal y del rio-hortega. In: Neurocir. México, v. III, No. 1, March 1974, pp. 5-20.

*PEYRONNARD, J.B., BOGHEN, D. and AGUAYO, A.J.: Polyneuropathy after accidental hypothermia. Canadian Journal of Neurological Science, v. 1, 1974, p. 268.

PINSKY, Leonard, MILLER, Jack, SHANFIELD, Bernice, WATTERS, Gordon and WOLFE, Leonhard S.: GM1 gangliosidosis in skin fibroblast culture. Enzymatic differences between Types 1 and 2 and observations on a third variant. The American Journal of Human Genetics, v. 26, #5, 1974, pp. 563-577.

RASMUSSEN, Theodore: Cortical excision for medically refractory epilepsy. In: The Natural History and Management of Epilepsy, P. Harris and C. Maudsley, editors. Churchill, Livingstone, Edinburgh, Scotland, 1974.

RASMUSSEN, Theodore: Cortical resection in the treatment of focal epilepsy. In: Advances in Neurology, v. 8, Neurosurgical Management of the Epilepsies. Dominick P. Purpura, J. Kiffin Penry and Richard D. Walter, editors. Raven Press, New York, 1975, pp. 139-154.

RASMUSSEN, Theodore: Surgery of frontal lobe epilepsy. In: Advances in Neurology, v. 8, Neurosurgical Management of the Epilepsies. Dominick P. Purpura, J. Kiffin Penry and Richard D. Walter, editors, Raven Press, New York, 1975, pp. 197-205.

RASMUSSEN, Theodore: Surgery for epilepsy arising in regions other than the temporal and frontal lobes. In: Advances in Neurology, v. 8, Neurosurgical Management of the Epilepsies. Dominick P. Purpura, J. Kiffin Penry and Richard D. Walter, editors. Raven Press, New York, 1975, pp. 207-226.

RASMUSSEN, Theodore: Surgery of epilepsy associated with brain tumours: In: Advances in Neurology, v. 8, Neurosurgical Management of the Epilepsies. Dominick P. Purpura, J. Kiffin Penry and Richard D. Walter, editors. Raven Press, New York, 1975, pp. 227-239.

REMILLARD, Guy M., ETHIER, Romeo and ANDERMANN, Frederick: Temporal lobe epilepsy and perinatal occlusion of the posterior cerebral artery. A syndrome analogous to infantile hemiplegia and a demonstrable etiology in some patients with temporal lobe epilepsy. Neurology, v. 24, #11, 1974, pp. 1001-1009.

REMILLARD, G.M., COLLE, E. and ANDERMANN, F.: On the relation of dystonic movements to serum thyroxine levels. Canadian Medical Association Journal, v. 110, Jan. 1974, pp. 59-61.

*RENAUD, L.P. and KELLY, J.S.: Simultaneous recordings from pericruciate pyramidal tract and non-pyramidal tract neurons. Response to stimulation of inhibitory pathways. Brain Research, v. 79, 1974, pp. 29-44.

*RENAUD, L.P., KELLY, J.S. and PROVINI, L.: Synaptic inhibition in pyramidal tract neurons. Membrane potential and conductance changes evoked by pyramidal tract cortical surface stimulation. Journal of Neurophysiology, v. 37, 1974, pp. 1144-1155.

*RENAUD, L.P. and MARTIN, J.B.: Microiontophoresis of thyrotropin-releasing hormone (TRH): effects on the activity of central neurons. Proceedings of the International Congress, Brain-Endocrine Interactions, Chapel Hill, N.C. 1974.

*RENAUD, L.P. and MARTIN, J.B.: Influence of thyrotropin releasing hormone (TRH) on the activity of single neurons in the central nervous system. Clinical Research, v. 22, 1974, p. 755A.

*RENAUD, L.P. and MARTIN, J.B.: Influence of amygdala stimulation on the activity of identified tuberofundibular neurons. Proceedings of the Canadian Federation of Biological Society, v. 17, 1974, p. 96.

*RENAUD, L.P. and MARTIN, J.B.: Antidromic and orthodromic activation of basomedial and periventricular hypothalamic neurons. Proceedings of the Society for Neuroscience, St. Louis, Mo., 1974, p. 391.

*RIVIER, J., BRAZEAU, P., VALE, W. and GUILLEMIN, R.: Somatostatin analogs, relative importance of the disulfide bridge and of the ala-glys side chain for biological activity. Journal of Medicinal Chemistry, 1974.

*RIVIER, J., BRAZEAU, P., VALE, W., and GUILLEMIN, R.: Structure/function studies of somatostatin. American Chemistry Society Meeting, Atlantic City, N.J., Sept. 8-13, 1974.

ROBB, Preston: Focal epilepsy: the problem, prevalence and contributing factors. In: Advances in Neurology, v. 8, Neurosurgical Management of the Epilepsies. Dominick P. Purpura, J. Kiffin Penry and Richard D. Walter, editors. Raven Press, New York, 1975, pp. 11-22.

ROMERO-SIERRA, C., SIERHUIS, A., HANSEBOUT, R. and LEWIN, M.: A new method for localised spinal-cord cooling. Medical and Biological Engineering, March 1974, pp. 188-193.

*ROMINE, J.S. and AGUAYO, A.J.: 25 years after! Sequelae from nutritional polyneuropathy in Canadian Ex-POWS. Canadian Journal of Neurological Science, v. 1, 1974, p. 258.

*ROMINE, J., AGUAYO, A.J. and BRAY, G.M.: Inhibition of Schwann cell proliferation by cytosine arabinoside in rat developing nerve. Clinical Research, v. 22, 1974, p. 755A.

SHEREMATA, William, COSGROVE, J.B.R. and EYLAR, E.H.: Cellular hypersensitivity to basic myelin ($A_1$) protein and clinical multiple sclerosis. New England Journal of Medicine, v. 291, 1974, pp. 14-17.

SHEREMATA, William, COSGROVE, J.B.R. and EYLAR, E.H.: Hypersensitivity to myelin protein preceding attacks of multiple sclerosis. Transactions of the American Neurological Association, v. 99, 1974, pp. 177-183.

SHEREMATA, W., KERNER, I., CARPENTER, S. and McGOVERN, J.: Jacob-Creutzfeld disease (JC) with atypical familial occurrence. Canadian Journal of Neurological Science, v. 1, 1974, p. 265.

SHEREMATA, W., COLBY, S., LUSKEY, G. and COSGROVE, J.B.R.: Guillain-Barré syndrome and delayed hypersensitivity to peripheral nervous system antigens. Neurology, v. 24, 1974, p. 385.

SHEREMATA, W., ANDREWS, R. and PANDYA, D.N.: Conduction aphasia from a frontal lobe lesion. Transactions of the American Neurological Association, v. 99, 1974, pp. 249-253.

SHERWIN, A.L., LOYND, J.S., BOCK, G.W. and SOKOLOWSKI, C.D.: Effects of age, sex, obesity and pregnancy on plasma diphenylhydantoin levels. Epilepsia, v. 15, 1974, pp. 507-521.

SHIBATA, Shobu, HODGE, Charles P. and PAPPIUS, Hanna M.: Effect of experimental ischemia on cerebral water and electrolytes. Journal of Neurosurgery, v. 41, 1974, pp. 145-159.

*TERRY, L.C., BRAY, G.M. and AGUAYO, A.J.: Schwann cell multiplication in developing rat unmyelinated nerves. A radioautographic study. Brain Research, v. 69, 1974, pp. 144-151.

*VALE, W., RIVIER, C., BRAZEAU, P., AMOSS, M., GRANT, G., MONAHAN, M., RIVIER, J., LING, N., BURGUS, R. and GUILLEMIN, R.: Physiology and pharmacology of hypothalamic hypophysiotropic hormones. Winter Conference on Brain Research, Steamboat Springs, Colorado, Jan. 19-26, 1974.

*VALE, W., RIVIER, C., BRAZEAU P. and GUILLEMIN, R.: Effects of somatostatin on the secretion of thyrotropin and prolactin. Endocrinology, v. 95, 1974, pp. 968-977.

WOLFE, Leonhard S.: Possible roles of prostaglandins in the nervous system. In: Advances in Neurochemistry, B.W. Agranoff, M.H. Aprison, eds. New York, Plenum Publishing, v. 1, 1975, pp. 1-59.

WOLFE, L.S. and MAMER, O.A.: Measurement of prostaglandin $F_{2\alpha}$ levels in human cerebrospinal fluid in normal and pathological conditions. Prostaglandins, v.9, #2, 1975, pp. 183-192.

WOLFE, L.S., BRECKENRIDGE, W.C. and SKELTON, P.P.C.: Involvement of mannosyl-phosphoryl-dolichols in mannose transfer to brain glycoproteins. Journal of Neurochemistry, v. 23, 1974, pp. 175-185.

YAMAMOTO, Lucas and WILLIAM, Feindel: Review of cerebral circulation. Neurological Surgery (Japan), v. 2(6), 1974, pp. 435-449.

*YOUNG, S.N., GARELIS, E., LAL, S., MARTIN, J.B., MOLINA-NEGRO, P., ETHIER, R. and SOURKES, T.L.: Tryptophan and 5-hydroxyindoleacetic acid in human cerebrospinal fluid. Journal of Neurochemistry, v. 22, 1974, pp. 777-780.

*Staff members of the Montreal General Hospital

# MONTREAL NEUROLOGICAL HOSPITAL

(Incorporated by Private Act under the laws of the Province of Quebec)

## BALANCE SHEET AS AT DECEMBER 31, 1974

### GENERAL FUND

| ASSETS | 1974 | 1973 |
|---|---|---|
| Cash | $ 86,319 | $ 516,171 |
| Accounts receivable — less provision for doubtful accounts | 613,797 | 388,494 |
| Due from The Quebec Department of Social Affairs | | |
| Operating grants | 653,725 | 428,568 |
| Special grant | 90,000 | 90,000 |
| Inventory of supplies at cost | 136,325 | 124,657 |
| | $1,580,166 | $1,547,890 |
| **LIABILITIES** | | |
| Bank loan | $ 513,397 | $ 249,125 |
| Accounts payable | 171,050 | 91,966 |
| Due to Royal Institution for the Advancement of Learning | | |
| Current account | 686,818 | 1,206,799 |
| Advances to cover prior years' deficit | 67,383 | 563,031 |
| CAPITAL (DEFICIT) (Note 1) | 141,518 | (563,031) |
| | $1,580,166 | $1,547,890 |

### PLANT FUND

| ASSETS | | | |
|---|---|---|---|
| Cash | | $ 16,185 | $ 47,363 |
| Due from The Quebec Department of Social Affairs | | 25,876 | 226,148 |
| Advance to Royal Institution for the Advancement of Learning — construction project | | 313,778 | — |
| Fixed assets, at cost | | | |
| Equipment | $2,160,570 | | |
| Less: Accumulated depreciation | 878,939 | 1,281,631 | 1,288,807 |
| | | $1,637,470 | $1,562,318 |
| **LIABILITIES** | | | |
| Bank loan | | $ 307,519 | $ — |
| Accounts payable | | 6,259 | — |
| Due to Royal Institution for the Advancement of Learning | | 42,061 | 273,511 |
| CAPITAL | | 1,281,631 | 1,288,807 |
| | | $1,637,470 | $1,562,318 |

# STATEMENT OF OPERATIONS
# FOR THE YEAR ENDED DECEMBER 31, 1974

| | 1974 | 1973 |
|---|---|---|
| INCOME | | |
| Quebec Department of Social Affairs (Note 1) | $5,293,348 | $3,933,713 |
| Revenue from patients | 1,556,835 | 1,327,943 |
| Grants — Quebec Department of Social Affairs | 90,000 | 90,000 |
| Other income | 16,343 | 16,349 |
| | 6,956,526 | 5,368,005 |
| EXPENSE: | | |
| Salaries and wages | 4,953,969 | 4,097,433 |
| Fringe benefits | 291,262 | 253,265 |
| Drugs, medical and surgical supplies | 303,956 | 255,819 |
| Services and supplies | 1,190,323 | 1,052,111 |
| | 6,739,510 | 5,658,628 |
| SURPLUS (DEFICIT) FOR THE YEAR (Note 3) | $ 217,016 | $ (290,623) |

# STATEMENT OF GENERAL FUND CAPITAL
# FOR THE YEAR ENDED DECEMBER 31, 1974

| | | |
|---|---|---|
| DEFICIT AT BEGINNING OF THE YEAR | $ (563,031) | $ (418,800) |
| Deduct: | | |
| Settlement from the Quebec Department of Social Affairs on account of prior years | 513,397 | 191,134 |
| Payment from the Quebec Department of Social Affairs on account of retroactive salary adjustments | 44,866 | — |
| Surplus for the year (Note 3) | 217,016 | — |
| Adjustment of prior year's deficit | 264 | 125 |
| | 212,512 | (227,541) |
| Add: | | |
| Salary adjustments retroactive to prior years | 1,615 | 44,867 |
| Deficit for the year | — | 290,623 |
| Estimated year end adjustment of offset income for prior years | 69,379 | — |
| CAPITAL (DEFICIT) AT END OF THE YEAR (Note 1) | $ 141,518 | $ (563,031) |

# STATEMENT OF PLANT FUND CAPITAL
# FOR THE YEAR ENDED DECEMBER 31, 1974

| | | |
|---|---|---|
| CAPITAL AT BEGINNING OF THE YEAR | $1,288,807 | $ 720,808 |
| Increase in plant capital | 127,860 | 699,422 |
| | 1,416,667 | 1,420,230 |
| Less: Depreciation on equipment | 135,036 | 131,423 |
| CAPITAL AT END OF THE YEAR | $1,281,631 | $1,288,807 |

# NOTES TO FINANCIAL STATEMENTS
# DECEMBER 31, 1974

1. *Quebec Department of Social Affairs*
   Income includes payments from the Government of Quebec to the extent of the amounts approved to December 31, 1974 by the Department of Social Affairs. 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. *Contingent Liabilities*
   Employees' accumulated sickness benefits, which are recoverable from the Department of Social Affairs when paid, amounted to $376,653 at December 31, 1974. These sickness benefits are payable when an employee terminates his services and are expensed at that time.

3. *Surplus*
   In 1974, the Quebec Department of Social Affairs has instructed the hospitals not to record in the accounts the estimated year end adjustment of offset income. Had the estimated year end adjustment been recorded on the same basis as in 1973, the surplus for the year and the operating grants receivable from the Quebec Department of Social Affairs would have been reduced by $193,379.

# AUDITORS' REPORT

To the Board of Directors,
Montreal Neurological Hospital.

We have examined the balance sheet of the Montreal Neurological Hospital as at December 31, 1974 and the statements of operations, general fund capital and plant fund capital for the year then ended. Our examination included a general review of the accounting procedures and such tests of accounting records and other supporting evidence as we considered necessary in the circumstances.

In our opinion these financial statements present fairly the financial position of the Hospital as at December 31, 1974 and the results of its operations for the year then ended, in accordance with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

Montreal, Que.
March 27, 1975

TOUCHE ROSS & CO.
Chartered Accountants.

# MONTREAL NEUROLOGICAL INSTITUTE
## RESEARCH AND TEACHING EXPENDITURE SUMMARY
## FOR THE YEAR ENDING DECEMBER 31, 1974

| | |
|---|---|
| M.N.I. — Endowment Funds | $ 510,797 |
| M.N.I. — Special Funds and Donations | 376,292 |
| Research and Fellowship Grants | 385,843 |
| McGill University — General Funds | 25,150 |
| — Geographic Full Time (Formerly QHIS — Hospital Component) | 112,500 |
| | $1,410,582 |

## 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

## 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

Medical Research Council of Canada Grants

— Dr. S. Carpenter
— Dr. C. Dila
— Dr. W. Feindel
— Dr. P. Gloor
— Dr. R. Hansebout
— Dr. G. Karpati
— Dr. B. Milner
— Dr. H. Pappius
— Dr. W. Sheremata
— Dr. A. Sherwin
— Dr. L. Wolfe
— Dr. I. Woods

Medical Research Council of Canada Associateships

— Dr. B. Milner
— Dr. L. Wolfe

Muscular Dystrophy Association Research Grants

— Dr. S. Carpenter
— Dr. A. Eisen
— Dr. G. Karpati
— Dr. G. Watters

Multiple Sclerosis Society of Canada

— Dr. W. Sheremata

# DONATIONS TO SPECIAL FUNDS — 1974-75

| | |
|---|---|
| **ANAESTHESIA RESEARCH FUND** | |
| **BRAIN RESEARCH FUND** | |
| Mr. A. Murray Vaughan | $ 1,000.00 |
| Mrs. A. Murray Vaughan | 1,000.00 |
| **CANCER CLINICAL RELIEF FUND** | |
| **WILLIAM CONE MEMORIAL RESEARCH FUND** | |
| Dr. David Berger | 25.00 |
| Mr. Kenneth H. Brown | 50.00 |
| In Memory of the late Mr. James Cheek | 358.00 |
| Mrs. Avis Cone | 5,000.00 |
| Mrs. Edith L. Dawson (In Memory of the late Miss Gail Budd) | 25.00 |
| Dr. & Mrs. G.K. Diggins (In Memory of the late Mrs. V. Lillie) | 25.00 |
| Miss Mildred Flynn | 100.00 |
| Mrs. Evelyn M. Griffith | 5.00 |
| Mr. Thomas Hecht | 1,000.00 |
| Mrs. Opal Holst | 50.00 |
| Mr. James G. Kendrick | 500.00 |
| Mr. Hugh G. Seybold | 50.00 |
| **COSGROVE RESEARCH FUND** | |
| Mr Michel Bourgeois | 100.00 |
| Mr. K.A. Boyce | 100.00 |
| Mr. Donald L. Gowing | 100.00 |
| Miss Doreen Jurychuk | 20.00 |
| Mr. J.A. de Lalanne | 200.00 |
| Miss Diana Zacaruk | 10.00 |
| **DICK EPILEPSY FUND** | |
| **GORDON LIBRARY FUND** | |
| **HARVEY CUSHING CLINICAL RELIEF FUND** | |
| Canadian Cancer Society | 425.00 |
| In His Name Society | 65.00 |
| In Memory of the late Mr. Walter Reinhardt | 156.00 |
| Mrs. Lillian Sandler | 35.00 |
| Mrs. Janet L. Shapiro | 25.00 |
| **HOSPITAL EQUIPMENT FUND** | |
| Mrs. A. Lachance (In Memory of her late husband Mr. Alphonse Lachance) | 500.00 |
| **MARY MASSABKY FOUNDATION RESEARCH FUND** | |
| **MISCELLANEOUS SPECIAL FUNDS** | |
| In Memory of the late Miss Louise Cohen | 15.00 |
| In Memory of the late Mr. Norman Corry | 10.00 |
| In Memory of the late Mr. Louis-Philippe Dallaire | 5.00 |
| In Memory of the late Mrs. H.B. Elliott | 10.00 |
| In Memory of the late Miss Anne Fyles | 10.00 |
| In Memory of the late Dr. Paul E. Gagnon | 75.00 |
| In Memory of the late Mr. Fred Goucher | 115.00 |
| In Memory of the late Mrs. Mary Kerr | 84.50 |

| | |
|---|---|
| In Memory of the late Mrs. Shirley Titleman Kiwitt | 140.00 |
| In Memory of the late Mr. Alphonse Lachance | 65.00 |
| In Memory of the late Mrs. Jeanne LeBeuf | 25.00 |
| In Memory of the late Mr. Gordon Marshall | 10.00 |
| In Memory of the late Mr. Archibald C. McDonald | 10.00 |
| In Memory of the late Mr. Jean Penverne | 20.00 |
| In Memory of the late Miss Kim Valentine | 10.00 |
| **M.N.I. BUILDING FUND** | |
| A.G.M. Limited | 5,000.00 |
| **M.N.I. NEUROSURGICAL RESEARCH FUND** | |
| In Memory of the late Mrs. Louise Fornarolo | 507.00 |
| Mr. Leo Posman | 1,000.00 |
| **M.N.I. PARKINSON'S DISEASE FUND** | |
| In Memory of the late Mr. Lovell C. Carroll | 20.00 |
| **M.N.I. STAFF LOAN FUND** | |
| **MULTIPLE SCLEROSIS CLINICAL RELIEF FUND** | |
| Multiple Sclerosis Golf League | 550.00 |
| **MULTIPLE SCLEROSIS RESEARCH FUND** | |
| Mr. and Mrs. Leonard Ellen | 6,500.00 |
| École Stella-Maria | 100.00 |
| **McNAUGHTON NEUROANATOMY RESEARCH FUND** | |
| **FRANCIS McNAUGHTON NEUROLOGICAL RESEARCH FUND** | |
| Mrs. Rita Breitman | 80.00 |
| In Memory of the late Mr. William P. Ferguson | 333.00 |
| In Memory of the late Master Gary Hounslow | 17.00 |
| Mr. William G. Lynn | 100.00 |
| Mr. Nathan Schreiber | 500.00 |
| Mr. Reginald E. Simons | 100.00 |
| Mr. B.A. Usheroff | 25.00 |
| Mr. and Mrs. D. Usheroff | 25.00 |
| Mr. J. Clare Wilcox | 100.00 |
| **NEUROLOGICAL RESEARCH FUND** | |
| Mr. Jack Berliner | 200.00 |
| Mr. B. Bosquet | 5.00 |
| Mr. A. Bronstein | 5.00 |
| Canadian Imperial Bank of Commerce, Timmons, Ont. | 26.00 |
| Miss Diane Davis | 5.00 |
| Mr. E. Gabelier | 5.00 |
| Mr. C. Grieff | 5.00 |
| Mr. G. Messadie | 5.00 |
| McConnell Foundation | 5,000.00 |
| Mr. André Michel | 245.00 |
| Mrs. Betty Nowa | 500.00 |
| Mr. & Mrs. Leslie Rothschild (in Honour of Mr. & Mrs. David Lisser's 40th Anniversary) | 15.00 |
| Mr. Arthur Rudnikoff | 20.00 |
| Mr. F. Rudnikoff | 5.00 |
| The Steyning Foundation | 3,000.00 |

| | |
|---|---|
| Mr. & Mrs. Steven Tolensky (in Honour of Mr. & Mrs. F. Rothschild's 30th Anniversary) | 25.00 |
| Mr. I.B. Zelikovitz | 250.00 |
| NEUROPHYSIOLOGY RESEARCH FUND | |
| NEURORADIOLOGY RESEARCH AND TEACHING FUND | |
| NURSING FUNDS | |
| EILEEN C. FLANAGAN NURSING BURSARY FUND | |
| M.N.I. NURSING EDUCATION FUND | |
| Women's Auxiliary of the Royal Victoria Hospital | 1,000. |
| OAKLAWN FOUNDATION FELLOWSHIP FUND | |
| PENFIELD AWARD FUND | |
| PENFIELD RESEARCH FUND | |
| REUBEN RABINOVITCH MEMORIAL FUND | |
| REUBEN RABINOVITCH MEMORIAL LIBRARY FUND | |
| Mr. and Mrs. Leo Posman | 250.00 |
| LEWIS REFORD FELLOWS' FUND | |
| SHERWIN RESEARCH FUND | |
| SPECIAL PROJECTS FUND | |
| Anonymous (for Stroke Research) | 120,000.00 |
| SPINAL CORD RESEARCH FUND | |
| Mr. Motel Bond | 500.00 |
| In Memory of the late Mr. James D. Brown | 172.00 |
| In Memory of the late Mr. William Leonard Mundy | 273.00 |
| In Memory of the late Mrs. Dorothy Scotcher | 400.00 |
| THOMAS WILLIS FUND | |
| R.V.H. WOMEN'S AUXILIARY FUND | |
| Women's Auxiliary of the Royal Victoria Hospital | 4,000.00 |

Donations to the Montreal Neurological Institute may be made to any of the above 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 the *Secretary, Mrs. Ernest Rossiter, Jr., Box 441, Elizabethtown, N.Y. 12932,* with the notation that they are for the Montreal Neurological Institute.

# SUGGESTED FORMS OF BEQUESTS

## 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 Institue, 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, address
The Director
Montreal Neurological Institute
3801 University St.
Montreal H3A 2B4, P.Q.

| | | |
|---|---|---|
| *Craniotomy and Craniectomy* | | |
| and biopsy | 14 | |
| and decompression | 7 | |
| and drainage of abscess | 1 | |
| and drainage of subdural haematoma | 16 | |
| and drainage of intracerebral haematoma | 7 | |
| and drainage of extradural haematoma | 1 | |
| and elevation of depressed skull fracture | 3 | |
| and excision of epileptogenic focus (lobectomy) | 56 | |
| and excision of epileptogenic focus (hemispherectomy) | 1 | |
| and excision, clipping or wrapping of aneurysm | 16 | |
| and hypophysectomy for pituitary or intrasellar tumour | 1 | |
| and hypophysectomy (transphenoidal) for endocrine tumour | 7 | |
| and hypophysectomy (transphenoidal) for pituitary of intrasellar tumour | 15 | |
| and incisions, drainage or removal of cyst | 1 | |
| and plastic repair of dura, (CSF, Rhinorrhea or Fistula) | 3 | |
| and plastic repair of skull defect (Plate, Bone or Plastic) | 2 | |
| and removal of adhesions | 2 | |
| and removal of arteriovenous malformation | 8 | |
| and removal of posterior fossa tumour | 11 | |
| and removal of cerebral tumour | 61 | |
| and removal of tumour of skull | 1 | |
| and trigeminal rhizotomy | 3 | |
| and ventriculo-cisternostomy (Torkildsen's) | 3 | 240 |
| *Trepanation* | | |
| and biopsy | 4 | |
| and drainage of epidural space | 10 | |
| and ventricular puncture | 1 | |
| and ventriculography | 8 | 23 |
| *Shunt Procedure* | | |
| lumbar subarachnoid-peritoneal | 1 | |
| ventricular caval | 38 | |
| ventricular peritoneal | 1 | |
| *Stereotaxic procedure* | | |
| ventriculography | 2 | |
| second stage | 17 | 59 |
| *Nerve Explorations* | | |
| avulsion or section | 14 | |
| neurolysis, transplantation or decompression | 40 | 54 |
| *Artery Exploration* | | |
| endarterectomy (Patchgraft) | 15 | |
| ligation | 3 | |
| progressive occlusion (Selverstone clamp) | 7 | 25 |
| *Laminectomy and Hemilaminectomy* | | |
| anterolateral cordotomy — cervical | 4 | |
| anterolateral cordotomy — thoracic | 7 | |
| biopsy | 1 | |
| decompression or exploration of spinal cord for spondylosis (dentate ligament section) | 17 | |
| decompression or exploration of spinal cord (trauma) | 5 | |

| | | |
|---|---|---|
| decompression or exploration of spinal cord tumour or vascular malformation | 6 | |
| discoidectomy — lumbaosacral | 57 | |
| discoidectomy — cervical | 2 | |
| discoidectomy — anterior approach — cervical | 24 | 189 |
| incision and drainage of abscess | 1 | |
| incision and drainage of intramedullary cyst (Syringomyelia) | 6 | |
| removal of tumour — intramedullary | 4 | |
| removal of tumour — extramedullary, intradural | 4 | |
| removal of extradural tumour — metastatic, bone, etc. | 10 | |
| rhizotomy | 6 | |
| spinal fusion with bone graft — autogenous or bone bank | 20 | |
| spinal fusion with wire, plate or surgical simplex | 12 | |
| spinal fusion — cervical — occipital | 3 | |
| *Wound Re-opening* | | |
| drainage of infection | 1 | |
| evacuation of haematoma | 9 | |
| exploration | 4 | |
| further removal of brain tissue | 1 | |
| further removal of epileptogenic focus | 1 | |
| further removal of tumour | 1 | |
| removal of bone flap, tantalum plate or wire mesh | 2 | |
| resuturing | 5 | 24 |
| *Miscellaneous* | | |
| miscellaneous | 52 | |
| tracheostomy | 11 | |
| muscle biopsy | 105 | 168 |
| TOTAL number of theatre cases | | 782 |
| *Radiological Procedures* | | |
| cerebral angiography | 294 | |
| percutaneous, carotid, vertebral or subclavian | 221 | |
| catheterization (brachial, femoral or carotid) | 273 | |
| TOTAL number of x-ray procedures | | 788 |

## CLASSIFICATION OF DISEASES — 1974

| | | |
|---|---|---|
| *Nervous System Generally* | | |
| Multiple Sclerosis | 78 | |
| Motor Neurone Disease | 19 | |
| Friedreich's Ataxia | 2 | |
| Tuberous Sclerosis | 5 | |
| Miscellaneous | 18 | 122 |
| *Meninges* | | |
| Meningocele & Myelomeningocele | 6 | |
| Acute Purulent Meningitis | 13 | |
| Subdural Haematoma | 25 | |
| Subarachnoid Haemorrhage | 42 | |
| CSF Rhinorrhea | 3 | |
| Spinal Arachnoiditis | 2 | |
| Miscellaneous | 70 | 161 |
| *Brain* | | |
| Congenital Anomalies | 11 | |
| Hydrocephalus | 25 | |
| Abscess | 2 | |

| | | |
|---|---|---|
| Head Injury (Contusion, Laceration, Traumatic Encephalopathy, Concussion, Skull Fracture) | 178 | |
| Epilepsy | 325 | |
| Arnold-Chiari Deformity | 15 | |
| Parkinsonism | 35 | |
| Intracerebral Haemorrhage | 21 | |
| Intracerebral Haematoma | 7 | |
| Alzheimer's Disease | 16 | |
| Thrombosis, Encephalopathy due to Arteriosclerosis | 108 | |
| Cysts | 8 | |
| Aneurysm | 14 | |
| Encephalitis | 3 | |
| Arteriovenous Malformation | 19 | |
| Miscellaneous | 180 | 541 |
| *Tumours* | | |
| Astrocytoma | 22 | |
| Meningeal Fibroblastoma | 4 | |
| Craniopharyngioma | 6 | |
| Schwannoma | 6 | |
| Neuroma | 3 | |
| Chromophobe Adenoma of Pituitary | 24 | |
| Gliomas | 21 | |
| Sarcoma | 3 | |
| Metastatic Carcinoma | 112 | |
| Brain Tumour Suspected | 4 | |
| Hemangioblastoma | 1 | |
| Myeloma | 1 | |
| Angioma | 1 | |
| Pinealoma | 1 | |
| Medulloblastoma | 4 | |
| Neurofibromatosis | 4 | |
| Glioblastoma Multiforme | 38 | |
| Oligodendroglioma | 4 | |
| Meningioma | 34 | |
| Chordoma | 2 | |
| Miscellaneous | 2 | 297 |
| *Spinal Cord* | | |
| Contusion of Spinal Cord | 4 | |
| Compression of Spinal Cord | 2 | |
| Guillain-Barre Syndrome | 8 | |
| Myelopathy | 17 | |
| Syringomyelia | 7 | |
| Hydromyelia | 5 | |
| Anterior Horn Cell Disease | 3 | |
| Diastematomyelia | 3 | |
| Spinocerebellar Degeneration Suspected | 2 | |
| Spinal Stenosis | 5 | |
| Ependymoma | 4 | |
| Miscellaneous | 67 | 127 |
| *Cranial & Peripheral Nerves* | | |
| Optic Neuritis | 2 | |
| Trigeminal Neuralgia | 16 | |
| Compression Ulnar Nerve | 3 | |
| Carpal Tunnel Syndrome | 17 | |
| Other Neuralgias | 8 | |

| | | |
|---|---|---|
| Peripheral Neuropathy | 10 | |
| Neuritis | 1 | |
| Occipital Neuralgia | 7 | |
| Retinopathy | 2 | |
| 6th Nerve Palsy | 2 | |
| Oculomotor Paresis | 1 | |
| Meralgia Paresthetica | 1 | |
| Miscellaneous | 57 | 127 |
| *Muscles* | | |
| Myasthenia Gravis | 8 | |
| Muscular Dystrophy | 11 | |
| Myopathy | 6 | |
| Spasmodic Torticollis | 3 | |
| Muscular Atrophy | 4 | |
| Charcot-Marie-Tooth Disease | 1 | |
| Miscellaneous | 21 | 54 |
| *Mental Disease* | | |
| Mental Retardation | 1 | |
| Depression | 16 | |
| Anxiety State | 5 | |
| Conversion Hysteria | 10 | |
| Schizophrenia | 3 | |
| Behaviour Disorder | 13 | |
| Chronic Alcoholism | 7 | 55 |
| *Other Systems* | | |
| Protrusion Disc — Lumbar | 87 | |
| Protrusion Disc — Cervical | 13 | |
| Fracture and/or Dislocation Vertebral Column | 27 | |
| Back Pain | 33 | |
| Pain Miscellaneous | 21 | |
| Traumatic Lesions and Infections | 2 | |
| Gunshot Wounds | 2 | |
| Coronary Insufficiency | 1 | |
| Diabetes Mellitus | 9 | |
| Osteomyelitis | 3 | |
| Hypertension | 6 | |
| Hyperventilation Syndrome | 3 | |
| Osteoarthritis | 2 | |
| Miscellaneous | 92 | 301 |
| TOTAL | | 2211 |

## CAUSES OF DEATH — 1974

| | | |
|---|---|---|
| Head injury (concussion, contusion, haematoma) | 13 | |
| Intracranial aneurysm (haemorrhage, haematoma due to aneurysm) | 7 | |
| Cerebrovascular disease (thrombosis, infarction, haemorrhage) | 32 | |
| Intracranial tumour, primary | 14 | |
| Intracranial tumour, metastatic | 13 | |
| Cardiac arrest | 4 | |
| Other systems | 34 | |
| TOTAL | | 117 |