

**THE  
AMERICAN ACADEMY  
OF  
NEUROLOGICAL SURGERY**



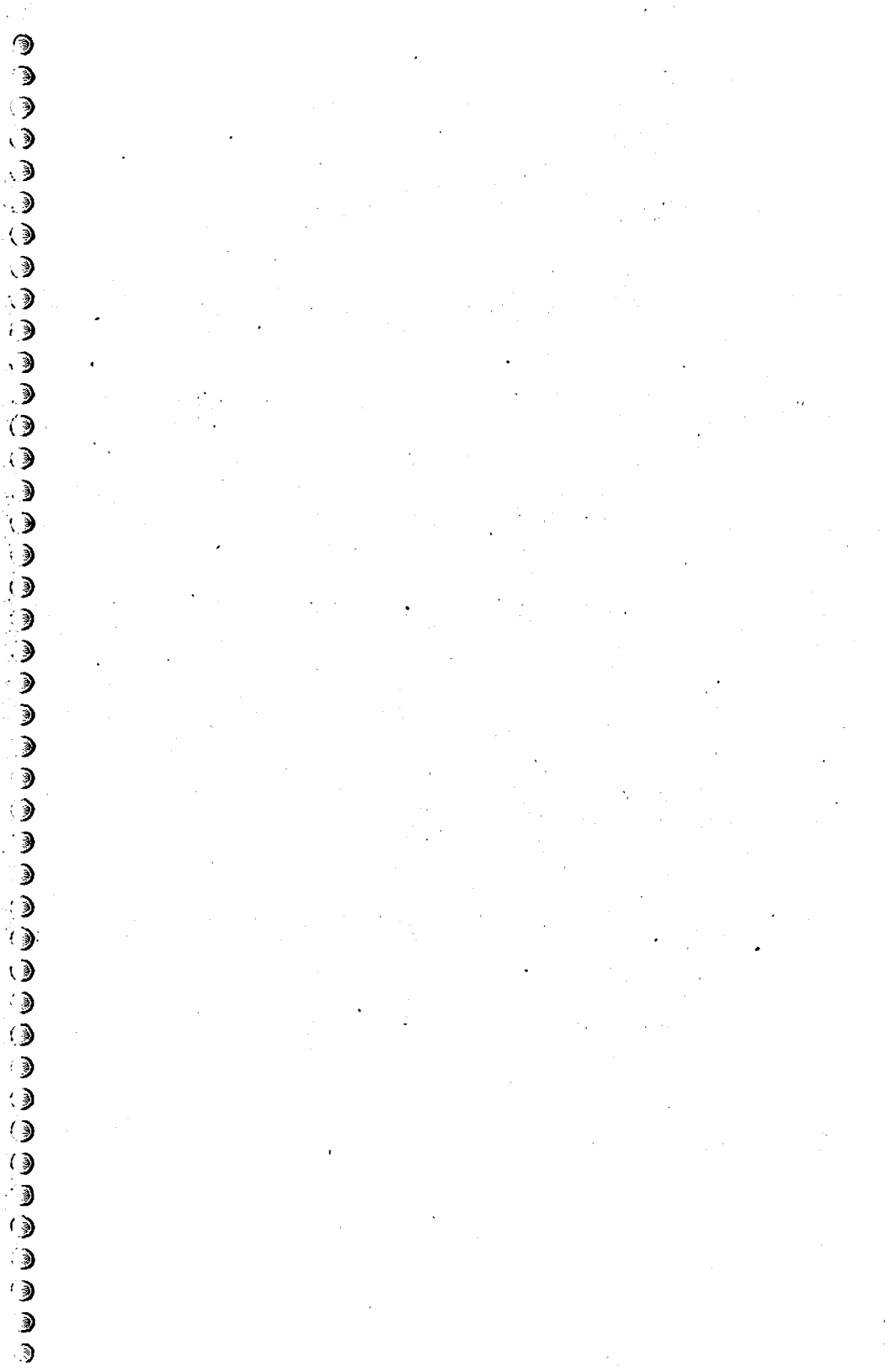
**58th Annual Meeting**

*The  
Greenbrier*  
WHITE SULPHUR SPRINGS  
WEST VIRGINIA 24986  
A CSX Resort

**September 18 - 22, 1996**



Jointly Sponsored by The American  
Association of Neurological Surgeons



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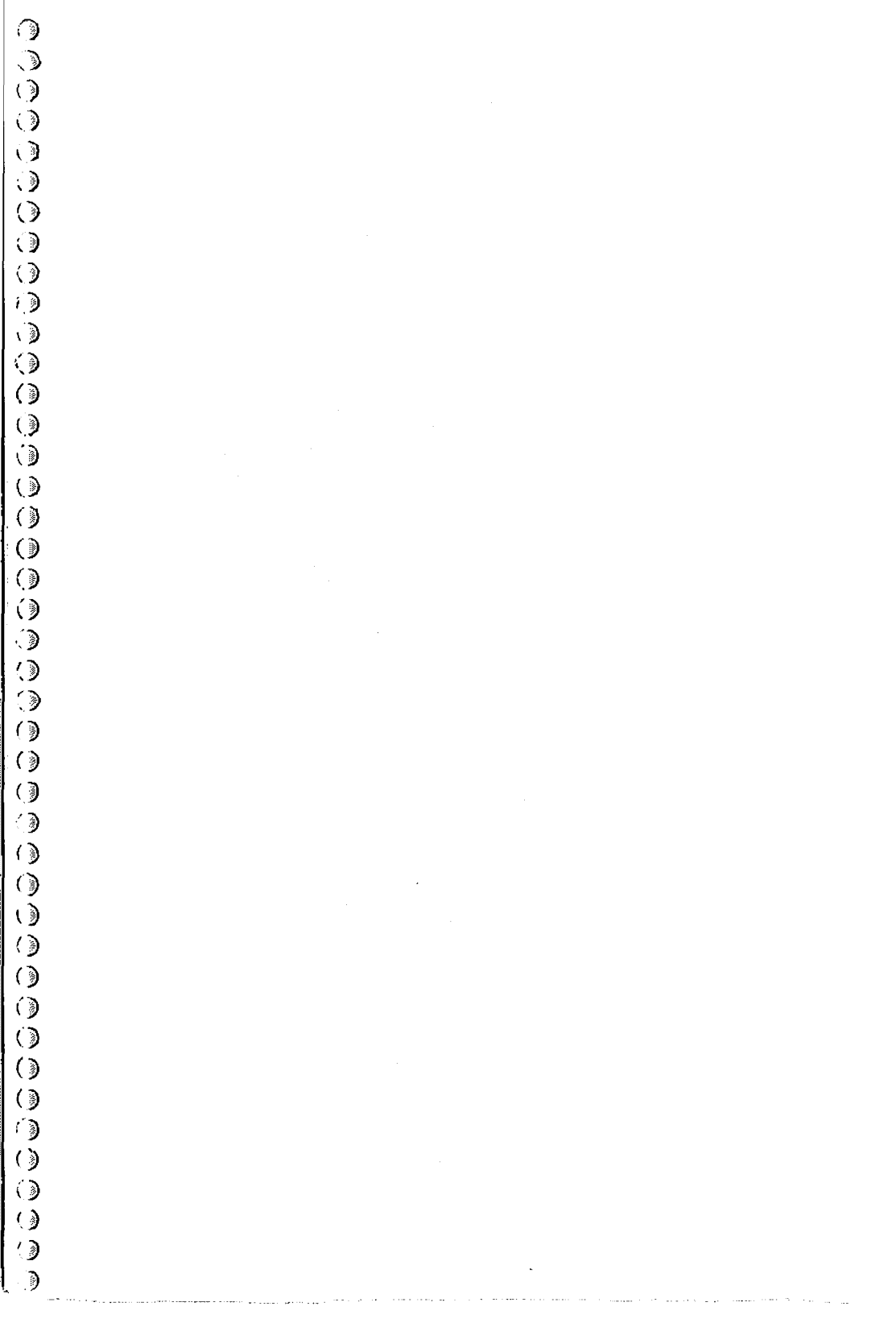
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L. Nelson (Nick) and Bonnie Hopkins

THE AMERICAN ACADEMY OF  
NEUROLOGICAL SURGERY

**Activities Program**

Tuesday, September 17

- |                   |   |
|-------------------|---|
| 4:00 PM - 7:30 PM | ABNS Exam Committee Review<br>Pierce Room |
| 7:30 PM - 9:30 PM | ABNS Dinner<br>Main Dining Room           |

Wednesday, September 18

- |                    |   |
|--------------------|---|
| 8:00 AM - 3:00 PM  | ABNS Primary Exam Committee<br>Pierce Room                          |
| 2:00 PM - 5:00 PM  | Registration<br>Lower Lobby, Area B                                 |
| 2:00 PM - 5:00 PM  | Speaker Ready Room<br>Editing Room (across from<br>Chesapeake Room) |
| 2:00 PM - 3:00 PM  | Executive Committee<br>Buchanan Room                                |
| 3:00 PM - 5:00 PM  | Membership Committee<br>Buchanan Room                               |
| 6:30 PM - 8:00 PM  | Welcome Reception*<br>Cameo Ballroom                                |
| 7:30 PM - 10:00 PM | Dinner*<br>Crystal Room   |
| 7:30 PM - 10:00 PM | Executive Committee Dinner*<br>Taft Room                            |

**\* Evening Wear:**

Gentlemen - Business suits, jackets and slacks, neckties or black tie  
Ladies - Dresses (short or long), evening suits



Thursday, September 19

- 6:00 AM - 2:00 PM      Speaker Ready Room  
                                 Editing Room
- 7:00 AM - 8:00 AM      Breakfast/Business Meeting  
                                 (Members only)\*  
                                 Crystal Room
- \* **Guest breakfast** available in Draper's Cafe at 7:00 AM or the  
Main Dining Room at 7:30 AM
- 8:00 AM - 1:00 PM      Registration  
                                 Chesapeake Room Foyer
- 8:00 AM - 1:00 PM      Symposium & Scientific Session I  
                                 Chesapeake Room
- 10:05 AM - 10:30 AM    Coffee Break  
                                 Colonial Lounge & Terrace
- 1:00 PM - 2:30 PM      ABNS Advisory Council  
                                 Wilson Room
- 1:04 PM - 6:00 PM      Golf  
                                 Sign up at Registration Desk
- 2:45 PM - 5:00 PM      Journal of Neurosurgery Editorial  
                                 Board  
                                 Pierce Room
- 3:00 PM - 5:00 PM      Tennis  
                                 Sign up at Registration Desk
- 6:30 PM - 8:00 PM      Reception  
                                 Colonial Lounge & Terrace
- 7:30 PM - 10:00 PM     Dinner\*  
                                 Main Dining Room

\* Sign up for 7:30 or 8:00 PM seating at Registration Desk

Friday, September 20

6:00 AM - 2:00 PM      Speaker Ready Room  
   Editing Room

7:00 AM - 8:00 AM      Breakfast/Business Meeting  
   (Members only)\*  
   Crystal Room

\* Guest breakfast available in Draper's Cafe at 7:00 AM or the  
Main Dining Room at 7:30 AM

8:00 AM - 12:30 PM      Registration  
   Chesapeake Room Foyer

8:00 AM - 12:30 PM      Symposium & Scientific Session II  
   Chesapeake Room

10:05 AM - 10:35 AM      Coffee Break  
   Colonial Lounge & Terrace

11:45 PM - 12:30 PM      Presidential Address:  
   John M. Tew, Jr., MD  
   Chesapeake Room

1:12 PM - 6:00 PM      Golf Tournament  
   Sign up at Registration Desk

3:00 PM - 5:00 PM      Tennis  
   Sign up at Registration Desk

6:30 PM - 8:00 PM      Reception and Putting Contest\*  
   Chesapeake Bay & Terrace

\* Sign up for contest at Registration Desk

7:30 PM - 10:00 PM      Dinner\*  
   Main Dining Room

\* Sign up for 7:30 or 8:00 PM seating at Registration Desk

Saturday, September 21

- 6:00 AM - 12:45 PM Speaker Ready Room  
Editing Room
- 7:00 AM - 8:25 AM Breakfast for Members and Guests  
Individual arrangements\*
- \* Draper's Cafe at 7:00 AM or the Main Dining Room at 7:30 AM
- 7:30 AM - 8:25 AM The Society of Neurological  
Surgeons  
Lee Room
- 8:25 AM - 12:45 PM Registration  
Chesapeake Room Foyer
- 8:25 AM - 12:45 PM Scientific Session III & IV  
Chesapeake Room
- 9:45 AM - 10:30 AM Keynote Address:  
Leadership Without Easy Answers  
Ronald Heifetz, Kennedy  
School of Government,  
Harvard University  
Chesapeake Room
- 10:30 AM - 11:00 AM Coffee Break\*  
Colonial Lounge & Terrace
- \*Group Photograph to be taken during break  
Sign up at Registration Desk for a copy of photo
- 1:04 PM - 6:00 PM Golf  
Sign up at Registration Desk
- 3:00 PM - 5:00 PM Tennis Tournament  
Sign up at Registration Desk
- 6:30 PM - 7:30 PM Reception  
Colonial Lounge & Terrace
- 7:30 PM - 12:00 AM Banquet - Dance  
Black tie  
Chesapeake Room

Sunday, September 22

Departures

## SCHEDULE OF ACTIVITIES FOR SPOUSES

### Wednesday, September 18

6:30 PM - 8:00 PM	Welcome Reception* Cameo Ballroom
7:30 PM - 10:00 PM	Dinner* Crystal Room
7:30 PM - 10:00 PM	Executive Committee Dinner* Taft Room

\* Evening Wear:

Gentlemen - Business suits, jackets and slacks, neckties or black tie

Ladies - Dresses (short or long), evening suits

### Thursday, September 19

Walking Course on your own: maps available at the  
Meeting Registration Desk

7:00 AM - 10:00 AM Breakfast - Individual Arrangements\*

\* Draper's Cafe from 7:00 - 10:00 AM or Main Dining Room  
from 7:30 - 10:00 AM

9:00 AM - 11:00 AM Hospitality Suite  
Spring Room

10:00 AM - 11:00 AM Book Review  
Fair and Tender Ladies by  
Lee Lewis  
Spring Room

1:04 PM - 6:00 PM Golf  
Sign up at Registration Desk

3:00 PM - 5:00 PM Tennis  
Sign up at Registration Desk

3:00 PM - 5:00 PM Hospitality Suite\*  
Spring Room

\* Card tables available; bridge and backgammon tables are in  
the nearby Green and Trellis Lobbies

4:15 PM - 5:00 PM Readings of Essays, Poetry, and Short  
Stories  
Spring Room

4:15 PM - 5:00 PM Tea and Concert  
Main Lobby

6:30 PM - 8:00 PM Reception  
Colonial Lounge & Terrace

7:30 PM - 10:00 PM Dinner\*  
Main Dining Room

\* Sign up for 7:30 or 8:00 PM seating at Registration Desk

Friday, September 20

Walking Course on your own

7:00 AM - 10:00 AM Breakfast - Individual Arrangements\*

\* Draper's Cafe from 7:00 - 10:00 AM or  
Main Dining Room from 7:30 - 10:00 AM

9:00 AM - 11:00 AM Hospitality Suite  
Spring Room

10:30 AM - 11:30 AM Interior Tour of The Greenbrier\*  
Meet guide at the Spring Room

\* Sign up at Registration Desk

1:12 PM - 6:00 PM Golf Tournament  
Sign up at Registration Desk

3:00 PM - 5:00 PM Tennis  
Sign up at Registration Desk

3:00 PM - 5:00 PM Hospitality Suite  
Spring Room

4:15 PM - 5:00 PM Tea and Concert  
Main Lobby

6:30 PM - 8:00 PM Reception and Putting Contest\*  
Chesapeake Bay & Terrace

\* Sign up for contest at Registration Desk

7:30 PM - 10:00 PM Dinner\*  
Main Dining Room

\* Sign up for 7:30 or 8:00 PM seating at Registration Desk

Saturday, September 21

Walking Course on your own

7:00 AM - 10:00 AM Breakfast - Individual Arrangements\*

\* Draper's Cafe from 7:00 - 10:00 AM or Main Dining  
Room from 7:30 - 10:00 AM

9:00 AM - 11:00 AM Hospitality Suite  
Spring Room

1:04 PM - 6:00 PM Golf  
Sign up at Registration Desk

4:15 PM - 5:00 PM Tea and Concert  
Main Lobby

3:00 PM - 5:00 PM Tennis Tournament  
Sign up at Registration Desk

6:30 PM - 7:30 PM Reception  
Colonial Lounge & Terrace

7:30 PM - 12:00 AM Banquet - Dance  
Black tie  
Chesapeake Room

Sunday, September 22

Departures

**SCIENTIFIC PROGRAM  
AMERICAN ACADEMY OF NEUROLOGICAL  
SURGERY  
1996 LEARNING OBJECTIVES  
September 18-22, 1996**

**Jointly Sponsored by The  
American Association of Neurological Surgeons**

**Following the Scientific Sessions, the participants will be able to:**

Critique the value of the recommended surgical and non-surgical options presented in the scientific papers.

Evaluate the relevance of the research methodologies, the findings, and the potential usefulness in practice of the topics presented for cerebrovascular, neoplastic, spinal and developmental and functional nervous system diseases.



**The American Association of Neurological Surgeons is accredited by the Accreditation Council for Continuing Medical Education to sponsor continuing medical education for physicians.**

**The American Association of Neurological Surgeons designates this continuing medical education activity for 14.7 credit hours in Category I of the American Medical Association.**

**SCIENTIFIC PROGRAM**  
**AMERICAN ACADEMY OF NEUROLOGICAL  
SURGERY**

**September 19-22, 1996**

Jointly Sponsored by The American  
Association of Neurological Surgeons

**Thursday, September 19**

- 8:00-8:05 **WELCOME** – John Tew, President
- 8:05-10:05 **SYMPOSIUM – Evaluating and Improving  
Neurosurgical Results**  
Moderators: **Julian Hoff, Martin Camins**
- 8:05-8:25 **Critical Pathways** – Charles Rich
- 8:25-8:45 **Assessing and Reporting Complications –  
Roberto Heros**
- 8:45-9:05 **Outcome Analysis** – Stephen Haines
- 9:05-9:25 **Institutional Guidelines** – Joseph Hahn
- 9:25-9:45 **Federal Regulations** – Paul Nelson
- 9:45-10:05 **Discussion**
- 10:05-10:30 **Coffee Break**

Thursday, September 19 Cont'd

**SCIENTIFIC SESSION I**

Moderators: **Edward Connolly, Harry van Loveren**

- 10:30-10:55 *Pathobiology of Cerebral Cavernous Malformations: An Integrative Paradigm*  
**Issam A. Awad, Murat Gunel, KM Desai, John Pizzonia, Richard P. Lifton**
- 10:55-11:20 *Posteroventral Pallidotomy: Indications, Surgical Technique and Clinical Outcome*  
**Kim Burchiel, Jacques Favre, Jamal Taha**
- 11:20-11:45 *Pathophysiology of Syringomyelia Associated with Chiari I Malformation*  
**JD Heiss, H DeVroom, A Eidsath, T Talbot, N Patronas, EH Oldfield**
- 11:45-12:10 *Differentiation between Cortical Atrophy and Hydrocephalus using <sup>1</sup>H MRS*  
**Stefan Blum, J. Gordon McComb, Brian D. Ross**
- 12:10-12:35 *The Risk of Major Morbidity after Stereotactic Radiosurgery*  
**Douglas Kondziolka, John C. Flickinger, L. Dade Lunsford, David J. Bissonette**
- 12:35-12:50 **Academy Award Presentations, Bryce Weir, Chair**  
*Drug-Regulated Apoptotic Death in a Rat Glioma Model Mediated by a Novel Retroviral Vector*  
**Academy Award Paper**  
**John S. Yu, Massachusetts General Hospital, Boston, Massachusetts**
- 12:50-1:00 **Academy Award Honorable Mention**  
*In Vivo Angioplasty Prevents the Development of Vasospasm in Canine Carotid Arteries: Pharmacological and Morphological Analyses*  
**Joseph F. Megyesi, McKenzie Health Sciences Center, Edmonton, Alberta**



**Friday, September 20**

8:00 AM - **SYMPOSIUM - New Directions in Image-Guided Minimally Invasive Neurosurgery**  
10:00 AM **Moderators: John Tew, Kalmon Post**

8:00-8:20 **Frameless Sterotaxis – Peter Heilbrun**

8:20-8:40 **Surgery in the MRI – Peter Black**

8:40-9:00 **Intravascular Therapies – L. N. Hopkins**

9:00-9:20 **Spinal Endoscopy – Volker Sonntag**

9:20-9:40 **Video-based Systems – David Thomas**

9:40-10:05 **Discussion**

10:05-10:35 **Coffee Break**

10:35-12:30pm

**SCIENTIFIC SESSION II**

**Moderators: Roberto Heros, Volker Sonntag**

10:35-11:00 *Extra-foraminal Lumbar Disc Herniations*  
**V. Rajaraman, N. Swami, W. S. Tobler,  
S. B. Dunsker**

11:00-11:20 *The Miami Project – Scientific Achievements*  
**Barth A. Green, Richard P. Bunge**

11:20-11:45 *Clinical and Experimental Studies of the Value of Surgical Decompression in Spinal Cord Injury*  
**Charles H. Tator**

11:45-12:30 **Presidential Address: John Tew**  
Introduced by Edward Connolly

**Saturday, September 21**

**SCIENTIFIC SESSION III**

**Moderators: David Piepgras, Fredric Meyer**

- 8:25-8:45 *AVM Radiosurgery: Truths and Consequences*  
**L.D. Lunsford, B. E. Pollock, D. Kondziolka,  
A. Maitz, J.C. Flickinger**
- 8:45-9:05 *Mechanism of Radiation Effect On Arterial  
Smooth Muscle Cells and Endothelium*  
**Marc M. Mayberg**
- 9:05-9:25 *The Role of Neuronal NO in Collateral and  
Normal rCBF*  
**Christopher M. Loftus, Scott C. Robertson**
- 9:25-9:45 *Repair of Carotid Endarterectomy with Collagen  
Dacron Graft*  
**Fredric B. Meyer, Wanda L. Windschitl**
- 9:45-10:30 **Keynote Address:**  
**Leadership Without Easy Answers**  
**Ronald Heifetz**
- 10:30-11:00 **Coffee Break**

Saturday, September 21 Cont'd

**SCIENTIFIC SESSION IV**

Moderators: L.N. Hopkins, Keith Black

- 11:00-11:20 *Drug Delivery by Intracerebral Clysis in a Rat Glioma Model*  
**Jeffrey Bruce, B. Birch, J. Johnson, J. Yoon, C. Lycette, A. Falavigna**
- 11:20-11:40 *Comprehensive Image-Guided Surgery of Sellar Tumors*  
**Michael A. Schulder, Peter Carmel**
- 11:40-12:00 *Dorsal Cervical-Medullary Bulge in Chiari I Malformations*  
**Peter W. Carmel, Jacqueline A. Bello**
- 12:00-12:20 *Brain Tumor Invasion – Biological Rationale and Preclinical Studies*  
**Mark L. Rosenblum, Tom Mikkelsen, Klaus Edvardsen, Kevin Nelson, Elise Kohn, Robert Smith, Donna Spencer, David Rasnick, Bonnie Sloane**
- 12:20-12:40 *Immunobiology of Primary Brain Tumors*  
**WH Brooks, RL Roszman, LE Elliott**
- 12:45 *Adjourn*

Thursday, September 19

10:30 AM

**Pathobiology of Cerebral Cavernous Malformations: An Integrative Paradigm**

Awad I, Gunel M, Desai KM, Pizzonia J, Lifton R

The cerebral cavernous malformation (CCM) is a common vascular lesion of the brain, affecting 0.5% of the population, and manifesting myriad neurologic sequelae including headache, epilepsy, focal neurologic deficits and hemorrhagic stroke. We review epidemiologic data from a multi-institutional data base of cases evaluated during one decade. There is marked difference in probability of lesion behavior among the genders, and in different age groups. Lesions which have hemorrhaged previously are more likely to hemorrhage again and cause clinical disability. Probability of untoward clinical events is driven by host and lesion factors, and does not follow a simple lesion-year hemorrhagic risk model. In collaboration with twelve centers across the United States, we have examined the genetics of the lesion, and mapped a gene causing CCM to 7q11.2-q21. Linkage disequilibrium studies in Hispanic Americans have demonstrated a preserved haplotype in the region of the CCM gene in familial and apparently sporadic cases, indicating that all CCM cases in this population are likely genetic and inherited from a common ancestor. We have uncovered evidence of genetic locus heterogeneity among non-Hispanic patients, with one additional gene likely causing the disease. Vascular biology studies have included immunohistochemical staining for markers of vessel wall maturity, and expression of angiogenesis growth factors. Studies on lesion epileptogenicity have focused on iron assays and impact of heme breakdown products on glial and neuronal excitability. Data from these studies is integrated into a disease paradigm with potential clinical applications including genetic screening, prediction of penetrance and clinical sequelae, and novel strategies for molecular modification of lesion behavior.

# NOTES

Thursday, September 19  
10:55 AM

## **Posteroventral Pallidotomy: Indications, Surgical Technique and Clinical Outcome**

Burchiel K, Favre J, Taha J

From January 1993 through May 1996, we performed 113 posteroventral pallidotomies (PVP) on 82 patients. In this series, two patients had probable "Parkinson's plus" syndromes, one had hemiballismus from cerebral palsy, and one had a combination of simultaneous pallidotomy with a thalamotomy performed contralaterally. The remainder (78) were patients with previously Sinemet-responsive Parkinson's disease, now medically intractable despite maximal adjunctive medications. Indications for PVP included in order of decreasing importance: Predominant symptoms of Levodopa-induced dyskinesias, bradykinesia, rigidity, dystonia, severe on-off fluctuations, freezing, gait disturbance, and tremor. Patients underwent Fast Spin Echo Inversion Recovery (FSE IR) MRI imaging for stereotactic localization using the Leksell frame system. Pallidotomy target parameters of 19-22 mm lateral, 2 mm anterior to the midcommissural point and 1-7mm below the intercommissural plane were used. Microelectrode recording in GPe/GPi, and in optic tract was used to confirm target localization. Anatomic (MRI) and physiologic (microelectrode) target localizations differed by <2mm in 98% of cases. Thus, MRI directed targets were rarely altered by microelectrode recordings. Furthermore, macrostimulation was used to rule out target localization within the internal capsule and optic tract. Typically three sequential lesions were created at 840 C for 60 seconds with a 2 X 1.3mm lesion electrode. Outcome measures showed that the majority of patients were satisfied with the procedure, and that excellent to good results were obtained in 65% of patients. Age appeared to be an important determinant of outcome in that patients over 70 years had a good/excellent recovery 37% of the time, while those under 70 had good/excellent results 72% of the time. Predictors of good outcome included age < 70, dyskinesias, rigidity, bradykinesia, and tremor. Dyskinesias, bradykinesia, rigidity, tremor, and walking were all significantly improved. Some deterioration in voice volume and articulation occurred in the majority of patients, and speech deterioration was quantitatively worse with bilateral pallidotomy. Overall, in comparing unilateral and bilateral pallidotomy, improvements (e.g., dyskinesia, rigidity, tremor and walking) were better after bilateral pallidotomy, whereas complications with bilateral pallidotomy were more prominent (e.g., decreased voice volume and articulation, increased drooling). In summary, pallidotomy is a valuable surgical treatment for parkinsonian symptoms, but complications, particularly with bilateral procedures, are not negligible.

## NOTES

Thursday, September 19

11:20 AM

**Pathophysiology of Syringomyelia Associated with Chiari I Malformation**

Heiss JD, DeVroom H, Eidsath A, Talbot T, Patronas N, Oldfield, EH

Recent investigations using anatomic and cine MRI combined with intraoperative ultrasound (IOUS) in patients with syringomyelia associated with a Chiari I malformation of the cerebellar tonsils suggest that syringomyelia may result from occlusion of the subarachnoid space (SAS) at the foramen magnum by limiting the free pulsatile movement of CSF between the cranial and spinal SAS, partial entrapment of the CSF in the spinal SAS, and excess pulsatile pressure waves in the spinal SAS. To investigate this further, we performed a clinical protocol in which clinical assessment, anatomic and cine MRI, preoperative pressures measured simultaneously from the syrinx and the cervical and lumbar SAS at rest and with Valsalva and Queckenstedt maneuvers, intraoperative pressure measurements from the same sites (and a cerebral ventricle for the intraoperative component of the study) combined with IOUS monitoring of the spinal cord, syrinx, and tonsils, and postoperative MRI and pressure testing similar to the preoperative testing was performed. The pressure waves in the syrinx and SAS at the various sites were recorded digitally and the cine MRI and IOUS were related to the cardiac cycle (EKG) so that the physiological and anatomic changes that occur over the course of the cardiac cycle could be related and compared. The results, which confirm the hypothesis of the study, and their clinical significance will be presented.



NOTES

Thursday, September 19

11:45 AM

## **Differentiation between Cortical Atrophy and Hydrocephalus using <sup>1</sup>H MRS**

Blum S, McComb JG, Ross BD

Quantitative <sup>1</sup>H MRS to determine cerebral metabolite patterns, and MRI to determine CSF flow, were applied to 12 patients with ventricular dilatation - Group A, cortical atrophy (N=5), or Group B, hydrocephalus (N=7) - and in 9 normal controls.

While mean brain water (Group A = 80% ± 6; Group B = 86% ± 5; normal = 95% ± 4) did not differ between the 2 groups of patients and controls, <sup>1</sup>H MRS distinguished those patients with cortical atrophy (Group A) (\*NAA/Cr = 0.69 ± 0.17, vs normal = 1.06 ± 0.16; P < 0.002; [NAA] = 5.9 ± 1.3 mmoles/kg. vs normal 8.0 ± 1.4; P < 0.02) from those with hydrocephalus (Group B) (NAA/Cr = 1.16 ± 0.11; [NAA] = 9.2 ± 1.2; P > 0.13 and P > 0.07). Lactate levels were elevated in 3/5 patients with cortical atrophy, but 0/7 of those with hydrocephalus. Mean absolute concentrations (mmoles/kg) of the five major cerebral osmolytes were 41 ± 4 (Group A), 43 ± 6 (Group B), and 42 ± 4 (normal), so that despite massive brain deformation, constant osmolality was maintained.

Thinning of the cortical mantle in hydrocephalus may result from osmotically driven reduction in individual cell-volumes, (shrinkage), rather than brain-compression.

\*N-acetylaspartate/creatinine

NOTES

Thursday, September 19

12:10 PM

## **The Risk of Major Morbidity After Stereotactic Radiosurgery**

Kondziolka D, Flickinger JC, Lunsford LD, Bissonette DJ,

Are current dose-selection guidelines acceptable for radiosurgery? We performed an analysis of major morbidity after Gamma Knife radiosurgery from a population of 1860 patients, to define the risks for parenchymal or cranial nerve deficits related to lesion type, location, size, and radiation dose. We selected prospectively a dose based on a theoretical risk of < 3% for permanent tissue injury. Morbidity occurred within 3 years.

1600 patients were evaluable at least 12 months after radiosurgery. Diagnosis included AVM (n=531), cavernous malformation (CM) (n=49), acoustic tumor (n=318), meningioma (n=204), pituitary tumor (n=63), malignant tumor (metastasis/glioma) (n=309), other tumor (n=94), and trigeminal neuralgia (n=32). We determined that major morbidity impacted function (e.g., hemiparesis, sensory loss, ataxia, hemianopsia, dysphasia, visual loss, dementia, lower cranial nerve palsy) or death. Acoustic, facial, or trigeminal deficits were excluded. Morbidity was defined by clinical exam and neuroimaging. Major morbidity developed in 30 patients (1.9%): 16 AVM (3.0%), 5 CM (10%), 1 acoustic (0.3%), 4 meningioma (2.0%), 1 pituitary (1.6%), 2 malignant tumors (0.6%), 1 other (1.1%), and no trigeminal neuralgia (0%). 11/16 AVMs were located in the brainstem or diencephalon. Lesion volume was related significantly to risk. 8 of 30 patients (27%) had received prior irradiation. 26 of 30 patients improved (87%). 14 of 1600 patients (0.9%) developed permanent major neurologic deficits after radiosurgery. Death following radiation-related neurologic morbidity occurred in 2 patients (.12%).

Dose-selection guidelines proved accurate. Major morbidity was 1.9% (below the 3% predicted risk), but was increased in patients with large lesion volumes, and those who received prior irradiation. The relative risks of radiosurgery should be compared to the risks of other surgical approaches during selection of management options.

## NOTES

Thursday, September 19

12:35 PM

**Drug-Regulated Apoptotic Death in a Rat Glioma Model Mediated by a Novel Retroviral Vector**

John S. Yu, Miguel Sena-Esteves, Werner Paulus, Xandra O. Breakefield, Steven A. Reeves

IL-1B-converting enzyme (ICE) is a member of a growing family of cysteine proteases shown to be a crucial component in the activation of a genetic program that leads to autonomous cell death in mammalian cells. In this study a murine ICE-*lacZ* fusion gene was introduced into a novel retroviral vector designed to achieve regulated ectopic expression of a foreign gene in mammalian cells. By delivering the ICE-*lacZ* gene within a retroviral vector and under the control of a tetracycline regulated promoter, we were able to utilize the intrinsic cell death program of ICE as a means for tumoricidal therapy in a rat brain tumor model. Both in culture and *In vivo* suppression of ICE-*lacZ* expression was extremely tight in the presence of tetracycline, as determined by the lack of X-gal positive tumor cells and by cell viability. When tetracycline was withdrawn, ICE-*lacZ* gene expression was rapidly turned on and apoptosis-mediated cell death occurred in essentially all tumor cells.

## NOTES

Thursday, September 19  
12:50 P.M.

***In Vivo* Angioplasty Prevents the Development of Vasospasm in Canine Carotid Arteries: Pharmacological and Morphological Analyses**

Joseph F. Megyesi, J. Max Findlay, Bozena Vollrath, David A. Cook, Ming H. Chen

**Background:**

In order to study the effects of *in vivo* transluminal balloon angioplasty (TBA) on the structure and function of the arterial wall, a new canine model of hemorrhagic cerebral vasospasm of the high cervical internal carotid artery (ICA) was developed. This model was used to determine if TBA performed prior to clot placement could prevent the development of vasospasm.

**Methods:**

Twelve dogs underwent surgical exposure of both distal cervical ICAs, followed by baseline angiography. One randomly-selected ICA in each dog was then subjected to *in vivo* TBA and repeat angiography. Both distal ICAs were then surrounded with blood clots held by silastic sheaths. Seven days later angiography was repeated and all animals sacrificed. The ICAs in four animals were perfusion-fixed *in situ* for morphological analysis by electron microscopy, and the arteries in the remaining eight animals were removed, and immediately immersed in oxygenated Krebs solution. Contractile responses of isolated arterial rings from each ICA were recorded after treatment with potassium chloride (KCl), noradrenaline (NA), serotonin (5-HT), and prostaglandin F<sub>2α</sub> (PGF<sub>2α</sub>) while relaxations were obtained after pre-constriction with NA, in response to the calcium ionophore A<sub>23187</sub> and bradykinin. The morphology and pharmacological responses of ICAs that had been exposed to blood with or without prior TBA, were compared with data obtained from control arterial segments of intact, more proximal regions of the ICAs from each animal.

**Results:**

TBA resulted in immediate angiographic enlargement of the ICA lumen that was still evident seven days later despite the placement of clotted blood around the artery. Scanning and transmission electron microscopy demonstrated flattening of the intima and internal elastic lamina in these dilated arteries, associated with patchy losses of endothelial cells. In contrast, ICAs which had been exposed to clotted blood but had not undergone prior TBA, developed consistent angiographic and morphological vasospasm. In comparison with control vessels and non-dilated vasospastic vessels, vessels dilated with TBA and then exposed to clotted blood showed significantly diminished responses to all compounds tested, with the exception of PGF<sub>2α</sub> and bradykinin.

These results indicate that *in vivo* TBA results in a degree of functional impairment of vascular smooth muscle that persists for at least seven days. This result is consistent with previous observations of the acute effects of TBA in isolated arteries. Furthermore, these results support the hypothesis that normal smooth muscle function is required for the development of vasospasm. Finally, these results indicate that TBA performed prior to the onset of vasospasm prevents its development.



## NOTES

Friday, September 20, 1996

10:35 AM

**Extra-Foraminal Lumbar Disc Herniations**

Rajaraman V, Swami N, Tobler WS, and Dunsker SB

Because of the advent of CT and MRI imaging, extra-foraminal or extreme lateral lumbar disc herniations are diagnosed more easily. To approach these lesions, some individuals continue to perform a unilateral laminectomy and facetectomy, but far lateral (extra-spinal) approaches are being performed more frequently. Moreover, recent biomechanical studies indicate there is increased translational movement following facetectomy alone, and the movements are worsened by combining facetectomy and discectomy.

We will present the important anatomy to know when performing these extra-spinal procedures, including the demonstration of an arterial arcade which encircles the main nerve trunk, and which endangers it. We believe that proper attention to this arcade and to the attached posterior primary ramus of the nerve will prevent the painful burning dysesthesias that commonly follow the extra-spinal approach.

We will also present our clinical experience with the procedure.

NOTES

Friday, September 20

11:00 AM

**The Miami Project - Scientific Achievements**

Green B. Bunge RP

The Miami Project to Cure Paralysis was established in 1985 with support from the University of Miami Department of Neurological Surgery, generous philanthropic gifts, and with a determination to find more effective treatment for patients with spinal cord injury. The faculty are members of the Department of Neurological Surgery who lead 15 laboratory groups, with expertise ranging from molecular biology to clinical physiology and rehabilitation, and including a comprehensive study of human spinal cord pathology and physiology. This unique group of basic and clinical scientists concentrating on a single clinical entity has: 1) shown that central cord syndrome may result from bilateral damage to the lateral corticospinal tract at the cervical level, rather than central cord cavitation; 2) developed a new method for stimulus evoked EMG monitoring during transpedicular lumbosacral spine instrumentation that reliably detects screw misplacement and decreases complications; 3) documented that assisted ejaculation and fertilization can allow many spinal cord injured men to successfully father children; 4) demonstrated that a spinal cord based central pattern generator for locomotion can be detected in selected cases of human spinal cord injury; 5) established that axons of the long tract of the spinal cord can be induced to regenerate by favorable cellular environment at the site of injury (for example transplantation of Schwann cells to midthoracic spinal cord injury; 6) devised reliable methods for the isolation and cultivation of Schwann cells from adult human nerve; 7) generated neuronal cell lines by genetic manipulations and established that some lines can express neuronal morphology appropriate to the brain region into which they are transplanted. This work and other studies will be presented.

## NOTES

Friday, September 20

11:20 AM

**Clinical and Experimental Studies of the Value of Surgical Decompression in Spinal Cord Injury**

Tator, C

There is a need for a randomized control trial of surgical decompression in patients with persisting compression of the cord after spinal cord injury. There is no definite evidence that decompression improves neurological recovery after either complete or incomplete acute spinal cord injury.

Several retrospective clinical studies have been performed including one by the author, which have failed to show improved recovery following surgical decompression. In contrast, several well controlled experimental studies including two from the author's laboratory have shown improved recovery following posttraumatic decompression of the spinal cord in various species. This presentation will review the past and current clinical and experimental studies of posttraumatic decompression of the cord. In addition, the results will be described of a recent retrospective analysis of the current incidence (66%) of surgical treatment of spinal cord injury in 36 U.S. and Canadian centres. Many of these operations were performed for purposes of decompression. The current protocol will be discussed for a proposed prospective control trial of surgical decompression in patients with persisting acute traumatic compression of the spinal cord.

# NOTES

Saturday, September 21

8:25 AM

## **AVM Radiosurgery: Truths and Consequences**

Lunsford LD, Pollock BE, Kondziolka D, Maitz A, Flickinger JC

### **Introduction:**

To clarify recent pejorative reports about outcomes of AVM radiosurgery, we reviewed our experience in 315 patients evaluable at least 3 years afterwards. The obliteration and risk rates were assessed.

### **Methods & Materials:**

Follow-up was available 98%; 197 patients (63%) completed 3 year angiography. MRI was used serially to assess AVM flow and to detect complications.

### **Results:**

The overall angiographically confirmed obliteration rate was 72%. Depending on volume, the obliteration rate varied from 41% to 98%. The minimum nidus dose was the only significant predictor of obliteration. The major cause for failure was poor nidus resolution during intraoperative imaging. MRI proved to have a 96% sensitivity and a 100% specificity of detecting residual AVM flow. No difference in outcomes or obliteration rates were detected in patients who had only MRI follow-up. Deep AVMs had a 5x increased risk of neurological sequelae. A recent AVM hemorrhage before radiosurgery increased the risk of a repeat hemorrhage during the latency interval prior to obliteration. No AVM bled after MRI demonstrated obliteration.

### **Conclusions:**

AVM radiosurgery is an effective strategy for many AVMs. Intraoperative MRI and angiography are critical to define the target volume. MRI alone can be used effectively to detect success, failure, and complications. AVMs with volumes that prevent minimal marginal doses > 16Gy should be considered for other treatment options, including staged radiosurgery.



NOTES

Saturday, September 21

8:45 AM

**Mechanism of Radiation Effect on Arterial Smooth Muscle Cells and Endothelium**

Mayberg, M

To determine by which radiation modulates injury for vascular smooth muscle cells (SMC) and endothelium, 108 rats were divided into three groups: (A) unilateral irradiation to cervical common carotid artery, (B) unilateral carotid balloon catheter injury, and (C) bilateral balloon injury with unilateral irradiation. Animals received from 100-2000 cGy (rads) and carotid arteries were processed for immunohistochemistry at 0-72 hours after treatment with terminal transferase end labeling (TUNEL - to detect apoptosis) and in situ nick translation (ISNT - to detect necrosis). Cultured rat aortic SMC and endothelium were placed in either serum-free medium (growth-arrested) or whole blood serum (growth-stimulated), radiated with 500-2000 cGy, and processed for TUNEL and ISNT at 0-72 hours.

Balloon catheter injury only (group B) produced immediate necrosis in SMC on the abluminal aspect of the media. The addition of radiation to balloon injury (group C) did not affect either TUNEL or ISNT labeling. Radiation alone (group A) caused dose-dependent apoptosis in endothelium, but not SMC; no necrosis was observed at any dose. Similarly, irradiated cultured SMC in either media showed mild morphologic changes compared to controls, but no evidence of necrosis or apoptosis up to 2000 cGy. Endothelium in vitro, on the other hand, showed considerable sensitivity to radiation with significant apoptosis at doses as low as 500 cGy, in both media. These data suggest that the primary effect of gamma radiation on medium-sized arteries involves apoptosis in endothelial cells. Strategies to either inhibit or augment the effect of radiation on arterial endothelium may be useful in future treatment of intracranial lesions.

# NOTES

Saturday, September 21

9:05 AM

## **The Role of Neuronal NO in Collateral and Normal rCBF**

Loftus CM, Robertson SC

N-Methyl-D-aspartate (NMDA) produces cerebral vasodilation in response to receptor activation, probably mediated by the neuronal isoform of nitric oxide (NO) synthase. Our experiments were studied the effects of NMDA and selective inhibition and neuronal NO synthase with 7-nitroindazole (7-NI) on collateral and normal cerebral blood flow (rCBF) following MCA occlusion. In 9 dogs under halothane anesthesia, a left craniotomy was performed. An MCA branch was cannulated for determination of collateral dependent tissue (CDT). CBF was measured using radioactive microspheres and cerebral vascular pressures were measured with a glass micropipette.

NMDA (300  $\mu$  M) increased flow to DCT by 54.6%, while normal ipsilateral and contralateral cerebrum increased by at least 35% from baseline. 7-NI caused a significant drop in rCBF, with the greatest drop of 33.8% occurring in CDT. Normal ipsilateral and contralateral rCBF were reduced by 32.3% and 20.2% respectively. The response to NMDA was significantly attenuated following 7-NI administration as rCBF actually decreased further from baseline. Vascular resistance decreased in response to NMDA; 7-NI caused a significant increase in cerebral vascular resistance.

In our study agonism at NMDA receptors following MCA occlusion increased blood flow significantly to CDT and normal cerebrum, probably due to the production of neuronal NO resulting in vasodilation. Blockade of neuronal NO synthase activity with 7-NI reduced rCBF to all regions of the brain from increase usually seen in response to NMDA administration. Neuronal NO production appears to play an important role in regulating vasculating vascular tone and CBF and may be especially important in maintaining flow to CDT following MCA occlusions.

## NOTES

Saturday, September 21

9:25-9:45 AM

**Repair of Carotid Endarterectomy with Collagen Dacron Graft**

Meyer FB, Windschitl WL

Closure of the arteriotomy following carotid endarterectomy with a saphenous vein patch graft may decrease the risk of acute postoperative occlusion and recurrent stenosis. However, disadvantages of a vein patch include postoperative rupture (0.15%) and pseudoaneurysm formation. This report analyzes preliminary results using a Hemashield microvel knitted double velour graft. From 1/93 through 7/95, 190 consecutive carotid endarterectomies were repaired with the synthetic graft. The surgical management included intraoperative monitoring with selective shunting, infusion of heparin 5000 units prior to cross clamping, pre and postoperative aspirin 325 mg qd, and perioperative antibiotics. All patients had postoperative noninvasive assessment of vessel patency prior to discharge with either carotid ultrasound or oculoplethysmography. There were no wound hematomas, perioperative occlusions, or graft infections. There was 1 major (embolic) and 1 minor (hemodynamic) stroke occurring in Sundt Grades 3 and 4, respectively. There was 1 death from cardiac arrest which occurred 10 days after surgery at home following combined cardiac and carotid revascularization. There were 2 patients involving 3 vessels who developed recurrent stenosis. The 1 patient who developed bilateral recurrent stenosis 9 months after the second surgery appeared to have a dense fibrotic reaction to surgery as evidenced by hypertrophic scar formation of the skin and myointimal hyperplasia of the endarterectomy site. The second patient developed a focal proximal stenosis underneath the graft site 6 months after surgery. These preliminary results suggest that this synthetic graft may be a viable alternative for those surgeons who prefer to repair a carotid endarterectomy with a patch graft.

## NOTES

Saturday, September 21

11:00 AM

**Drug Delivery by Intracerebral Clysis in a Rat Glioma Model**

Bruce J. Birch B, Johnson J, Yoon J, Lycette C, Falavigna A

To circumvent the limitations of a systemic chemotherapy for malignant brain tumors, a novel local drug delivery method known as intracerebral clysis has been developed which involves the use of high flow microinfusion directly into brain tumors by means of a controllable pump. To establish baseline parameters for preclinical, in vivo drug investigations of intracerebral clysis in a rat glioma model, we have studied the effects of varying infusion parameters on intracranial pressure, infusate distribution and clinical therapeutic response.

C6 rat glioma cells were stereotactically implanted into the frontal lobe of male Fischer rats. Between 10 to 25 days later, catheters were stereotactically implanted into the tumors and 100 ul of 25% albumin was infused at flow rates from 0.5 to 4 ul/min while monitoring ICP. Fluoresceinated dextran (MW 20,000 D) was then infused under similar conditions and the distribution volumes were calculated after brain sectioning and photography under UV light.

Flow rates less than 1 ul/min were tolerated well even after 25 days of tumor growth. The increase in ICP with increasing flow volumes was progressively greater as the flow rate was increased. Flow rates greater than 3 ul/min were associated with morbidity and mortality. Volumes of distribution at tolerated flow rates were sufficient to provide adequate drug delivery to tumors. Preliminary results demonstrating efficacy of several anti-tumor compounds delivered by intracerebral clysis will also be presented.



NOTES

Saturday, September 21

11:20-11:40 AM

**Comprehensive Image Guided Surgery of Sellar Tumors**  
Schulder MA, Carmel P

More than 25 years ago, the advent of the operating microscope and fluoroscopic C-arm rehabilitated the transsphenoidal approach to the sella, making it the route of choice for most patients with pituitary tumors. However, significant obstacles still limit the radical removal of these tumors, including; 1) uncertainty of limits of cavernous sinus extension; 2) lack of lateral landmarks, especially in patients with larger, more invasive tumors; 3) "tunnel" vision of the operating microscope does not provide angles needed to visualize portions of tumor.

We have employed new technical advances to optimize surgical planning and removal of sellar tumors. Techniques utilized included: 1) differential hysteresis image processing, which defines cavernous involvement more clearly than standard MR scans; 2) Frameless stereotactic navigation, which allows precise evaluation of lateral resection extent; and 3) working channel endoscopy, which allows visualization and removal of tumor which lies above the planum, upper clivus, and laterally within and above the sella.

These techniques will be illustrated. They have the potential to considerably enhance the scope and safety of transsphenoidal operations. We believe they can be shown to be cost effective in treating patients with these tumors.

# NOTES

Saturday, September 21

11:40 AM

## **Dorsal Cervical-Medullary Bulge in Chiari I Malformations**

Carmel PW. Bello JA

A dorsal surface bulge underlying the tonsillar prolapse of Chiari I malformations has been reported by a number of authors. Surprisingly, there has been no systematic study of this associated deformity, correlation with clinical symptomatology, or explanation of its pathogenesis. This report details the pre- and post-operative MR findings, clinical and operative findings and incidence in a series of 137 patients with Chiari I malformations.

In adequately studied Chiari I patients, dorsal deformity was found in 19% (18/99). Patients with dorsal deformities had a higher incidence of lower cranial nerve problems, including a "medullary cough" syndrome. Bulges were infrequent in children and adolescents, and more frequent in adults.

Post-op MRI's showed progressive resolution of this deformity. These data indicate that the bulge is reversible. It is likely to be secondary to progressive tonsillar prolapse and is acquired, rather than congenital, in origin. It is not an anatomically "fixed" malformation.

# NOTES

Saturday, September 21

12:00 noon

**Brain Tumor Invasion-Biological Rationale and Preclinical Studies**

Rosenblum ML, Mikkelsen T, Edvardsen K, Nelson K, Kohn E, Smith R, Spencer D, Rasnick D, Sloane B

The invasiveness of malignant glioma cells is a major cause of therapeutic failure both locally and at distant sites within the brain. We have evaluated the clinically relevant pathways of tumor spread and hypothesized that increased protease activity, cell receptor (integrin) interactions with specific extracellular matrix (ECM) proteins, and second messenger systems are the most logical targets against which to develop antiinvasive strategies. Cathepsin B (CB) is elevated in malignant gliomas, excreted into the extracellular space and prominent in invading cells (Cancer Res 54:6027-6031, 1994). We have utilized two types of specific, irreversible CB inhibitors to demonstrate a 10-70% inhibition of invasion for U251MGn, U87MG and HF66 malignant glioma cells using a Matrigel ECM invasion assay. A clinically relevant spheroid confrontation assay that demonstrates human brain tumor cell invasion into organotypic normal brain aggregates derived from fetal rats was used to show a marked inhibition of invasion using all the CB inhibitors. We have demonstrated the deposition of laminin by normal brain cells at the invading front of tumor cells in both the spheroid confrontation assay as well as an in vivo model for brain tumor invasion. A simultaneous increase in the expression of a laminin-associated integrin in tumor cells was also observed. Furthermore, antiintegrin antibodies were shown to decrease tumor cell invasion in the Matrigel ECM assay. Carboxy-amido-triazole (CAI) is an inhibitor of G-protein-mediated signal transduction and has been developed as an antimetastasis agent. We have shown that 2-20 uM CAI inhibits Matrigel invasion of glioma cell lines by an average of 60% without killing cells. CAI also inhibits tumor cell invasion in the spheroid confrontation model. We conclude that protease inhibitors and agents which block integrin-mediated adhesion and second messenger systems could be developed as novel antiinvasive strategies to treat malignant gliomas.

## NOTES

Saturday, September 21

12:20 PM

**Immunobiology of Primary Brain Tumors**

Brooks WH, Roszman TL, Elliott LE

Individuals harboring primary malignant tumors manifest a broad variety of immunological deficits. These anomalies are confined primarily to the T-helper cell subset and are linked to decreased production of IL-2 and failure to properly assemble the high-affinity receptor for IL-2 in the membrane of stimulated T lymphocytes. In this study, the early transmembrane signaling events on which normal T-cell function is contingent were examined. Concurrently, the mechanism(s) of how these and/or other biochemical and molecular abnormalities are induced in the T-cell was investigated. The results demonstrate that early transmembrane signaling via the T-cell receptor/CD3 complex of lymphocytes obtained from glioma bearing individuals is not normal; these cells are found to have an intrinsic defect which renders them unable to respond to appropriate proliferative stimuli. Concurrently, these investigations reveal that soluble factors secreted by malignant glial cells induce programmed cell death (apoptosis) in T cells. Collectively, the present study indicates that immune suppression observed in patients with malignant gliomas is contingent on and may be correlated with tumor size and the liberation of glial T cell suppresser factors(s) (GSF). These findings further contribute to elucidating the immunobiological potential of these patients. The relevancy of this immunobiological model to immune modulation as a therapeutic option will be discussed.



# NOTES

**GUEST**

**Issam Awad  
New Haven, CT**

**Stan Barnwell  
Portland, OR**

**Joshua Bederson  
New York, NY**

**Charles Branch  
Winston-Salem, NC**

**William C. Broaddus  
Richmond, VA**

**William H. Brooks  
Lexington, KY**

**Jeffrey Bruce  
New York, NY**

**Joseph Cusick  
Milwaukee, WI**

**Kenneth A. Follett  
Iowa City, IA**

**Kevin Gibbons  
Buffalo, NY**

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Miami, FL**

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Beverly Hills, CA**

**Prof. Ronald Heifetz  
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**John Van Gilder**

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**Edward H. Oldfield  
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Detroit, MI**

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Shatin, Hong Kong**

**Michael A. Schulder  
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**Peter Carmel**

**Stewart Ben Dunsker**

**Paul B. Nelson**

**Academy Award  
Winner**

## Academy Award Winners

Paul M. Lin .....	1955
Hubert L. Rosomoff .....	1956
Byron C. Pevehouse .....	1957
Norman Hill .....	1958
Jack Stern .....	1959
Robert Ojemann .....	1960
Lowell E. Ford .....	1962
Charles H. Tator .....	1963
Earle E. Crandall .....	1964
Stephen Mahaley, Jr. ....	1965
Chun Ching Kao .....	1966
John P. Kapp .....	1967
Yoshio Hosobuchi .....	1968
Gary G. Ferguson .....	1970
Richard L. Pressley .....	1971
David G. McLone .....	1972
Arden F. Reynolds, Jr. ....	1973
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John R. Howe .....	1976
Howard W. Blume .....	1977
Howard J. Senter .....	1978
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Dennis A. Turner .....	1981
Marc R. Mayberg .....	1982
David S. Baskin .....	1983
Kevin J. Kiwak .....	1984
Terry Lichtor .....	1985
Michael G. Noskp .....	1986
Joseph R. Madsen .....	1987
James T. Rutka .....	1988
Christopher D. Heffner .....	1989
Scott I. Gingold .....	1990
Mary Louise Hlavin .....	1991
Adam P. Brown .....	1992
Michael Tymianski .....	1993
David Garrett, Jr. ....	1994
L. Brannon Thomas .....	1995
John S. Yu .....	1996

## Meetings of the Academy

Hotel Netherland Plaza, Cincinnati, Ohio .....	October 28-29, 1938
Roosevelt Hotel, New Orleans, Louisiana .....	October 27-29, 1939
Tudor Arms Hotel, Cleveland, Ohio .....	October 21-22, 1940
Mark Hopkins Hotel, San Francisco and Ambassador Hotel, Los Angeles, California .....	November 11-15, 1941
The Palmer House, Chicago, Illinois .....	October 16-17, 1942
Hart Hotel, Battle Creek, Michigan .....	September 17-18, 1943
Ashford General Hospital, White Sulphur Springs, West Virginia .....	September 7-9, 1944
The Homestead, Hot Springs, Virginia .....	September 9-11, 1946
Broadmoor Hotel, Colorado Springs, Colorado .....	October 9-11, 1947
Windsor Hotel, Montreal, Canada .....	September 20-22, 1948
Benson Hotel, Portland, Oregon .....	October 25-27, 1949
Mayo Clinic, Rochester, Minnesota .....	September 28-30, 1950
Shamrock Hotel, Houston, Texas .....	October 4-6, 1951
Waldorf-Astoria Hotel, New York City .....	September 29-October 1, 1952
Biltmore Hotel, Santa Barbara, California .....	October 12-14, 1953
Broadmoor Hotel, Colorado Springs, Colorado .....	October 21-23, 1954
The Homestead, Hot Springs, Virginia .....	October 27-29, 1955
Camelback Inn, Phoenix, Arizona .....	November 8-10, 1956
The Cloister, Sea Island, Georgia .....	November 11-13, 1957
The Royal York Hotel, Toronto, Canada .....	November 6-8, 1958
Del Monte Lodge, Pebble Beach, California .....	October 18-21, 1959
Copley Sheraton Plaza, Boston, Massachusetts .....	October 5-8, 1960
Royal Orleans, New Orleans, Louisiana .....	November 7-10, 1962
El Mirador, Palm Springs, California .....	October 23-26, 1963
The Key Biscayne, Miami, Florida .....	November 11-14, 1964
Terrace Hilton Hotel, Cincinnati, Ohio .....	October 14-16, 1965
Fairmont Hotel & Towers, San Francisco, California .....	October 17-19, 1966
The Key Biscayne, Miami, Florida .....	November 8-11, 1967
Broadmoor Hotel, Colorado Springs, Colorado .....	October 6-8, 1968
St. Regis Hotel, New York City .....	September 21, 1969
Camino Real, Mexico City .....	November 18-21, 1970
Sahara-Tahoe Hotel, Stateline, Nevada .....	September 26-30, 1971
New College, Oxford, England .....	September 4-7, 1972
Huntington-Sheraton Hotel, Pasadena, California .....	November 14-17, 1973
Southampton Princess Hotel, Bermuda .....	November 6-9, 1974

The Wigwam (Litchfield Park), Phoenix, Arizona .....	November 5-8, 1975
Mills Hyatt House, Charleston, South Carolina .....	November 10-13, 1976
Mauna Kea Beach Hotel, Kamuela, Hawaii .....	November 2-5, 1977
Hotel Bayerischer Hof, Munich, Germany .....	October 22-25, 1978
Hyatt Regency, Memphis, Tennessee .....	November 7-10, 1979
Waldorf Astoria, New York City .....	October 1-4, 1980
Sheraton Plaza, Palm Springs, California .....	November 1-4, 1981
Ritz-Carlton Hotel, Boston, Massachusetts .....	October 10-13, 1982
The Lodge at Pebble Beach, California .....	October 23-26, 1983
The Homestead, Hot Springs, Virginia .....	October 17-20, 1984
The Lincoln Hotel Post Oak, Houston, Texas .....	October 27-30, 1985
The Cloister, Sea Island, Georgia .....	November 5-8, 1986
Hyatt Regency, San Antonio, Texas .....	October 7-10, 1987
Omni Netherland Plaza, Cincinnati, Ohio .....	September 13-17, 1988
Loews Ventana Canyon, Tucson, Arizona .....	September 27-October 1, 1989
Amelia Island Plantation, Amelia Island, Florida .....	October 2-7, 1990
Salishan Lodge, Gleneden Beach, Oregon .....	September 22-26, 1991
Ritz-Carlton Hotel, Naples, Florida .....	October 21-25, 1992
The Wigwam, Phoenix, Arizona .....	October 27-30, 1993
The Cloister, Sea Island, Georgia .....	November 3-6, 1994
Loew's Ventana Canyon Resort, Tucson, Arizona .....	November 1-5, 1995
The Greenbrier, White Sulphur Springs, West Virginia .....	September 18-22, 1996

#### **FUTURE MEETINGS:**

Rimrock Hotel, Banff, Alberta, Canada .....	September 10-14, 1997
Four Seasons Biltmore, Santa Barbara, California .....	November 3-8, 1998

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Dean H. Echols .....	1938-39	James G. Balbraith .....	1968
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Francis Murphey .....	1942	Robert L. McLaurin .....	1972
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A. Earl Walker .....	1944	Benjamin B. Whitcomb .....	1974
Barnes Woodhall .....	1946	John R. Green .....	1975
William S. Keith .....	1947	William H. Feindel .....	1976
Howard A. Brown .....	1948	William H. Sweet .....	1977
John Raaf .....	1949	Arthur A. Ward .....	1978
E. Harry Botterell .....	1950	Robert B. King .....	1979
Wallace B. Hamby .....	1951	Eben Alexander, Jr. ....	1980
Henry G. Schwartz .....	1952	Joseph Ransohoff II .....	1981
J. Lawrence Pool .....	1953	Byron C. Pevehouse .....	1982
Rupert B. Raney .....	1954	Sidney Goldring .....	1983
David L. Reeves .....	1955	Russel H. Patterson, Jr. ....	1984
Stuart N. Rowe .....	1956	Thomas Langfitt .....	1985
Arthur R. Elvidge .....	1957	Phanor L. Perot, Jr. ....	1986
Jess D. Herrmann .....	1958	Shelley N. Chou .....	1987
Edwin B. Boldrey .....	1959	James T. Robertson .....	1988
George S. Baker .....	1960	Thoral Sundt, Jr. ....	1989
C. Hunter Shelden .....	1961-62	Robert Ljemann .....	1990
Samuel R. Snodgrass .....	1963	Nicholas Zervas .....	1991
Theodore B. Rasmussen .....	1964	Henry Garretson .....	1992
Edmund J. Morrissey .....	1965	George Tindall .....	1993
George Maltby .....	1966	William A. Buchheit .....	1994
Guy L. Odom .....	1967	David L. Kelly, Jr. ....	1995

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William S. Keith .....	1942	Edward W. Davis .....	1971
John Raaf .....	1943	John R. Green .....	1972
Rupert B. Raney .....	1944	George J. Jayes .....	1973
Arthur R. Elvidge .....	1946	Richard L. DeSaussure .....	1974
John Raaf .....	1947	Ernest W. Mack .....	1975
Arthur R. Elvidge .....	1948	Frank E. Nulsen .....	1976
F. Keith Bradford .....	1949	Robert S. Knighton .....	1977
David L. Reeves .....	1950	Robert G. Fisher .....	1978
Henry G. Schwartz .....	1951	H.T. Ballantine, Jr. ....	1979
J. Lawrence Pool .....	1952	George Ehni .....	1980
Rupert B. Raney .....	1953	Courtland H. Davis, Jr. ....	1981
David L. Reeves .....	1954	John F. Mullan .....	1982
Stuart N. Rowe .....	1955	Hugo Rizzoli .....	1983
Jess D. Herrmann .....	1956	James W. Correll .....	1984
George S. Baker .....	1957	E. Bruce Hendrick .....	1985
Samuel R. Snodgrass .....	1958	Griffith R. Harsh III .....	1986
C. Hunter Shelden .....	1959	Ellis B. Keener .....	1987
Edmund Morrissey .....	1960	Robert Grossman .....	1988
Donald F. Coburn .....	1961-62	Jim Story .....	1989
Deben Alexander, Jr. ....	1963	John Jane .....	1990
George L. Maltby .....	1964	Stewart Dunsker .....	1991
Robert Pudenz .....	1965	Burton Onofrio .....	1992
Francis A. Echlin .....	1966	Martin Weiss .....	1993
Benjamin Whitcomb .....	1967	John M. Tew, Jr. ....	1994
Homer S. Swanson .....	1968	John Van Gilder .....	1995



### Past Secretary-Treasurers

Francis Murphey .....	1938-40	Eben Alexander, Jr. ....	1954-57
A. Earl Walker .....	1941-43	Robert L. McLaurin .....	1958-62
Theodore C. Erickson ....	1944-47	Edward W. Davis .....	1963-65
Wallace B. Hamby .....	1948-50	Robert G. Fisher .....	1966-68
Theodore B. Rasmussen .	1951-53	Byron C. Pevehouse .....	1969-72

### Past Secretaries

Byron C. Pevehouse .....	1973	James T. Robertson .....	1984-86
Russel H. Patterson, Jr. ..	1974-76	Nicholas T. Zervas .....	1987-89
Phanor L. Perot, Jr. ....	1977-80	William A. Buchheit .....	1990-92
John T. Garner .....	1981-83	Julian T. Hoff .....	1992-95

### Past Treasurers

Russell H. Patterson, Jr. ....	1973	Nicholas T. Zervas .....	1984-86
Phanor L. Perot, Jr. ....	1974-76	William A. Buchheit .....	1987-89
John T. Garner .....	1977-80	Julian T. Hoff .....	1990-92
James T. Robertson .....	1981-83	Roberto C. Heros .....	1992-95

## HONORARY MEMBERS

Elected

**GUY LAZORTHE**, (Annick)  
26 Rue D. Aurlol  
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1973

**VALENTINE LOGUE** (Anne)  
16 Rowan Road  
London, W6 7DU  
ENGLAND

1974

**BERNARD PERTUISET**  
Hospital de la Pitie  
83 Bernard de l'Hopital  
75651 Paris Cedex 13  
FRANCE

1986

**KEIJI SANO** (Yaeko)  
Dept. of Neurosurgery  
Teikyo Univ. Hospital  
2-11-1 Kaga, Itabashi-ku  
Itabasji-ku  
Tokyo 173 JAPAN

1975

**SENIOR MEMBERS**

Elected

**EBEN ALEXANDER JR.** (Betty) 1950  
Wake Forest School of Medicine  
300 S. Hawthorne  
Winston-Salem, NC 27157-1002

**DONALD BECKER** (Maria) 1990  
UCLA, Division of Neurosurgery  
10833 La Conte Avenue  
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**GILLES BERTRAND** (Louise) 1967  
Montreal Neurological Institute  
3801 University Street  
Montreal, QUEBEC H3A 1B4  
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**E HARRY BOTTERELL** (Margaret) 1938  
2 Lakeshore Boulevard  
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**JERALD BRODKEY** (Arielle) 1977  
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**WILLIAM BUCHHEIT** (Christa) 1980  
Thomas Jefferson University  
Department of Neurosurgery  
1015 Chestnut, #1400  
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**HARVEY CHENAULT** (Billee) 1949  
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- SHELLEY CHOU (Jolene)** 1974  
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- W. KEMP CLARK (Fern)** 1970  
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- WILLIAM COLLINS, JR. (Gwen)** 1963  
 Yale University School of Medicine  
 333 Cedar Street  
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- JAMES CORRELL (Cynthia)** 1966  
 249 Olde Point Rd.  
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- COURTLAND DAVIS, JR. (Carrie)** 1967  
 2525 Warwick Road  
 Winston-Salem, NC 27104
- RICHARD DESAUSSURE JR. (Phyllis)** 1962  
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- DONALD DOHN (Carolyn)** 1968  
 P.O. Box 998  
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- CHARLES DRAKE (Ruth)** 1958  
 University Hospital  
 339 Windermere Road  
 London, ONT N6A 5A5  
 CANADA

- WILLIAM FEINDEL (Faith)** 1959  
 Montreal Neurological Institute  
 3801 University Street  
 Montreal, Quebec H3A 2B4  
 CANADA
- ROBERT FISHER (Constance)** 1955  
 Department of Neurosurgery  
 DHMC  
 Lebanon, NH 03756
- ELDON FOLTZ (Catherine)** 1960  
 UCI Medical Center  
 Division of Neurosurgery  
 P.O. Box 14091  
 Orange, CA 92613-4091
- LYLE FRENCH (Gene F.)** 1954  
 Dept. of Neurosurgery  
 University of MN Hospital  
 420 Delaware Street, S.E.  
 Minneapolis, MN 55455
- JAMES GALBRAITH (Marguerite {Peggy})** 1947  
 Division of Neurosurgery  
 Room 515, M.E.B.  
 University Station  
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- JOHN GARNER (Candace)** 1971  
 50 Allesandro Place, Suite 400  
 Pasadena, CA 91105
- HENRY GARRETSON (Marianna)** 1973  
 University of Louisville  
 Dept. of Neurological Surgery  
 210 E. Gray Street  
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<b>SIDNEY GOLDRING (Lois)</b> #1 Barnes Hospital Plaza Neurosurgery St. Louis, MO 63110	1964
<b>PHILIP GORDY (Silvia)</b> 3601 Carmel Drive Casper, WY 82604	1968
<b>EVERETT GRANTHAM (Mary)</b> Gray Street Medical Bldg. 210 Gray Street Louisville, KY 40202	1942
<b>WALLACE B. HAMBY (Ellen)</b> Apt. #306/Eastlake 601 S.W. 6th Street Pompano Beach, FL 30060	1941
<b>GRIFF HARSH, III (Craig)</b> P.O. Box 232 Sweetwater, TN 37874	1980
<b>MAJOR GEN. GEORGE HAYES</b> 303 Skyhill Road Alexandria, VA 22314	1962
<b>E. BRUCE HENDRICK (Gloria)</b> 63 Leggett Ave. Weston, Ontario M9P1X3 CANADA	1968
<b>HAROLD HOFFMAN (Jo Ann)</b> Hospital for Sick Children 555 University Avenue Toronto, ONTARIO M5G 1X8 CANADA	1982

- EDGAR HOUSEPIAN** (Marion) 1976  
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- JOHN A. JANE** (Noella) 1982  
 Dept. of Neurosurgery  
 University of Virginia  
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- PETER J. JANNETTA** (Diana) 1994  
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 Presbyterian University Hospital  
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- ELLIS KEENER** (Ann) 1978  
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- WILLIAM KELLY** (Joan) 1977  
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- ROBERT KING** (Molly) 1958  
 State Univ. of NY Health Science Ctr.  
 750 East Adams Street  
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- WOLFF KIRSCH (Marie-Claire)** 1971  
 Loma Linda University Med. Ctr.  
 Division of Neurosurgery  
 11234 Anderson Street, Rm. 2539  
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- ROBERT KNIGHTON (Louise)** 1966  
 9388 Avenida  
 San Timoteo  
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- THEODORE KURZE (Joan)** 1967  
 University of California at Irvine Medical Center  
 101 The City Drive South  
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 Orange, CA 92868-3298
- THOMAS LANGFITT (Carolyn)** 1971  
 Glenmede Corporation  
 One Liberty Place, Suite 1200  
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- SANFORD LARSON (Jacquelyn)** 1989  
 Department of Neurosurgery  
 9200 W. Wisconsin Ave.  
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- RAEBURN C. LLEWELLYN (Carmen Rolon)** 1963  
 #3 Poydras Street  
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- DON M. LONG** (Harriett) 1983  
 Dept. of Neurological Surgery  
 Johns Hopkins Medical School  
 600 N. Wolfe, Meyer 7-109  
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- WILLIAM LOUGHEED** 1962  
 178 Klempenfeld Drive  
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- JOHN J. LOWREY** (Catherine {Katy}) 1965  
 Box 6989  
 65-1160 Hokuula Road  
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- ALFRED LUESSENHOP** (Frances) 1977  
 Georgetown University Hospital  
 3800 Reservoir Road  
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- ERNEST W. MACK** (Bobbie) 1956  
 505 Arlington, South, Suite 106  
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- LEONARD MALIS** (Ruth) 1973  
 1148 Fifth Avenue  
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- ROBERT L. MCLAURIN** (Sarah) 1955  
 415 Bond Place #8A  
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- WILLIAM MEACHAM (Alice)** 1952  
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- SEAN F. MULLAN (Vivian)** 1963  
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- BLAINE NASHOLD, JR. (Irene)** 1967  
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Department of Surgery  
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- GUY ODOM** 1946  
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Neurosurgery Service  
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- BURTON ONOFRIO (Judith)** 1975  
Mayo Clinic  
Department of Neurosurgery  
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- RUSSEL H. PATTERSON, JR. (Julie)** 1971  
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- PHANOR PEROT, JR.** 1970  
 Dept. of Neurosurgery  
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- ROBERT W. PORTER (Dean)** 1962  
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- ROBERT H. PUDENZ (Rita)** 1943  
 Huntington Medical Research Institute  
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- JOHN RAAF (Lorene)** Founder  
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 University of Washington/Dept. of Neuro.  
 University Hospital RI-20  
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 University of Tennessee  
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 847 Monroe Ave., Suite 427  
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- HENRY G. SCHWARTZ** 1942  
 #1 Barnes Hosp. Plaza, Neurosurgery  
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- EDWARD L. SELJESKOG** (Peg) 1992  
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- C. HUNTER SHELDEN (Betty)** 1941  
Huntington Medical Research Inst.  
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- WILLIAM SHUCART (Laura)** 1989  
Department of Neurosurgery  
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- JAMES C. SIMMONS (Vanita)** 1975  
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- ROBERT R. SMITH (Helen)** 1989  
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Department of Neurosurgery  
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- BENNETT M. STEIN (Bonita)** 1970  
The Neurological Institute  
710 West 168th Street  
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- JIM STORY (Joanne)** 1972  
Univ. of TX, HSC, Neurosurgery  
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- ANTHONY F. SUSEN (Patricia)** 1965  
Route 3  
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- WILLIAM H. SWEET** (Elizabeth) 1950  
 Massachusetts General Hospital  
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- RONALD R. TASKER** (Mary) 1971  
 Toronto Western Hospital  
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 CANADA
- GEORGE T. TINDALL** (Wendy) 1968  
 Emory Univ. School of Medicine  
 1327 Clifton Road  
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- JOHN TYTUS** (Virginia) 1967  
 1100 9th Ave.  
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- EXUM WALKER** (Nellie) 1938  
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- ARTHUR A. WARD, JR.** (Janet) 1953  
 Dept. of Neurological Surgery, Univ. of WA  
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- BENJAMIN B. WHITCOMB** (Peggie) 1947  
 RDI Box 124  
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- LOWELL E. WHITE JR.** (Marsie) 1971  
 5750 Huffman Dr., N.  
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**ROBERT H. WILKINS** (Gloria) 1973  
Duke University Medical Center, Box 3807  
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**CHARLES B. WILSON** (Francie Petrocelli) 1966  
Dept. of Neurological Surgery  
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533 Parassus Ave., U125 Box 0350  
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**DAVID YASHON** 1972  
#1201 1492 E. Broad Street  
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**NICHOLAS T. ZERVAS** (Thalia) 1972  
Massachusetts General Hospital  
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Boston, MA 02114

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- MICHAEL APUZZO** (Helene) 1988  
1200 N. State Street, Ste. 5046  
Los Angeles, CA 90033
- JAMES AUSMAN** (Carolyn) 1979  
Univ. of Illinois-Chicago  
Dept. of Neuro/ M/C 799  
912 S. Wood St.  
Chicago, IL 60612
- DANIEL BARROW** (Molly) 1993  
Dept. of Neurological Surgery  
Emory Clinic  
1365 Clifton Ave., N.E.  
Atlanta, GA 30322
- KEITH L. BLACK** (Carol Bennett) 1995  
UCLA Medical Center, Div. of Neurosurgery  
10833 Le Conte Ave., 18-228 NPI  
Los Angeles, CA 90095-7039
- PETER MCL. BLACK** (Katharine) 1988  
Brigham and Women's Hospital  
75 Francis Street  
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- LAWRENCE F. BORGES** (Susan) 1993  
Massachusetts General Hospital  
Div. of Neurosurgery, White 1205  
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Boston, MA 02114



- WILLIS BROWN, JR. (Ann)** 1984  
 Division of Neurosurgery  
 Univ. of Texas Health Science Ctr.  
 7703 Floyd Curl Drive  
 San Antonio, TX 78284-7843
- DEREK BRUCE (Frances)** 1984  
 1935 Motor Street  
 Dallas, TX 75235
- KIM J. BURCHIEL (Debra)** 1992  
 Division of Neurosurgery  
 Oregon Health Sciences University  
 3181 S.W. Sam Jackson Park Rd.  
 Portland, OR 97201-3098
- MARTIN B. CAMINS (Joan)** 1995  
 205 E. 68th Street  
 Suite T 1-C  
 New York, NY 10021
- PETER W. CARMEL (Jacqueline Bello)** 1991  
 Suite 7300  
 90 Bergen Street  
 Newark, NJ 07103-2499
- WILLIAM CHANDLER (Susan)** 1989  
 2128 Taubman Health Ctr., 0338  
 University of Michigan  
 1500 E. Medical Center Drive  
 Ann Arbor, MI 48109-0338
- PAUL CHAPMAN (Tansy)** 1983  
 Department of Neurosurgery  
 Massachusetts General Hospital  
 32 Fruit Street  
 Boston, MA 02114

- EDWARD CONNOLLY (Elise)** 1972  
 Ochsner Clinic  
 Department of Neurosurgery  
 1514 Jefferson Highway  
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- PAUL COOPER (Leslie)** 1995  
 550 First Avenue  
 New York, NY 10016
- ROBERT CROWELL (Mary)** 1990  
 Neurosurgery/ACC #31  
 510 North Street  
 Pittsfield, MA 01201
- RALPH DACEY, JR. (Corinne)** 1990  
 Washington Univ. School of Med.  
 CB #8057/Dept. of Neurosurgery  
 660 Euclid  
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- ARTHUR L. DAY (Dana)** 1990  
 University of Florida Health Center  
 Neurosurgery/Box 100265  
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- STEWART DUNSKER (Ellen)** 1975  
 Mayfield Neurological Institute  
 2123 Auburn Avenue  
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- MICHAEL S.B. EDWARDS (Linda)** 1992  
 California Pacific Medical Center  
 2100 Webster Street  
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- HOWARD EISENBERG** (Janet) 1985  
 Division of Neurosurgery  
 University of Maryland  
 22 S. Greene Street  
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 Rhode Island Hospital  
 Department of Neurosurgery  
 Suite 505  
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- EUGENE S. FLAMM** (Susan) 1979  
 Hospital of Univ. of Pennsylvania  
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- RICHARD A. R. FRASER** (Sara Ann) 1976  
 525 East 68th Street  
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- ALLAN FRIEDMAN** (Elizabeth Bullitt) 1994  
 Division of Neurosurgery  
 Duke University Hospital  
 P.O. Box 3807  
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- WILLIAM A. FRIEDMAN** (Ransom) 1995  
 University of Florida Health Sciences Center  
 P.O. Box 100265, Neurosurgery  
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 LAC/Univ. Southern California Medical Ctr.  
 1200 N. State, Box 239  
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- ROBERT GROSSMAN (Ellin)** 1984  
 Department of Neurosurgery  
 Baylor College of Medicine  
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- ROBERT L. GRUBB, JR. (Julia)** 1986  
 Dept. of Neurological Surgery, Box 8057  
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- JOSEPH F. HAHN (Andrea)** 1993  
 Cleveland Clinic  
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 Box 96, UMHC  
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- PETER HEILBRUN (Robyn)** 1984  
 Division of Neurosurgery #3B409  
 Univ. of Utah Medical Center  
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- ROBERTO C. HEROS (Deborah)** 1985  
 Department of Neurosurgery  
 University of Miami  
 1501 NW Ninth Ave., D4-6  
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- CHARLES HODGE, JR.** (Cathy) 1982  
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- JULIAN T. HOFF** (Diane) 1975  
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- L. N. HOPKINS** (Ann {Bonnie}) 1992  
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- ALAN HUDSON** (Susan) 1978  
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New York University Medical Center  
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- GLENN KINDT** (Charlotte) 1977  
Div. of Neurosurgery  
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- DAVID G. KLINE** (Helen) 1971  
 Department of Neurosurgery  
 Louisiana State University Medical Center  
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 Department of Neurosurgery  
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- CHRISTOPHER LOFTUS** (Sara J. Sirna) 1992  
 Div. of Neurosurgery, Univ of Iowa Hosp.  
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 Iowa City, IA 52242
- L. DADE LUNSFORD** (Julie) 1992  
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- ROBERT L. MARTUZA** (Jill) 1989  
 Georgetown University Medical Center  
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 Department of Neurosurgery  
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**RICHARD MORAWETZ** (Mary Jean) 1990  
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- DAVID G. PIEGRAS (Jane)** 1987  
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 Mayo Clinic, 200 First Street, S.W.  
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- KALMON D. POST (Linda)** 1995  
 The Mount Sinai Medical Center  
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- DONALD QUEST (Ilona)** 1986  
 Department of Neurological Surgery  
 The Neurological Institute - Columbia Univ.  
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- ROBERT A. RATCHESON (Peggy)** 1986  
 Neurosurgery-University Hospital  
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 M.S. 5042  
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- J. CHARLES RICH, JR. (Jasmine)** 1987  
 370 Ninth Ave., Suite 111  
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- JON H. ROBERTSON (Carol Ann)** 1992  
 920 Madison Ave., Suite 600  
 Memphis, TN 38103
- DUKE SAMSON (Patricia)** 1994  
 Department of Neurosurgery  
 University of Texas, Southwestern  
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- R. MICHAEL SCOTT (Susan)** 1991  
 Neurosurgery / Bader 3  
 Childrens Hospital  
 300 Longwood Ave.. Neuro  
 Boston, MA 02115
- WARREN R. SELMAN (Diana)** 1995  
 Department of Neurological Surgery  
 University Hospitals of Cleveland  
 11100 Euclid Avenue, HH-5th Floor  
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- CHRISTOPHER SHIELDS (Deborah)** 1993  
 Department of Neurosurgery  
 University of Louisville  
 210 E. Gray St., Suite 1102  
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- FREDERICK SIMEONE** 1981  
 Pennsylvania Hospital  
 800 Spruce Street  
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- KENNETH R. SMITH, JR. (Marjorie)** 1987  
 St. Louis University Hospital  
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- VOLKER K. H. SONNTAG (Lynn)** 1995  
 Barrow Neurological Institute  
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- DENNIS D. SPENCER (Susan)** 1989  
 Section of Neurological Surgery  
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- SUZIE C. TINDALL** 1990  
 Emory University  
 1365 Clifton Road  
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- RUSSELL L. TRAVIS** 1994  
 1401 Herrodburg Rd., Suite 485B  
 Lexington, KY 40504-3700
- JOHN VAN GILDER (Kerstin)** 1980  
 Department of Neurosurgery  
 University of Iowa School of Medicine  
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- HARRY VAN LOVEREN (Judy)** 1995  
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- CLARK WATTS (Patricia)** 1975  
 Ford & Ferraro  
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- BRYCE K. WEIR (Mary Lou)** 1984  
 Section of Neurosurgery, MC 3026  
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 USC Medical Center, Box 786  
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 Dept. of Neurosurgery  
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- FREMONT P. WIRTH (Penny)** 1993  
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**RONALD F. YOUNG (Christina)** 1986  
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**HAROLD F. YOUNG (Terry)** 1994  
Medical Col. of Virginia Station  
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**INACTIVE**

Elected

**ROBERT BOURKE**

1983

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**JOHN KAPP**

1985

P.O. Box 448  
Galax, VA 24333  
(703) 236-2613

**RICHARD S. KRAMER**

1978

Duke University Medical Center  
Box 3255  
Durham, NC 27710

<b>SENIOR CORRESPONDING</b>	<b>ELECTED</b>
<b>JEAN BRIHAYE</b> (van Geertruyden) Belgium 98 avenue Des Franciscains Brussels, BELGIUM	1975
<b>KARL-AUGUST BUSHE</b> (Eva-Christa) Lerchenweg 8 D-97074 Wurzburg GERMANY	1972
<b>FERNANDO CABIESES</b> Peruano De Formento Educativo Av. Arenales 371, of. 501 Apartado 5254 Lima, PERU	1966
<b>JUAN CARDENAS</b> (Delores) Insurgentes Sur 594 Av. Insurgentes Mexico City, 40 MEXICO	1966
<b>JUAN CHRISTENSEN</b> (Diana Poli) José C. Paz 234 Acassusi (1641) Buenos Aires Province ARGENTINA	1970
<b>HANS ERICH DIEMATH</b> (Karin) Landesnervenklinik, Dept. of Neurosurgery 5020 Salzburg, Ignaz Harrer-StraBe 79 AUSTRIA	1970

- HERMANN DIETZ** (Elfrun) 1970  
 Department of Neurosurgery  
 Hannover School of Medicine  
 30623 Hannover  
 GERMANY
- JOHN GILLINGHAM** 1962  
 Royal Infirmary  
 Lauriston Place  
 Edinburgh EH43 PB  
 Scotland, United Kingdom
- JAIME G. GOMEZ** (Lucy) 1975  
 5353 N. Federal Highway, #210  
 Fort Lauderdale, FL 33068
- JOHN HANKINSON** (Nicole) 1973  
 Westacres  
 Woosington Hall  
 Newcastle-Upon-Tyne, NE13 8DG  
 ENGLAND
- SHOZO ISHII** (Akiko) 1975  
 Juntendo University  
 2-1 Hongo, Bunkyo-ku  
 Tokyo 113, JAPAN
- HANS-PETER JENSEN** 1980  
 Neurochirurgische  
 Universitätsklinik Kiel  
 Welmarer Strasse 8  
 Kiel D-2300  
 GERMANY

- RICHARD JOHNSON** 1974  
 Dept. of Neurological Surgery  
 Royal Infirmary  
 Manchester, ENGLAND
- KATSUTOSHI KITAMURA (Yoshiko)** 1970  
 1-3-1 Kanada  
 Kokurakita-Ku, Kitakyushu  
 803, JAPAN
- LAURI LAITINEN (Kerstin)** 1972  
 Sophiahemmet  
 Box 5605  
 S-114 86, Stockholm  
 SWEDEN
- GUISEPPE DALLA ORE (Guisi)** 1970  
 Clinica Neurochirurgica  
 Universita di Verona  
 Piazzale Stefani  
 Verona 37100  
 ITALY
- B. RAMAMURTHI (Indira)** 1973  
 Voluntary Health Services  
 Adyar Madras-600 113  
 INDIA
- KURT-FRIEDRICH SCHURMANN** 1978  
 Am Eselsweg 29  
 D-6500 Mainz 1  
 GERMANY
- CHARAS SUWANWELA** 1972  
 Chulalongkorn Hospital Medical School  
 Bangkok  
 THAILAND



LINDSAY SYMON (Pauline) 1982  
Gough-Cooper Dept. of Neurological Surgery  
Institute of Neurology, The National Hospital  
Queen Square London WC1N 3BG  
ENGLAND

KJELD VAENET 1970  
Department of Neurosurgery  
Rigshospitalet  
Copenhagen 2100  
DENMARK

SIDNEY WATKINS 1975  
The London Hospital  
Whitechapel  
London E 1  
ENGLAND

M. GAZI YASARGIL (Dianne) 1975  
Dept. of Neurosurgery  
University of Arkansas  
Little Rock, AR 72205

**CORRESPONDING**

Elected

**LEIGH ATKINSON** (Sally Anne) 1989  
Alexandra, Suite, 2nd, Floor  
201 Wickham Terrace, 4000  
Brisbane 4000  
AUSTRALIA

**LUC CALLIAUW** (Dora) 1988  
Dept. of Neurosurgery, University Hospital  
De Pintelaan  
Ghent, BELGIUM

**H. ALAN CROCKARD** (Caroline) 1992  
Dept. of Surgical Neurology, National Hosp.  
Queen Square  
London, WCIN 3BG, ENGLAND

**NOEL GEORGE DAN** (Adrienne) 1989  
Specialist Medical Center, Suite 302  
235-285 New South Head Road  
Edgecliff, N.S.W. 2027  
AUSTRALIA

**NICHOLAS DE TRIBOLET** 1995  
Service de Neurochirurgie  
Centre Hospital  
Universite Vaudois  
Lausanne, CH1011  
SUISSE

**JACQUES DEVILLIERS** (Jeanne Marie Erica) 1986  
Department of Neurosurgery  
University of Cape Town  
Observatory 7925 Cape 7  
Republic of SOUTH AFRICA

- VINKO DOLENC** 1988  
 Univ. of Ljubljana/Neuro.  
 Clinical Ctr. Zaloska 7  
 Ljubljana 61105  
 YUGOSLAVIA
- RUDOLPH FAHLBUSH (Hanna)** 1991  
 Neurochirurgische Klinik  
 University; Erlangen-Nurnberg  
 Schwabachanlage 6  
 91054 Erlangen  
 GERMANY
- SALVADOR GONZALEZ-CORNEJO (Rosa)** 1982  
 Av. Chapultepec Sur 130-204  
 Guadalajara, 44140  
 MEXICO
- ERNST GROTE (Juliana)** 1984  
 Department of Neurosurgery  
 University Kliniks Schnarrenberg  
 Hoppe Seyler-Str. 3  
 7400 Tubingen  
 GERMANY
- DAE HEE HAN (Sung Soon Cho)** 1991  
 SNU Hospital  
 Seoul Nat'l, Univ., School of Medicine  
 #28 Youngon-dong  
 Chongno-Gu, Seoul 110-744  
 KOREA
- HAMIME HANDA (Hiroko)** 1985  
 Takeda General Hospital  
 28-1 Moriminami-cho Ishida  
 Fushimi-ku,  
 Kyoto 601-13, JAPAN

- FABIAN ISAMAT (Maria V. {Marivi})** 1989  
Clinica Sagrade Familia  
Neurogrup, Torras y Pujalt, 1  
08022 Barcelona, SPAIN
- HARUHIKO KIKUCHI** 1993  
Dept. of Neurosurgery  
Kyoto Univ., Medicine  
5-1 Kawahara-cho  
Shogoin Skyo-ku 606  
Kyoto, JAPAN
- RAUL MARINO, JR. (Angela)** 1977  
Rua Maestro Cardim, 808  
Instituto Nueurologico de S. Paulo  
S. Paulo-SP  
01323-100, BRAZIL
- KINTOMO TAKAKURA** 1988  
Dept. of Neurosurgery  
Neurological Institute  
Tokyo's Women's Medical College  
8-1, Kawadacho, Shinjuku-ku  
Tokyo 162, JAPAN
- DAVID G.T. THOMAS (Hazel)** 1995  
Institute of Neurology  
Queens Square  
London WC1 3BG  
ENGLAND

## DECEASED MEMBERS

	Deceased	Elected
<b>JAMES R. ATKINSON</b> Phoenix, Arizona (Active)	1978	1970
<b>PERCIVAL BAILEY</b> Evanston, Illinois (Honorary)	1973	1960
<b>GEORGE BAKER</b> Litchfield Park, AZ (Senior)	1993	1940
<b>H. THOMAS BALLANTINE, JR.</b> Boston, Massachusetts (Senior)	1996	1951
<b>WILLIAM F. BESWICK</b> Buffalo, New York (Active)	1971	1959
<b>EDWIN B. BOLDREY</b> San Francisco, California (Senior)	1988	1941
<b>SPENCER BRADEN</b> Cleveland, Ohio (Active)	1969	Founder
<b>F. KEITH BRADFORD</b> Houston, Texas (Active)	1971	1938
<b>HOWARD BROWN</b> San Francisco, California (Senior)	1990	1939

<b>GALE CLARK</b> Oakland, California (Senior)	1996	1970
<b>DONALD COBURN</b> Wilbington, Delaware (Senior)	1988	1938
<b>WINCHELL McK. CRAIG</b> Rochester, Minnesota (Honorary)	1960	1942
<b>EDWARD DAVIS</b> Portland, Oregon (Senior)	1988	1949
<b>PEARDON DONAGHY</b> Burlington, Vermont (Senior)	1991	1970
<b>FRANCIS ECHLIN</b> New POaltz, New York (Senior)	1988	1944
<b>DEAN ECHOLS</b> New Orleans, Louisiana (Senior)	1991	Founder
<b>GEORGE EHNI</b> Houston, Texas (Senior)	1986	1964
<b>ARTHUR ELVIDGE</b> Montreal, Quebec, Canada (Senior)	1985	1939
<b>THEODORE C. ERICKSON</b> Madison, Wisconsin (Senior)	1986	1940
<b>JOSEPH P. EVANS</b> Kensington, Maryland (Senior)	1985	Founder

<b>JOHN FRENCH</b> Los Angeles, California (Senior)	1989	1951
<b>JOHN GREEN</b> Phoenix, Arizona (Senior)	1990	1953
<b>JAMES GREENWOOD, JR.</b> Houston, Texas (Senior)	1992	1952
<b>WESLEY A. GUSTAFSON</b> Jensen Beach, Florida (Senior)	1975	1942
<b>HANNIBAL HAMLIN</b> Providence, Rhode Island (Senior)	1982	1949
<b>JOHN W. HANBERY</b> Palo Alto, CA (Senior)	1996	1959
<b>JESS HERRMANN</b> Oklahoma City, OK (Senior)	1994	1938
<b>HENRY L. HEYL</b> Hanover, New Hampshire (Senior)	1975	1951
<b>OLAN HYNDMAN</b> Iowa City, Iowa (Senior)	1966	1942
<b>KENNETH G. JAMIESON</b> Brisbane, Australia (Corresponding)	1976	1970
<b>SIR GEOFFREY JEFFERSON</b> Manchester, England (Honorary)	1961	1951

<b>WILLIAM S. KEITH</b> Toronto, Canada (Senior)	1987	Founder
<b>HUGO KRAYENBUHL</b> Zurich, Switzerland (Honorary)	1985	1974
<b>KRISTIAN KRISTIANSEN</b> Oslo, Norway (Senior corresponding)	1993	1967
<b>WALPOLE S. LEWIN</b> Cambridge, England (Corresponding)	1980	1973
<b>HERBERT LOURIE</b> Syracuse, New York (Senior)	1987	1965
<b>WILLEM LUYENDIJK</b> Oegstgeest, the Netherlands (Senior Corresponding)	1996	1973
<b>M. STEPHEN MAHALEY</b> Birmingham, Alabama (Active)	1992	1972
<b>GEORGE L. MALTBY</b> Scarsborough, Maine (Senior)	1988	1942
<b>FRANK MARGUTH</b> Munich, Germany (Senior Corresponding)	1991	1978
<b>DONALD D. MATSON</b> Boston, Massachusetts (Active)	1969	1950
<b>FRANK MAYFIELD</b> Cincinnati, Ohio (Senior)	1991	Founder



<b>AUGUSTUS McCRAVEY</b> Chattanooga, Tennessee (Senior)	1990	1944
<b>KENNETH G. McKENZIE</b> Toronto, Ontario, Canada (Honorary)	1964	1960
<b>JAMES M. MEREDITH</b> Richmond, Virginia (Active)	1962	1946
<b>J. DOUGLAS MILLER</b> Edinburgh, Scotland (Corresponding)	1995	1988
<b>W. JASON MIXTER</b> Woods Hole, Massachusetts (Honorary)	1968	1951
<b>EDMUND J. MORRISSEY</b> San Francisco, California (Senior)	1986	1941
<b>FRANCIS MURPHEY</b> Naples, FL (Senior)	1994	Founder
<b>GOSTA NORLEN</b> Goteborg, Sweden (Honorary)	1985	1973
<b>FRANK NULSEN</b> Naples, Florida (Senior)	1994	1956
<b>SIXTO A. OBRADOR</b> Madrid, Spain (Honorary)	1978	1973
<b>PIETRO PAOLETTI</b> Milan, Italy (Corresponding)	1991	1989

<b>HANS-WERNER PIA</b> Giessen, West Germany (Corresponding)	1986	1978
<b>WILDER PENFIELD</b> Montreal, Canada (Honorary)	1976	1960
<b>HELMUT PENZHOLZ</b> Heidelberg, West Germany (Corresponding)	1985	1978
<b>RUPERT R. RANEY</b> Los Angeles, California (Active)	1959	1939
<b>BRONSON RAY</b> New York, New York (Honorary)	1993	1992
<b>DAVID L. REEVES</b> Santa Barbara, California (Active)	1970	1939
<b>DAVID REYNOLDS</b> Tampa, Florida (Active)	1978	1964
<b>R.C.L. ROBERTSON</b> Houston, Texas (Senior)	1985	1946
<b>STEWART N. ROWE</b> Pittsburgh, Pennsylvania (Senior)	1984	1938
<b>RICHARD C. SCHNEIDER</b> Ann Arbor, Michigan (Senior)	1986	1970
<b>WILLIAM B. SCOVILLE</b> Hartford, Connecticut (Senior)	1984	1944

<b>R. EUSTACE SEMMES</b> Memphis, Tennessee (Honorary)	1982	1955
<b>SAMUEL R. SNODGRASS</b> Galveston, Texas (Senior)	1975	1939
<b>GLEN SPURLING</b> LaJolla, California (Honorary)	1968	1942
<b>C. WILLIAM STEWART</b> Montreal, Quebec, Canada (Corresponding)	1948	1948
<b>THORALF SUNDT, JR.</b> Rochester, Minnesota (Active)	1992	1971
<b>KENICHIRO SUGITA</b> Nagoya, Japan (Senior Corresponding)	1994	1988
<b>HENDRIK SVIEN</b> Rochester, Minnesota (Active)	1972	1957
<b>HOMER S. SWANSON</b> Atlanta, Georgia (Senior)	1987	1949
<b>ALFRED UIHLEIN</b> Rochester, Minnesota (Senior)	1990	1950
<b>A. EARL WALKER</b> Albuquerque, New Mexico (Senior)	1995	1938
<b>THOMAS A. WEAVER, JR.</b> Dayton, Ohio (Senior)	1985	1943

**W. KEASLEY WELCH**  
Waban, Massachusetts  
(Senior)

1996

1957

**BARNES WOODHALL**  
Durham, North Carolina  
(Senior)

1985

1941

**FRANK WRENN**  
Greenville, South Carolina  
(Senior)

1990

1973

