

## CURRICULUM VITAE

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**PETER A. PAHAPILL, M.D., PhD., F.A.C.S., F.R.C.S. (C.)****CURRENT POSITION:**

Director, Nasseff Neurorestoration Center ,  
 Staff Neurosurgeon, United Neurological Associates,  
 United Hospital, Allina Hospitals & Clinics  
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**EDUCATION**

<b><u>DEGREE</u></b>	<b><u>FIELD OF STUDY</u></b>	<b><u>UNIVERSITY</u></b>	<b><u>YEAR</u></b>
<b>B.Sc.</b>	Biomedical Science	U. of Toronto	1984
<b>M.Sc.</b>	Neurophysiology	U. of Toronto	1985
<b>Ph.D.</b>	Neuroscience	U. of Toronto	1990
<b>M.D.</b>	Medicine	U. of Toronto	1992
<b>FRCS(C)</b>	Neurosurgery	U. of Western Ontario	1998
<b>FACS</b>	Neurosurgery		2006
<b>Fellowship</b>	Functional Neurosurgery	U. of Toronto	2000
<b>Course Graduate</b>	Pittsburgh Gamma Knife Surgery	U. of Pittsburgh	2001
	Kyphoplasty	Medical College of Philadelphia	2003
	Interstim Therapies	Medtronic	2003
	Cleveland Clinic Gamma Knife Surgery	Cleveland Clinic	2007

**PREVIOUS PROFESSIONAL/ACADEMIC APPOINTMENTS**

Staff Neurosurgeon, Surgical Director Hamot Movement Disorders and Parkinson's Care Center, Erie, PA (November 2006 – September 2008)

Staff Neurosurgeon, Pennsylvania Neurosurgery and Neurosciences Institute, Harrisburg, PA (November 2002-October 2006)

Assistant Professor, Head, Section of Stereotactic, Functional and Restorative Neurosurgery, Penn State, Milton S. Hershey Medical Center, Hershey, PA (September 2001-May 2002)

Assistant Professor, Division of Neurosurgery, Department of Surgery, Head, Section of Stereotactic, Functional and Restorative Neurosurgery Medical College of Ohio, Toledo, Ohio. (July 2000-August 2001)

**HONOURS**

Engineering Entrance Scholarship, University of Waterloo, 1980.

Margaret J. Santalo Memorial Scholarship for Highest Academic Standing in Advanced Physiology, University of Toronto, 1983-1984.

Natural Sciences and Engineering Research Council of Canada (NSERC) Research Scholarship, 1984.

Ontario Graduate Scholarship, 1984-1985.

Medical Research Council (MRC) Scholarship, 1986-87.

George Brown Memorial Award for Research Accomplishment, Faculty of Medicine, University of Toronto, 1986-1987.

Health Research Personnel Award, Ontario Ministry of Health, 1987.

Medical Research Council (MRC) Scholarship, 1987-88, ranked 25th out of 742.

Selected Delegate at Research Frontiers in Diabetes Mellitus, 1988.

Medical Research Council (MRC) Scholarship, 1988-89.

Talbot Travel Award, American Biophysical Society, 1989.

Medical Research Council (MRC) Scholarship, 1989-90.

Physician Scientist Program Award Gold Medal. University of Miami School of Medicine, Eastern Student Research Forum, 1990.

Medical Research Council (MRC) Scholarship, 1990-91.

ANSA Foundation MD/PhD Research Scholarship, 1990-1992.

Letter of Recognition for Resident Teaching, University of Western Ontario, 1994.

First Prize for Clinical Research at University of Western Ontario Department of Neurological Sciences Resident Research Day, 1996.

Glaxo-Wellcome Epilepsy Research Grant, 1998-99 (declined)

Medical Research Council (MRC) Research Fellowship Grant, 1998-99.

Best Multimedia Lecture to Medical Students, Penn State University College of Medicine, 2002.

**{PRIVATE }EXAMINATIONS COMPLETED AND LICENSURE{tc \ 1 "EXAMINATIONS COMPLETED AND LICENSURE"}**

LMCC (MCCQE PART I), 1992

Ontario Medical License (since 1993)

MCCQE PART II, 1993

Principles of Surgery, 1995

American Board of Neurological Surgeons Part I, 1996

Royal College Final Examinations in Neurosurgery (FRCSC), 1998

USMLE (Parts I, II, III), 1999

Ohio State Medical License (since 2000)

Pennsylvania State Medical License (since 2001)

American Board of Neurological Surgeons Part II (FACS), 2006

Minnesota State Medical License (since 2008)

Wisconsin State Medical License (since 2010)

**SOCIETY MEMBERSHIPS**

American Biophysical Society (1989-1991)

Ontario Medical Association (since 1985)

Canadian Medical Association (since 1985)

American Association of Neurological Surgeons (since 1995)

Pain Section of Association of Neurological Surgeons (since 2000)

Leksell Gamma Knife Society (since 2001)

Pennsylvania Medical Society (since 2002)

Dauphin/Erie County Medical Society (since 2002)

Minnesota Medical Society (since 2008)

Hennepin County Medical Society (since 2008)

North American Neuromodulation Society (since 2008)

**PREVIOUS/PRESENT ACADEMIC COMMITTEE MEMBERSHIPS**

Operating room committee

Graduate School Faculty

Compliance Officer for Surgery

Graduate Neurobiology Committee

Professional Development and Credentialing Committee

Allina Investigational Review Board (IRB) Restructuring Committe

United Hospital Investigational Review Board (IRB) Committee (active)

**CURRENT EDITORIAL CONTRIBUTIONS**

Journal of Neurology, Reviewer

**COURSE INSTRUCTOR**

1. Surgery for Movement Disorders. Department of Neurology and Neurosurgery, University of Toronto School of Medicine, Toronto, Ontario, Canada (May, 1998).
2. Brain and Behavior. Division of Neurology, University of Toronto School of Medicine, Toronto, Ontario, Canada (March, 1999)
3. Surgery for Movement Disorders. Department of Neurology and Neurosurgery, University of Toronto School of Medicine, Toronto, Ontario, Canada (May, 1999).
4. Neuromodulation and Restorative Neurosurgery: Procedures for the New Millenium, New York University, New York, New York (June, 1999).
5. Neuromodulation Therapies; Canadian Congress of Neurosciences and Medtronic of Canada Ltd., Edmonton, Alberta, Canada (June, 1999).
6. Strengthening the Body and Mind for the Journey through Parkinson's Disease, Medical College of Ohio Hospitals, Toledo, Ohio (July, 2000).
7. Neurosurgery Update. Co-director, Department of Surgery, Division of Neurosurgery, Medical College of Ohio Hospitals. Toledo, Ohio (January, 2001).
8. Indications, Patient Selection and Results of Pumps and Stimulators for Human CNS Disease. Fulton County Hospital CME Course, Wausean, Ohio (January, 2001).
9. Use of Pumps and Stimulators for Neuromodulation. Neurology Research Day Course, Medical College of Ohio, Toledo, Ohio (March, 2001).
10. Anatomic, Pathologic and Clinical Correlation of Spinal Cord Injuries. Department of Neurosciences, Medical College of Ohio, Toledo, Ohio (April, 2001).
11. Practical Workshop on Deep-Brain Stimulation. Director. 2001 Annual Clinical Assembly of Osteopathic Specialists (October, 2001).

**INVITED SPEAKER/LECTURES**

1. "Long-term Facilitation and Low-frequency Depression in Invertebrate Motoneurons", University of Toronto Department of Physiology, Toronto, Ontario (June, 1985).
2. "Effects of Temperature on Potassium Channels in Human T Cells", University of Toronto Department of Physiology, Toronto, Ontario (June, 1989).
3. "Regulation of Potassium and Chloride Channels in Normal Human T lymphocytes", Eastern North American Research Forum, Miami, Florida (February, 1990).
4. "Modulation of Ion Channels in Human Lymphocytes", National North American Research Forum, Galveston, Texas (August, 1990).
5. "Modulation of Human Lymphocyte Ion Channels by Temperature, Membrane Receptors and Second Messengers", University of Toronto Department of Physiology, Toronto, Ontario (November, 1990).
6. "Mechanisms of Spinal Cord Injury: An Anatomical and Clinical Correlation", Victoria Hospital Teaching Rounds, London, Ontario (May, 1994).
7. "Human Channelopathies and the Patch-Clamp Technique", University of Western Ontario Neuroscience Grand Rounds, London, Ontario (September, 1994).
8. "Pleomorphic Xanthoastrocytoma and the Role of Surgery", University of Western Ontario Neuroscience Grand Rounds, London, Ontario (January, 1995).
9. "Basics of Human Neuroanatomy: a Practical Approach", University Hospital Teaching Rounds, London, Ontario (March, 1995).
10. "A Conservative Approach to an Acute Spinal Epidural Hematoma", University of Western Ontario Neuroscience Grand Rounds, London, Ontario (September, 1996).
11. "Neurosurgical Emergencies", University of Toronto Medical School Core Neurosurgery Teaching, Toronto, Ontario (November, 1997).
12. "Cranial Nerves and the Motor System", University of Toronto Medical School Core Neurosurgery Teaching, Toronto, Ontario (February, 1998).
13. "Deep-brain Stimulation for Chronic Pain", Medtronic of Canada Ltd., Mississauga, Ontario (June, 1998).
14. "Chronic brain stimulation: Current and Future Clinical Application", Neuroscience Grand Rounds, Westchester Medical School, Westchester, New York (July, 1998).
15. "Human Central Nervous System Electrical Stimulation", Neurosurgery Grand Rounds, Case Western Medical Center, Cleveland, Ohio (December, 1998).
16. "Turning Off Tremor, the Surgical Way – Pallidotomy and Implantable Deep Brain Stimulators", Brain and Behavior Course, University of Toronto, Toronto, Ontario, Canada (March, 1999).
17. "Microinjection Studies and Parkinson's Disease", Neuromodulation and Restorative Neurosurgery Course, New York University, New York, New York (June, 1999).
18. "Spinal Cord Stimulation for Refractive Angina Pectoris", Neuromodulation Therapies Course, Edmonton, Alberta (June, 1999).
19. "Neurostimulation of the Human CNS: Present and Future Clinical and Research Applications", California Institute of Technology and Huntington Hospital, Pasadena, California (February, 1999).
20. "Electrical Stimulation of the Human Central Nervous System: I. Present Therapeutic Applications; II. Future Therapeutic and Research Applications", Prince of Wales Medical Research Institute and Institute of Neurological Sciences, The Prince Henry and Prince of Wales Hospitals, The University of New South Wales, Randwick, Australia (May, 1999).
21. "Clinical and Research Applications of Deep-brain and Spinal-cord Stimulation", Cleveland Clinic Foundation, Cleveland, Ohio (June, 1999).
22. "Human Central Nervous System Electrical Stimulation: Present and Future Clinical and Research Applications", Clinical Neurosciences, University of Calgary, Calgary, Alberta. (July, 1999).
23. "Degenerative and Neoplastic Lesions of the Human Spine and Spinal Cord", University of Toronto Core Neurosurgery Teaching, Toronto, Ontario (September, 1999).
24. "Human Deep-brain and Spinal-cord Stimulation: Clinical and Research Prospectives", Neurosciences Grand Rounds, St. Michael's Hospital, University of Toronto, Toronto, Ontario (September, 1999).

25. "Brain Tumors and Surgical Stroke", University of Toronto Core Neurosurgery Teaching, Toronto, Ontario (October, 1999).
26. "Deep-brain and Spinal-cord Stimulation of the Human Central Nervous System", Neurosciences Grand Rounds, Medical College of Ohio, Toledo, Ohio (October, 1999).
27. "Human Deep-brain and Spinal-cord Stimulation". Neurosurgery Grand Rounds, University of Texas, Medical Branch at Galveston, Galveston, Texas (October, 1999).
28. "Human Central Nervous System Electrical Stimulation: Present and Future Clinical and Research Applications". Neurosciences Grand Rounds, University of Texas, Houston, Houston Texas. (October, 1999).
29. "Coma", University of Toronto Core Neurosurgery Teaching, Toronto, Ontario (November, 1999).
30. "Deep-brain and Spinal-cord Stimulation", Neurosciences Grand Rounds, University of Toronto, St. Michael's Hospital (November, 1999).
31. "Surgical Advances in Parkinson's Disease: Deep Brain Stimulation", Parkinson's Disease Symposium, Medical College of Ohio Hospitals, Toledo, Ohio (July, 2000),
32. "Intrathecal Drug Therapy, Spinal Cord Stimulation and Deep Brain Stimulation for Pain", Rehabilitation Medicine Rounds, Medical College of Ohio, Toledo, Ohio (July, 2000).
33. "Neuromodulation Therapies: Present and Future Clinical and Research Applications". Neuroscience Rounds, Bowling Green State University, Bowling Green, Ohio (September, 2000).
34. "Neurosurgical Neuromodulation Therapies for the Patient with Pain: Present and Future Clinical and Research Applications". Medicine Grand Rounds, Medical College of Ohio, Toledo, Ohio (September, 2000).
35. "Spinal Cord Tumors and Other Compressive Lesions of the Spinal Cord". Core Lecture Series for Neurology Residents, Medical College of Ohio, Toledo, Ohio (October, 2000).
36. "Microinjection Studies in Patients with Movement Disorders". Botterall Scientific Meeting. University of Toronto, Toronto, Canada (November, 2000).
37. "Surgical Neuromodulation Therapies: Present and Future Clinical and Research Applications". Toledo Neurological Society Keynote Speaker. Toledo, Ohio (November, 2000).
38. "Electrical Stimulation of the Human Central Nervous System". Medical College of Ohio Hospitals Outreach Program. Defiance, Ohio (January, 2001).
39. "Electrical Stimulation of the Human Central Nervous System". Medical College of Ohio Hospitals Outreach Program. Fulton County Health Center, Fulton, Ohio (January, 2001).
40. "Update on Surgical Treatment of Movement Disorders". Medical College of Ohio Neurosurgery Symposium. Medical College of Ohio, Toledo, Ohio, (January, 2001).
41. "Human Deep-Brain Electrical Stimulation Therapy: How does it work?". Medical College of Ohio Neuroscience Seminar Series. Medical College of Ohio, Toledo, Ohio (February, 2001).
42. "Surgical Neuromodulation Therapies: Present and Future Clinical and Research Applications", Visiting Lectureship, Department of Neurosurgery, Penn State University, Hershey Medical Center, Hershey, Pennsylvania (March, 2001)
43. "Functional, Stereotactic and Restorative Neurosurgery Programs at the Medical College of Ohio", Surgical Research Group, Medical College of Ohio, Toledo, Ohio (March, 2001).
44. "Neuromodulation Therapies", First Annual Neurology Research Day, Medical College of Ohio, Toledo, Ohio (March, 2001)
45. "Learn to Break the Chain of Pain: New Advancements in the Treatment of Pain, Angina, Abnormal Movements and Paralysis", Community Education Series at MCO, Medical College of Ohio, Toledo, Ohio (March, 2001).
46. "Present and Future Clinical and Research Applications of Functional Neurosurgical Therapeutic Techniques", Travelling Lectureship, Department of Neurosurgery, University of Colorado, Denver, Colorado (March, 2001).
47. "The Use of Pumps and Stimulators for Human Neuromodulation: Present and Future Clinical and Research Applications", Travelling Lectureship, Section of Neurosurgery, Neurosciences Grand Rounds, Winnipeg, Manitoba, Canada (March, 2001).
48. "Role of Neurosurgery for Parkinson's Disease". Parkinson's Foundation of America Support Group, Medical College of Ohio (April, 2001).
49. "Deep-brain Stimulation for Essential Tremor". Channel 24, NBC News Broadcast, Medical College of Ohio, Toledo, Ohio (April,

- 2001).
50. "Updates on Deep Brain Stimulation at the Medical College of Ohio". Parkinson's Disease Symposium, Toledo, Ohio (May, 2001).
  51. "Deep Brain Stimulation and its Effects in the PVG and PAG". Case Western University Neuromodulation Grand Rounds. Cleveland, Ohio (August, 2001)
  52. "Human Deep-Brain Stimulation in the USA: Clinical and Business Considerations". 2001 Annual Clinical Assembly of Osteopathic Specialists. Palm Desert, California (October, 2001).
  53. "Practical Workshop on Deep-Brain Stimulation". 2001 Annual Clinical Assembly of Osteopathic Specialists. Palm Desert, California (October, 2001).
  54. "Clinical and Research Utility of fMRI in Patients with Deep Brain, Spinal Cord, and Vagal Nerve Stimulators". Functional MRI Group. Hershey Medical Center, Hershey, PA (October, 2001).
  55. "Clinical and Research Utility of Magnetic Resonance Imaging in Patients with Deep Brain, Spinal Cord and Vagal Nerve Stimulators" Functional Magnetic Resonance Imaging Group. The Milton S. Hershey Medical Center. Hershey, PA (October, 2001).
  56. "Utility of Vagal Nerve Stimulation for Epilepsy and Chronic Depression" Department of Psychiatry. The Milton S. Hershey Medical Center Hershey, PA (November, 2001).
  57. "Deep-brain Stimulation for Parkinson's Disease". Care-Line Employees. The Milton S. Hershey Medical Center, Hershey, PA. (December, 2001).
  58. "Deep-brain Stimulation for Parkinson's Disease". Hanover Hospital. Hanover, PA (January, 2002).
  59. "Neuromodulation for Pain and Movement Disorders". Trindall Rehabilitation Medical Center. Mechanicsburg, PA. (January, 2002).
  60. "The Thalamus and Basal Ganglia: Anatomical Considerations". Neuroscience Resident Lecture Series. The Milton S. Hershey Medical Center. Hershey, PA. (January, 2002).
  61. "The Role of Surgical Neuromodulation for Pain and Parkinson's Disease". Primary Care Residency Program Lecture Series. The Milton S. Hershey Medical Center Hershey, PA. (January 11, 2002).
  62. "The Thalamus and Basal Ganglia: Functional and Surgical Considerations". Neuroscience Resident Lecture Series. The Milton S. Hershey Medical Center. Hershey, PA. (January, 2002).
  63. "Recent advances in neuromodulation therapies for pain and movement disorders". Fishburn Road Health Group. The Milton S. Hershey Medical Center, Hershey, PA. (January, 2002).
  64. "Neuromodulation therapies including spinal cord stimulation for RSD". Division of Rheumatology Lecture Series. The Milton S. Hershey Medical Center, Hershey, PA. (January, 2002).
  65. "Neurotransmission". Neuroscience Resident Lecture Series. The Milton S. Hershey Medical Center, Hershey, PA. (January, 2002).
  66. "Neuromodulation therapies including spinal cord stimulation for peripheral vascular disease". Division of Vascular Surgery Lecture Series. The Milton S. Hershey Medical Center, Hershey, PA. (January, 2002).
  67. "Functional Neurosurgery". Medical Student Lecture Series. The Milton S. Hershey Medical Center, Hershey, PA. (January, 2002).
  68. "Surgical Treatments for Parkinson's Disease and Chronic Pain". Hanover Hospital, Hanover, Pennsylvania (January, 2002).
  69. "Deep Brain Stimulation for Parkinson's Disease". Mechanicsburg Parkinson's Support Group, Mechanicsburg, Pennsylvania (January, 2002).
  70. "The Human Thalamus". Neuroscience Resident Lecture Series. The Milton S. Hershey Medical Center, Hershey, Pennsylvania (January, 2002).
  71. "Chronic Pain Syndromes". Primary Care Residency Colloquium Series. The Milton S. Hershey Medical Center, Hershey, Pennsylvania (January, 2002).
  72. "The Human Basal Ganglia". Neuroscience Resident Lecture Series. The Milton S. Hershey Medical Center, Hershey, Pennsylvania (January, 2002).
  73. "Neuromodulation for Chronic Pain and Movement Disorders". Fishburn Road Health Group. The Milton S. Hershey Medical

- Center, Hershey, Pennsylvania (January, 2002).
74. "Spinal Cord Stimulation for Reflex Sympathetic Dystrophy". Department of Rheumatology Lecture Series. The Milton S. Hershey Medical Center, Hershey, Pennsylvania (January, 2002).
  75. "Neurotransmission". Neuroscience Resident Lecture Series. The Milton S. Hershey Medical Center, Hershey, Pennsylvania (January, 2002).
  76. "Spinal Cord Stimulation for Refractory Peripheral Vascular Disease". Department of Vascular Surgery Lecture Series. The Milton S. Hershey Medical Center, Hershey, Pennsylvania (January, 2002).
  77. "Parkinson's Disease and Alcohol Withdrawal". Medical Student Seminar Series. The Milton S. Hershey Medical Center, Hershey, Pennsylvania (January, 2002).
  78. "Care of Parkinson's Patients with Deep Brain Stimulators". Intensive Care Unit Staff, Community General and Osteopathic Hospital (January, 2003).
  79. "Deep-brain Stimulation for Parkinson's Disease". Reading Parkinson's Support Group. Reading Hospital, Reading, PA. (March, 2003).
  80. "Post-operative Care of DBS Patients". 1 West Nursing Station, Community General and Osteopathic Hospital (April, 2003).
  81. "Surgical Options for Parkinson's Patients". Hannover Parkinson's Support Group. Hannover, PA. (June, 2003).
  82. "Parkinson's Disease and Surgery". Cornwall Manner Parkinson's Support Group. Cornwall, PA. (July, 2003).
  83. "Peri-operative Issues with DBS Patients". Operating Room Staff, Community General and Osteopathic Hospital (August, 2003).
  84. "Neuromodulation Therapies and Neurorehabilitation". Department of Rehabilitation, Health South Hospital. Mechanicsburg, PA. (August, 2003).
  85. "Deep Brain Stimulation". Susquehanna Valley Parkinson's Disease Support Group. Montoursville, PA (September, 2003)
  86. "Neurosurgical Therapies for Neuromodulation". Department of Surgery Grand Rounds Presentation, Pinnacle Health, Harrisburg Hospital, Harrisburg, PA (September, 2003).
  87. "All About Activa", Community General and Osteopathic Hospital, Harrisburg, PA (January, 2004)
  88. "Parkinson's Disease and Tremor Open House", Community General and Osteopathic Hospital, Harrisburg, PA (February, 2004).
  89. "Surgical Treatments for Parkinson's Disease and Tremor". St. Joan of Arc Health Fair, Hershey, PA (April, 2004).
  90. "Third Ventricular Width as a Guide to Subthalamic Nucleus Electrode Placement for Parkinson's Disease". Pennsylvania Neurosurgery Society Meeting, Poster Presentation. Hershey, PA (July, 2004).
  91. "Intrathecal Baclofen Therapy for Spasticity". Health South Physical Therapy Department, Mechanicsburg, PA (August, 2004).
  92. "Subthalamic Nucleus Deep Brain Stimulation for Parkinson's Disease: Third Ventricular Width and Final Electrode Position: A Prospective and Retrospective Study". American Association of Stereotactic Neurosurgery Annual Meeting, Poster Presentation. Cleveland, OH (September, 2004).
  93. "Deep Brain Stimulation for Parkinson's Disease". Pinnacle Health Systems. Harrisburg, PA. (October, 2004).
  94. "Deep Brain Stimulation for Dystonia". Community General and Osteopathic Hospital, Harrisburg, PA (December, 2004).
  95. "Deep Brain Stimulation for Parkinson's Disease and Dystonia". Pinnacle Health Systems, Harrisburg, PA (February, 2005).
  96. "Rehabilitation and Programming after Deep Brain Stimulation". Healthsouth Rehabilitation Center, Altoona, PA (February, 2005).
  97. "Neuromodulation Therapies: Present and Future Applications". "Regaining Functions of Patients with Neurological Disease: An Update Symposium", Pinnacle Health Neurosciences, Harrisburg, PA (March, 2005).
  98. "Subthalamic Nucleus Deep Brain Stimulation for Parkinson's Disease: Third Ventricular Width and Final Electrode Position". Pinnacle Health System Medical Education Day, Poster Presentation. Harrisburg, PA (March, 2005).
  99. "Deep Brain Stimulation for Parkinson's Disease". Healthsouth Rehabilitation Hospital of Altoona, Altoona, PA (April, 2005).
  100. "Deep Brain Stimulation for Parkinson's Disease and Dystonia". Healthsouth Rehabilitation and Reading Hospital. Reading, PA (May, 2005).

101. "Roundtable Discussion on Deep Brain Stimulation Therapies". Medtronic. New York, New York. (June, 2005).
102. "Spinal Cord Stimulation for Neuropathic Dysmenorrhea". Pennsylvania Neurosurgical Society, Hershey, PA. (July, 2005).
103. "Subthalamic Nucleus Deep Brain Stimulation for Parkinson's Disease: Third Ventricular Width Determines Final Electrode Position: A Prospective Study". Pennsylvania Neurosurgical Society, Hershey, PA. (July, 2005).
104. "Immediate and Sustained Therapeutic Effects of Unilateral Subthalamic Nucleus Deep-Brain Stimulation for Cervical Dystonia: Pennsylvania Neurosurgical Society, Hershey, PA. (July, 2005).
105. "Future of Neuromodulation Therapies". Board of Directors, Pinnacle Health System, Harrisburg, PA (September, 2005).
106. "Neuromodulation Therapies". HealthSouth Rehabilitation Center. Mechanicsburg, PA. (October, 2005).
107. "Future of Rechargeable Technologies for Spinal Implants". Board of Directors, Pinnacle Health System, Harrisburg, PA (October, 2005).
108. "Spinal Cord Stimulation Therapies: Expert Roundtable Discussion". Medtronic. Philadelphia, PA (October, 2005).
109. "Intrathecal Baclofen Therapies for Multiple Sclerosis". Pinnacle Health Systems Multiple Sclerosis Symposium. Harrisburg, PA (October, 2005).
110. "Coding Issues in Functional Neurosurgery". Pinnacle Health Systems Coding Personnel. Harrisburg, PA (January, 2006).
111. "Neuromodulation Therapies: Present and Future Clinical and Research Applications". Grand Rounds, Department of Neurosurgery, University of Washington, Seattle, WA. (March, 2006).
112. "Vagus Nerve Stimulation: Indications, Results and Socioeconomic Implications". Neuroscience Update Conference. Pinnacle Health Systems. Harrisburg, PA. (April, 2006).
113. "Surgery for Parkinson's Disease and Tremors". Pinnacle Health Neurorehabilitation Center. Harrisburg, PA (April, 2006)
114. "Subthalamic Nucleus Deep Brain Stimulation for Cervical Dystonia: Microrecordings and Results in Three Patients". American Society for Stereotactic and Functional Neurosurgery Biennial Conference. Boston, MA. (June, 2006).
115. "Shorter Operating Times Achieved with Staged Deep Brain Stimulation Electrode Placements Help Minimize Transient Confusional States and Length of Hospital Stays". American Society of Stereotactic and Functional Neurosurgery Biennial Conference. Boston, MA. (June, 2006).
116. "Vagal Nerve Stimulation for Epilepsy in Central Pennsylvania". Current Approaches in Epilepsy Treatment. Pinnacle Health Systems. Harrisburg, PA. (June, 2006)
117. "Subthalamic Nucleus Deep Brain Stimulation for Cervical Dystonia: Microrecordings and Results in Three Patients". Platform presentation at Pennsylvania Neurological Society Annual Meeting. Hershey, PA. (July, 2006).
118. "Shorter Operating Times Achieved with Stages Deep Brain Stimulation Electrode Placements Help Minimize Transient Confusional States and Length of Hospital Stays and Improve Outcomes and Cost Efficiency". Platform presentation at Pennsylvania Neurological Society Annual Meeting. Hershey, PA. (July, 2006).
119. "Neuromodulation Therapies: Present and Future Clinical Applications", Neurology Residency Program, Hamot Hospital, Erie, PA. (December, 2006).
120. "Deep Brain Stimulation Therapies", Neuro-ortho Lunch and Learn Series, Hamot Hospital, Erie, PA. (February, 2007).
121. "Pain and Neuromodulation Therapies of Cancer and non-Cancer Patients", Grand Rounds, The Regional Cancer Center, Erie, PA. (March, 2007).
122. "New Technology Regarding DBS", Interview, Hospital Research Associates, Washington, D.C. (April, 2007)
123. "Bringing Neuromodulation into your Practice", Chiropractic Association, Erie, PA (April, 2007).
124. "New Advances in Parkinson's Care: Role of Surgery", Hamot Neuroscience Institute, Erie, PA (April, 2007).
125. "Deep Brain Stimulation at Hamot", AORN Nurses Week Presentation, Hamot Hospital, Erie, PA (May, 2007).
126. "Neuromodulation Therapies: Present and Future Clinical Applications", Grand Rounds, Hamot Hospital, Erie, PA (June, 2007).
127. "Spinal Cord Stimulation for Reflex Sympathetic Dystrophy". Northwestern Pennsylvania RSD Support Group, Erie, PA (August, 2007)

128. "Living with Tremor: Role of Deep-Brain Stimulation". International Tremor Foundation. Erie, PA (August, 2007)
129. "Living Well with PD: Role of Deep-Brain Stimulation". Parkinson's Partners of NW PA. Erie, PA (August, 2007).
130. "Deep-Brain Stimulation for Movement Disorders". Kane Community Hospital, Olean, NY (August, 2007).
131. "Deep-Brain Stimulation". 2007 Neurology Conference, invited speaker. Hamot Hospital, Erie, PA (October, 2007).
132. "Neuromodulation and CRPS". Erie Podiatry Society Meeting. Erie, PA (January, 2008).
133. "Neuromodulation and Deep-Brain Stimulation". Medical Student Lecture, LECOM University, Erie, PA (May, 2008)
134. "Changing the Pace of Parkinson's Therapies" Twin Cities Parkinson's Society, Minneapolis, MN (October, 2008)
135. "Neuromodulation Therapies: Present and Future Applications", Neurosciences Update, United Neurosciences Center, St. Paul, MN (November, 2008).
136. "Spinal Cord Stimulation vs. Reoperation, Clinical and Economic Efficacy", Neuroscience Journal Club, St. Paul, MN (January, 2009).
137. "Neuromodulation: Clinical Applications", United Hospital Grand Rounds, United Hospital, St. Paul, MN (January, 2009).
138. "Neurorestoration: Clinical Applications and Rehabilitation Medicine Implications", Sister Kenny Rehabilitation, St. Paul, MN (January, 2009)
139. "Neurorestoration and United Deep-brain stimulation for Movement Disorders". Minnesota Family Physician's Conference, Minneapolis Conference Center, Minneapolis, MN. (April, 2009).
140. "DBS for Parkinson's Disease Update". Capistrant Center Patient Education Series. St. Paul, MN. (August, 2009).
141. "DBS for Dystonia, Spinal Cord and Sacral Nerve Stimulation for Pain and Overactive Bladder". Sister Kenny Rehabilitation Center. St. Paul, MN (September, 2009).
142. "Evidence-based Spinal Cord Stimulation Therapy". Courage Center. Minneapolis, MN (November, 2009).
143. "Evidence-based Deep-brain Stimulation Therapy for Parkinson's Disease". Cambridge Physician Group. Cambridge, MN (January, 2010).
144. "Controlled Stimulation of the Nervous System: Medical and Economic Benefits". Foundation Board, United Hospital. St. Paul, MN. (February, 2010).
145. "Evidence-based Deep Brain and Spinal Cord Stimulation Programs". United Nursing Association. United Hospital, St. Paul, MN (March, 2010).
146. "The Role of Gamma-knife Stereotactic Radiosurgery in Neurosurgery Practice". United Neurosurgical Associates, St. Paul, MN (April, 2010).
147. "Evidence-based Neurorejuvenation: Deep-brain and Spinal-cord Stimulation: Do it Sooner!". Pathways from Primary Care to Neurosciences Conference. St. Paul, MN (April, 2010).
148. "Evidence-based Deep Brain Stimulation". AMC Physician Leaders. Woodbury, MN (May, 2010).
149. "Evidence-based Neurorejuvenation": United Hospitalists. St. Paul, MN (May, 2010)
150. "Reasons to continue to Spinal Cord Stimulation Therapies". Human Resources and Allocation Committee. St. Paul, MN (May, 2010).

**ORAL PRESENTATIONS AT SCIENTIFIC MEETINGS**

1. "Asymmetry of motor impulses and neuromuscular synapses produced in crayfish claws by unilateral immobilization", Clinical Research Society of Toronto, Toronto, Ontario (October, 1985).
2. "The role of ion channels in immune cells", Clinical Research Society of Toronto, Toronto, Ontario (October, 1988).
3. "Effects of temperature on K currents in whole-cell clamped normal human T cells", Clinical Research Society of Toronto, Toronto, Ontario (October, 1989).
4. "Effects of temperature on potassium currents in human T lymphocytes", Biophysics Society Meeting, St. Louis, Missouri (November, 1989).
5. "Ion channels in lymphocytes: possible roles in natural killing of cancer cells", East-Canadian Conference on Development and Cancer, Quebec City, Quebec (November, 1989).
6. "Regulation of K and Cl channels in normal human T lymphocytes. Eastern North American Student Research Forums, Miami, Florida (February, 1990).
7. "Modulation of Human Lymphocyte ion channels", National North American Student Research Forum, Galveston, Texas (August, 1990).
8. "Kinase- and temperature-regulated K and Cl channels in normal human T lymphocytes", Clinical Research Society of Toronto, Toronto, Ontario (October, 1990).
9. "Kinase- and temperature-regulated chloride channels in T lymphocytes", Biophysics Society Meeting, Cincinnati, Ohio (November, 1990).
10. "Pleomorphic xanthoastrocytoma: a proposal for two clinicopathologic subtypes", Neurooncology Society Meeting, Lake Louise, Alberta (March, 1994).
11. "Acute effects of cerebral angioplasty upon human cerebral vessels in vasospasm: a histopathological study", Canadian Neurological Science Society, Victoria, British Columbia (June, 1995).
12. "Adult low-grade gliomas: response to radiotherapy", Neurooncology Society, Montreal, Quebec (May, 1996).
13. "Splitting of the Sylvian fissure", Canadian Neurological Science Society, Saskatoon, Saskatchewan (June, 1996).
14. "Tremor Arrest with Thalamic Microinjections of Muscimol in Patients with Essential Tremor", American Association of Neurological Surgeons, New Orleans, Louisiana (April, 1999).
15. "Spinal Cord Stimulation for Patients with Refractory Angina Pectoris", American Association of Neurological Surgeons, New Orleans, Louisiana (April, 1999).
16. "Functional Magnetic Resonance Imaging in Patients with Bilateral Subthalamic Nucleus Deep-brain Stimulating Electrodes for Parkinson's Disease", American Association of Neurological Surgeons, San Francisco, California (April, 2000).
17. "Human Deep-Brain Stimulation in the USA: Clinical and Business Considerations", Annual Clinical Assembly of Osteopathic Specialists, Palm Desert, California (October, 2001)
18. "Practical Workshop on Deep-Brain Stimulation", Annual Clinical Assembly of Osteopathic Specialists, Palm Desert, California (October, 2001).
19. "Immediate and Sustained Therapeutic Effects of Unilateral Subthalamic Nucleus Deep-Brain Stimulation for Cervical Dystonia" Pennsylvania Neurosurgery Society Annual Meeting, Hershey, PA (July, 2005)
20. "Spinal Cord Stimulation for Neuropathic Dysmenorrhea". Congress of Neurological Surgeons, Boston, MA (October, 2005).
21. "Subthalamic Nucleus Deep Brain Stimulation for Cervical Dystonia: Microrecordings and Results in Three Patients". American Society for Stereotactic and Functional Neurosurgery Biennial Conference. Boston, MA. (June, 2006).
22. "Shorter Operating Times Achieved with Staged Deep Brain Stimulation Electrode Placements Help Minimize Transient Confusional States and Length of Hospital Stays". American Society of Stereotactic and Functional Neurosurgery Biennial Conference. Boston, MA. (June, 2006).
23. "Long-Term Benefits of Subthalamic Nucleus Deep-Brain Stimulation for Cervical Dystonia". American Association of Neurological Surgeons, Chicago, IL (April, 2008).

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1. **Pahapill, P.A.**, G.A. Lnenicka and H.L. Atwood (1985). Asymmetry of motor impulses and neuromuscular synapses produced in crayfish claws by unilateral immobilization. **J. Comp. Physiol. A.** 157: 461-467.
2. **Pahapill, P.A.**, G.A. Lnenicka and H.L. Atwood (1986). Neuronal experience modifies synaptic long-term facilitation. **Can. J. of Physiol. Pharmacol.** 64: 1052-1054.
3. **Pahapill, P.A.**, G.A. Lnenicka and H.L. Atwood (1987). Long-term facilitation and low-frequency depression in a crayfish phasic motor axon. **J. Comp. Physiol. A.** 161: 367-375.
4. **Pahapill, P.A.** and L.C. Schlichter (1990). Modulation of potassium channels in human T lymphocytes: effects of temperature. **J. Physiol. (Lond.)** 420: 103-126.
5. Schlichter, L.C., Grygorczyk, R., **Pahapill, P.A.**, and Grygorczyk, C. (1990). A large, multiple-conductance chloride channel in normal human T lymphocytes. **Pflügs. Arch.** 416: 413-426.
6. MacDonald, J.F., Bartlett, M.C., Mody, I., **Pahapill, P.A.**, Reynolds, J.N., Salter, M.W., Schneiderman, J.H., and Pennefather, P.S. (1991). Actions of ketamine, phencyclidine and MK-801 on NMDA receptor currents in cultured mouse hippocampal neurones. **J. Physiol. (Lond.)** 432: 483-508.
7. Schlichter, L.C. and **P.A. Pahapill** (1991). Ion channels in human lymphocytes. **Biomedical Research** 12, Supplement 3: 1656-1658.
8. **Pahapill, P.A.** and L.C. Schlichter. (1992). Modulation of potassium channels in intact human T lymphocytes. **J. Physiol. (Lond.)** 445: 407-430.
9. **Pahapill, P.A.** and L.C. Schlichter. (1992). Chloride channels in intact human T lymphocytes. **J. Membr. Biol.** 125: 171-183.
10. Schlichter, L.C., **P.A. Pahapill** and I. Chung. (1992). Dual action of 2,3-butanedione monoxime (BDM) on potassium current in human T lymphocytes. **J. Pharm. Exp. Therap.** 261(2): 311-321.
11. Schlichter, L.C., **P.A. Pahapill** and P.A. Schumacher. (1993). Reciprocal regulation of K<sup>+</sup> channels by Ca<sup>2+</sup> in intact human T lymphocytes. **Receptors and Channels**, 1: 201-215.
12. **Pahapill, P.A.**, D.A. Ramsay and R.F. Del Maestro. (1996). Pleomorphic xanthoastrocytoma: a case report and review of the literature with respect to necrosis and the role of surgery. **Neurosurgery**, 38 (4): 822-829.
13. **Pahapill, P.A.** and S.P. Lowie. (1998). Conservative treatment of acute spontaneous spinal epidural hematoma: a case report and review of the literature. **Can. J. Neurol. Sci.** 25: 159-163.
14. **Pahapill, P.A.** and A.M. Lozano. (1998). Deep-brain stimulation therapy for Parkinson's Disease. **Mature Medicine Canada**: 1(6): 10-14.
15. G.S. Bauman, **P.A. Pahapill**, D. MacDonald, B. Fisher S., C. Leighton and J.G. Cairncross. (1999). Low-grade glioma: a measure of radiographic response to radiation. **Can. J. Neurol. Sci.** 26: 18-22.
16. **Pahapill, P.A.**, R. Levy, K. Davis, J. Dostrovsky, A.R. Rezai, R.R. Tasker, A.M. Lozano. (1999). Arrest of tremor with intrathalamic injections of muscimol in patients with essential tremor. **Annals of Neurology**: 46: 249-252
17. **Pahapill, P.A.** and A.M. Lozano. (2000). The putative role of the pedunculo-pontine nucleus in Parkinson's disease. **Brain**: 123: 1767-83.
18. Peletier M, **P.A. Pahapill**, P.S. Pennefather, P.L. Carlen. (2000). Analysis of single K<sub>ATP</sub> channels in mammalian dentate gyrus granule cells. **J. Neurophysiol.** 84: 2291-2301.
19. Levy R, Lang AE, Dostrovsky JO, **Pahapill PA**, Romas J, Saint-Cyr J, Hutchison WD, Lozano AM (2001). Effects of lidocaine and muscimol microinjections in subthalamic nucleus reverse parkinsonian symptoms. **Brain**: 124: 2105-2118.
20. Stefurak T, Mikulis D, Mayberg H, Lang AE, Hevenor S, **Pahapill PA**, Saint-Cyr J, Lozano A (2003). Deep brain stimulation associated for Parkinson's Disease dissociates mood and motor circuits: a functional MRI case study. **Mov. Disord.** 18: 1508-1516.
21. **Pahapill, P.A.** and O'Connell, B. (2010). Long-term Follow-up of Subthalamic Nucleus Deep-brain Stimulation for Cervical Dystonia. **Neuromodulation.** 13: 26-30.

**BOOK CHAPTERS/NON-REFEREED ARTICLES**

1. **Pahapill PA**, Lozano AM, Lang AE. (2001). Pallidal stimulation for treatment of Parkinson's Disease, pp. 170-175. In: Krauss JK, Jankovic J, and Grossman RG, ed. **Movement Disorders Surgery**. Philadelphia, PA: Lippincott Williams and Wilkins.
2. **Pahapill PA**, Lozano AM. (2005). The Pedunculopontine Nucleus: Anatomy, physiology and function in locomotion, pp. 115-120. In: Galvez-Jimenez N, ed. Scientific Basis for the Treatment of Parkinson's Disease. London and New York. Taylor and Francis.
3. **Pahapill PA** (2010). Tremor. **Minnesota Physician**. (In press)

**RECENT POSTER PRESENTATIONS AT SCIENTIFIC MEETINGS**

1. **Pahapill PA**, Black D (2006). Shorter operating times help minimize transient confusional states following deep brain stimulation. AANS Annual Meeting.
2. **Pahapill PA**, Black D (2006). Electrophysiology of the subthalamic nucleus and substantia nigra in patients with refractory primary cervical dystonia. AANS Annual Meeting.
3. **Pahapill PA** (2006). Strategies in developing active neuromodulation therapy services in private practice. AANS Annual Meeting.
4. **Pahapill PA** (2006). Spinal cord stimulation: the acute post-implantation syndrome. AANS Annual Meeting.
5. **Pahapill PA**, Black D, O'Connell B (2005). Immediate and sustained therapeutic effects of electrophysiologically-identified unilateral subthalamic nucleus deep-brain stimulation for cervical dystonia. CNS Annual Meeting, Boston MA.
6. **Pahapill PA**, Black D (2005). Subthalamic nucleus deep-brain stimulation for Parkinson's Disease: third ventricular width and final electrode position: a prospective study. CNS Annual Meeting, Boston MA.
7. **Pahapill PA** (2005). Spinal cord stimulation of neuropathic dysmenorrhea. CNS Annual Meeting, Boston MA.

**PUBLISHED ABSTRACTS**

1. MacDonald, J.F., **P.A. Pahapill**, I. Mody and P.S. Pennefather (1987). Quantitative study of the use-dependent block of excitatory amino acid currents by ketamine and phencyclidine. **Soc. Neurosci. Abstr.** 13: 753.
2. **Pahapill, P.A.** and L.C. Schlichter (1989). Effects of temperature on potassium currents in human T lymphocytes. **Biophys. J.** 55: 8a.
3. **Pahapill, P.A.** and L.C. Schlichter (1990). Kinase- and temperature-regulated chloride channels in T lymphocytes. **Biophys. J.** 57: 394a.
4. Grygorczyk, R., L.C. Schlichter, **P.A. Pahapill**, and C. Grygorczyk (1990). Large conductance chloride channels in normal human T lymphocytes. **Biophys. J.** 57: 318a.
5. Schlichter, L.C., I. Chung and **P.A. Pahapill**. (1991). Should oximes be used to study effects of dephosphorylation on ion channels? **J. Cell Biology** 115 (3, Pt. 2): 468a.
6. Schlichter, L.C., **P.A. Pahapill** and P.S. Pennefather. (1991). Hormonal regulation of potassium channels in human T lymphocytes. **Soc. Neurosci. Abstr.** 17: 364a.
7. Schlichter, L.C. and **P.A. Pahapill**. (1991). Hormone and mitogen regulation of potassium channels in intact human T lymphocytes. **J. Cell Biology** 115 (3, Pt. 2): 469a.
8. Schlichter, L.C., I. Chung, **P.A. Pahapill** and P.A. Schumacher. (1992). Calcium-dependent regulation of K channels in intact human T lymphocytes. **Soc. Neurosci. Abstr.** 18: 587a.
9. **Pahapill, P.A.**, R.F. DelMaestro and D.A. Ramsay (1994). Pleomorphic xanthoastrocytoma: a proposal for two clinicopathologic subtypes. **J. Neurooncol.** 19: 189a.
10. **Pahapill, P.A.**, J. Siddiqi, D.A. Ramsay, H. Barr, A. Fox and L. Assis (1995). The immediate histopathology of cerebral vasospasm and reversal of vasospasm after effective cerebral angioplasty: a case report. **Can. J. Neurol. Sci.** 22, Supplement 1: S30.
11. **Pahapill, P.A.** and S.P. Lownie (1995). Conservative treatment of spontaneous spinal epidural hematoma: a case report and review of the literature. **Can. J. Neurol. Sci.** 22, Supplement 1: S41.
12. **Pahapill, P.A.**, B.J. Fischer, G. Bauman, D. MacDonald and J.G. Cairncross (1996). Adult low-grade gliomas: response to radiotherapy. **J. Neurooncol.**
13. Siddiqi, J., **P.A. Pahapill**, A. Ranger, B. Jhawar, M. Abdulhak (1996). An Association of Canadian neurosurgery residents: some views. **Can. J. Neurol. Sci.** 23, Supplement 1: S40.
14. **Pahapill, P.A.**, D.A. Ramsay and R.F. DelMaestro (1996). The role of surgery in cerebral congophilic angiopathy. **Can. J. Neurol. Sci.** 23, Supplement 1: S87.
15. **Pahapill PA**, Levey R, Dostrovsky JO, Davis K, Rezai AR, Tasker RR, Lozano AM (1999): Thalamic injections of muscimol arrest tremor. **J Neurosurg** 90: 408A.
16. **Pahapill PA**, Tasker RR (1999): Spinal cord stimulation for refractory angina pectoris. **J Neurosurg** 90: 432-3.
17. **Pahapill PA**, Levy R, Dostrovsky JO, Davis KD, Rezai AR, Tasker RR, Lozano AM. (1999). Tremor arrest with thalamic microinjections of muscimol in patients with essential tremor. **Can J Neurol Sci** 26 (Supplement 1): S39.
18. **Pahapill PA**, RR Tasker, AM Lozano. (1999). Neurosurgical approaches for patients with phantom limb pain. **Can J Neurol Sci** 26 (Supplement 1): S60.
24. **Pahapill PA**, Davis KD, Lozano AM, Mikulis DA. (1999). fMRI in patients with deep- brain stimulators: applications to bilateral deep-brain and cortical surface stimulators. **Can J Neurol Sci** 26 (Supplement 1): S39.
25. **Pahapill PA**, Pelletier M, Lozano AM, Carlen PA. (1999). Recording of single ion- channel activity in human neocortical slices from epileptic patients. **Can J Neurol Sci** 26 (Supplement 1): S44.
26. Peletier M, **Pahapill PA**, Pennefather P, Carlen PA. (1999). ATP-dependent potassium channels revealed by single-channel patch-clamp recordings in the acutely isolated rat dentate gyrus. **Soc for Neurosci. Abstr.** 25: 194.
22. Levy R, Davis KD, Hutchison WD, **Pahapill PA**, Lozano AM, Tasker RR, Dostrovsky JO (1999). Simultaneously recorded neuron pairs in the motor thalamus of patients with Parkinson's disease and essential tremor. **Soc Neurosci. Abstr.** 25: 1408.

23. **Pahapill PA**, Saint-Cyr J, Lozano AM, Davis KD, Dostrovsky, Mikulis DA. (2000). Functional MRI in patients with bilateral subthalamic nucleus electrodes for Parkinson's disease. **J Neurosurg.** 92: 572
24. Pelletier MR, **Pahapill PA**, Pennefather PS, Carlen PL. (2000). Analysis of single ATP-dependent potassium channels in mammalian dentate gyrus granule cells. **Am. J. Physiol. Abst.** 7: 0408J.
25. Gannon J, **Pahapill PA**. (2002). Is subthalamic nucleus deep-brain stimulation neuroprotective? **J Neurosurg** 96:407
26. **Pahapill PA**, O'Connell, B (2008). Long-term Benefits of STN DBS for Cervical Dystonia. **J. Neurosurg.** 108: A869.

### **RESEARCH PROJECT APPROVALS**

1. Approval from Medical College of Ohio IRB committee and from FDA IDE committee to provide bilateral subthalamic nucleus (STN) deep-brain stimulation (DBS) therapeutic surgeries to twenty patients at the Medical College of Ohio (May, 2001).
2. Approval from Medical College of Ohio IRB committee for "Visualizing the Human Brain in Response to Emotionally Stimulating Music Using Functional Magnetic Resonance Imaging" at the Medical College of Ohio (December, 2000), Dr. Michael J. Dennis, Principal Investigator.
3. Approval from Penn State Hershey Medical Center IRB committee and from FDA IDE committee to provide bilateral subthalamic nucleus (STN) deep-brain stimulation (DBS) therapeutic surgeries to twenty patients at the Hershey Medical Center (November, 2001).
4. Approval from Pinnacle Health Systems IRB committee to provide deep-brain stimulation therapeutic surgeries for patients with primary dystonia. (August, 2003).
5. Approval from Pinnacle Health Systems IRB committee: Low Back Pain Outcomes Registry (LoBaPOR) (August, 2006).
6. Approval from Pinnacle Health Systems IRB committee: Implantable Systems Performance Registry (ISPR) (August, 2006).
7. Approval from Hamot Hospital IRB committee: Low Back Pain Outcomes Registry (LoBaPOR) (February, 2007).
8. Approval from Hamot Hospital IRB committee: Implantable Systems Performance Registry (ISPR) (February, 2007).
9. Approval from Hamot Hospital IRB committee: HDE for Activa Therapy for Dystonia (April, 2007).
10. Approval from United Hospital IRB committee: HDE for Activa Therapy for Dystonia (January, 2009).
11. Approval from Allina 3 IRB committee: St. Jude Post-implant Registry for Spinal Cord Stimulation (April, 2010).

### **PRINCIPAL INVESTIGATOR ON RESEARCH PROJECTS**

1. "Deep brain stimulation of the subthalamic nucleus for Parkinson's Disease". Approval from IRB and approved IDE from FDA.
2. "A study to evaluate the predictive value of functional magnetic resonance imaging in patients with spinal cord stimulators for pain" Pahapill PA (PI)  
Agency: Advanced Neurological Systems  
Amount: \$10,000
3. "Deep-brain Stimulation for Dystonia"
4. "Partnership for Advancements in Neuromodulation (PAIN): a Prospective Clinical Outcomes Registry". Amount: \$15,000.

### **CO-INVESTIGATOR ON RESEARCH PROJECTS**

1. "Phase I open label safety and pharmacokinetic study of the oxygenated fluorocarbon nutrient emulsion (OFNE) perfusion system in adult patients with severe focal hemispheric cerebral ischemia". Approval from IRB. Dr. R. Reichwein, principal investigator.

**PRESENT FIELDS OF RESEARCH INTERESTS**

- 1) Deep-brain stimulation (DBS) surgery for movement disorders, pain, epilepsy and behavioral disorders;
- 2) Spinal cord stimulation (SCS) for pain, angina pectoris, peripheral vascular disease and bladder disorders;
- 3) Vagal nerve stimulation (VNS) for epilepsy and behavioral disorders;
- 4) Functional imaging (MRI and PET) studies;
- 5) Intracerebral microinjection and microdialysis studies;
- 6) Membrane ion-channel electrophysiology.

**SUMMARY OF FORMAL RESEARCH TRAINING:**

- 1984-1985: Study of mechanisms of synaptic plasticity using intracellular microelectrode techniques in an invertebrate preparation leading to M.Sc. degree (Dr. H.L. Atwood, supervisor, University of Toronto).
- 1987-1990: Study of regulation of ion channels using "patch-clamp" microelectrode whole-cell and single-channel electrophysiological recording techniques on human lymphocytes and cultured mouse hippocampal neurons leading to Ph.D. degree (Dr. L.C. Schlichter, supervisor, University of Toronto).
- 1993-1998: Study of the effects of surgery and/or radiation therapy on patients with low-grade gliomas and pleomorphic xanthoastrocytomas during neurosurgery residency (Drs. R.F. Del Maestro and J.G. Cairncross supervisors, University of Western Ontario).
- 1998-2000: Study of deep-brain stimulation (DBS) and spinal-cord stimulation (SCS) and neuromodulation of single-cell activity using microinjection and extracellular microelectrode recording techniques in patients with pain and movement disorders; Functional MRI during DBS and SCS in patients with chronic pain and movement disorders; single-channel recording techniques on human and non-human cerebral cortex and hippocampus leading to Fellowship in Stereotactic and Functional Neurosurgery (Drs. R.R.Tasker, P.L.Carlen and A.M. Lozano, supervisors, University of Toronto).