

Stereotactic and Functional NEUROSURGERY



Spring 2007

AANS/CNS Section on Stereotactic and Functional Neurosurgery and American Society for Stereotactic and Functional Neurosurgery

Editor: Konstantin Slavin, MD

In This Issue...

2

**Tinnitus: The Chronic
Pain of the Auditory
System**

**Intraoperative MRI: No
Longer a Child**

3

**Stereotactic and Functional
Neurosurgery at the 75th
AANS Annual Meeting**

5

From the Editor

6

**ASSFN Officers and
Executive Council**

**Upcoming Meetings—
Mark Your Calendar!**

From the President



Michael Schulder, MD

Stereotactic Radiosurgery

Economics has been a part of medical practice since the days of the healing priests and shamans. The boom in physicians' and especially surgeons' incomes in the United States over the last

60 years has been driven by the rise of the third-party payer system. This "deal with the devil" has come with an inevitable price—an increasingly arcane set of codes and regulations with which all American neurosurgeons are lamentably familiar.

Stereotactic radiosurgery, SRS, is reimbursed by a complex group of codes. For neurosurgeons, code 61793 was created by the Current Procedural Terminology and approved by the Relative-Value Update Committee in the early 1990s. This is the code you should use to bill for your services when performing SRS. If you treat up to four different targets (e.g., for metastatic disease), you should add the -51 modifier for each additional site. Simple enough. But there are also technical fees to be charged by the facility at which the SRS is done and a slew of codes used by the radiation oncologists for 3-D modeling, dose selection, treatment, and more.

Recent technological advances have improved the precision of image guidance in the delivery of therapeutic radiation. This has opened the door for radiation oncologists to use what is in essence stereotactic methodology for treatments other than SRS. This blurring of the lines has led to an occasional lack of clarity regarding how each of our specialties views the proper CPT coding for SRS. Most areas of disagreement have been resolved, but occasionally there is still the need for communication on this topic

from the leadership of the CNS and AANS to the leadership of the American Society for Therapeutic Radiation Oncology.

How does this relate to you? And what can you do to have a positive effect on the ongoing process?

If you are doing SRS in the United States, with very rare exceptions (patients paying cash) you will need to submit a bill with proper CPT coding. If the value of code 61793 is downgraded and/or if SRS comes to be viewed as a form of focused radiation therapy, you will be paid less for your time and effort.

What can you do about it? For starters, the Washington Committee of the AANS recently e-mailed a survey to all members to assess SRS practice patterns. Kudos if you responded. If you did not respond, make sure to do so the next time you receive the survey. The more information available, the better the AANS and CNS leadership can represent your interests.

Treat SRS as Surgery

More importantly, treat SRS like it really is the last "S"—that is, surgery. It is not enough merely to place and remove a stereotactic frame. Neurosurgeons doing SRS should be completely familiar with the indications and limitations of the technique; understand basic principles of radiation physics and radiobiology; take the lead role in target selection, anatomical contouring, and dose selection; review the treatment plan in detail, if not actually create it; and be present for the treatment itself.

We can and must maintain stereotactic radiosurgery as a minimally invasive surgical procedure. This surely is to our patients' benefit. And by doing so we will be able to resolve to our satisfaction the above issues regarding coding and reimbursement.

Tinnitus: The Chronic Pain of the Auditory System



Brian H. Kopell, MD

Tinnitus is a fairly common disorder affecting up to 40 million patients in the U.S. population. Of these, 10 percent to 15 percent are severe and refractory cases requiring medical intervention. Conservative management strategies include pharmacotherapy and behavioral/cognitive therapy with very few severe patients finding significant relief. Surgery has also been tried for these cases, mainly focusing on manipulation of the VIIIth nerve by vascular decompression or sectioning. The results for these approaches seem to be most effective in patients with demonstrable vascular compression of the VIIIth nerve by the anterior inferior cerebellar artery and accompanied by a narrow-band frequency hearing loss. Most patients who present with refractory severe tinnitus, however, have had damage to the cochlear apparatus with profound hearing loss and do not have a compressive vascular etiology. For these patients, treatment options remain few and far between.

Recent investigations with functional imaging have demonstrated that tinnitus is similar to another malady well-known to functional neurosurgeons, chronic neuropathic deafferentative pain. We know that the loss of normal neural input, be it from peripheral causes (such as brachial plexus avulsion) or central causes (cortical stroke), results in maladaptive patterns of activity in the sensorimotor thalamocortical circuitry. For example, in patients with phantom limb pain, fMRI and MEG has demonstrated a functional reorganization of the sensory homunculus in which areas subserving the painful amputated limb are invaded by adjacent areas subserving

normal body parts. Furthermore, MEG has demonstrated that loss of normal afferent activity to the thalamus results in an aberrant oscillation between thalamus and cortex in chronic pain states. Similarly, fMRI and MEG have demonstrated tonotopic reorganization of auditory cortex in patients with chronic tinnitus, and PET has shown rCBF abnormalities in the auditory cortex of tinnitus patients. Findings such as these raise the question, "Is tinnitus the chronic pain of the auditory system?"

Recently neuromodulation techniques have been applied to the treatment of refractory tinnitus. On the noninvasive side of the spectrum, rTMS has been investigated as a possible intervention. Taking the insight of rTMS one step further, epidural and subdural cortical stimulation has been investigated. Utilizing a model similar to motor cortex stimulation for chronic pain, DeRidder et al. published their encouraging results in the *Journal of Neurosurgery* in 2004. A feasibility study of this technique in the United States by Northstar Neuroscience is currently concluding. Finally, DBS has also been explored. A group from the Henry Ford Medical System presented its results at a recent neuro-otology meeting. This investigation used DBS leads targeted to the deep white matter of Heschl's gyrus to alleviate refractory tinnitus symptoms.

Tinnitus represents another front in the neuromodulation war against refractory neurological disorders. Insight gained in this arena will be of tremendous benefit to patients without other avenues of relief. Its physiological relationship to deafferentation models of pain may mean that gains made in this disorder may translate to the far larger body of patients with refractory neuropathic pain.

Intraoperative MRI: No Longer a Child

Michael Schulder, MD

A decade has passed since the first publications on intraoperative MRI appeared. These were the result of years of theorizing, planning, construction, and early clinical experience. As with any new technology, the birth of iMRI was accompanied by a large "gee-whiz" factor. Especially for those of us who lived through the introduction of diagnostic MRI, the notion that you could actually obtain these images during surgery was unbelievable at first. The ingenuity of the different iMRI solutions, ranging from fixed room solutions, to high field units on ceiling tracks, to compact MR imagers the size of a home theater system, added to the excitement.

A sizable literature, peer-reviewed and otherwise, has been published on the use of iMRI. Without exception these have been retrospective, single-center reviews. Most patients in these series have had intracranial tumors. This reflects the difficulty of applying iMRI to spinal surgery (because of limitations in receiving coil technology and patient positioning) and the continued ergonomic obstacles in the actual use of iMRI. Small series have discussed iMRI in the management of hydrocephalus or in functional stereotactic neurosurgery, but the paucity of these reports merely underscores the difficulty of doing surgery in the iMRI environment.

What have we learned from these reports? More or less, about 33 percent of patients having iMRI-guided surgery for brain tumors have additional resection based on intraoperative images. Complication avoidance thanks to iMRI has been reported in as

many of 14 percent of patients. These results have mainly been reported in patients with intrinsic brain tumors. A few authors have reported longer progression-free survival for patients who had iMRI-guided surgery. There is also some evidence that iMRI use reduces hospital length of stay and costs.

iMRI has passed its toddler stage. We should no longer be content to stand around and coo admiringly at the few clever things it can do. If intraoperative imaging is to become part of mainstream neurosurgical routine, it has to become easier and cheaper to use. The laudable early enthusiasm for this amazing technology must morph into a mature assessment of the actual benefits that it may (or may not) confer. Progress toward these ends is evident in the convergence that has already occurred in iMRI systems. "High-field" devices have become more user-friendly and provide integrated surgical navigation, while "low-field" systems have increased in power and imaging quality. (What they have not become is cheaper, with cost ranging from about \$1.5 million to \$5 million.)

The logic of intraoperative imaging is unavoidable. Who among us doesn't acquire a postoperative MRI? Who would not want to know, at the time of surgery, if the tumor is out, if the electrode is correctly placed, that there is no hematoma? For the foreseeable future, MRI will be the best possible means of obtaining this information, better by far than CT or ultrasound. The first decade of iMRI proved the concept; the next will have to prove its worth.

Stereotactic and Functional Neurosurgery at the 75th AANS Meeting in Washington, D.C.

April 14-19, 2007 • Washington, D.C.

This meeting marks the 75th anniversary and diamond jubilee celebration of the AANS. This innovative and celebratory meeting promises an exciting array of programming and events.

The scientific program features the latest technological innovations and scientific advances from all areas of neurosurgery, presented within the framework of the practical clinics, breakfast seminars, plenary sessions, scientific and section sessions. While this meeting highlights cutting-edge research and the latest advances in the field, it also offers a wonderful setting to reflect on the 75 years of tradition and excellence that have enabled the AANS to help move neurosurgery forward.

The entire program and details are available online at www.AANS.org.

Monday, April 16, 2007

Plenary Session

11:30–11:45 AM

The Long-Term Perspective on Meningioma Radiosurgery: Experience From Over 1,000 Tumors

D. Kondziolka, D. Mathieu, J.J. Martin, R. Madhok, J. Flickinger, A. Niranjan, A. Maitz, D. Lunsford

11:45 AM–12:00 PM

Intrastriatal Gene Transfer With AAVNeurturin for Parkinson's Disease: Results of a Phase I Trial

P.A. Starr, L. Verhagen, P.S. Larson, R. Bakay, R. Taylor, D. Cahn-Weiner, R. Bartus, J.L. Ostrem, W.J. Marks, Jr.

12:00–12:15 PM

Epilepsy Surgery in Children Under 3 Years of Age: A Canadian Wide Survey

P.Y.C. Gan, M. Connolly, P. Steinbok, B. Sinclair, L. Carmant, J.T. Rutka, R.W. Griebel, K. Aronyk, W. Hader, E. Ventureyra

Stereotactic and Functional Session

2:45–3:00 PM

Placement of Subthalamic DBS Electrodes Using 1.5T Interventional MRI: Preliminary Clinical Outcomes and Targeting Accuracy

P.S. Larson, A.J. Martin, J.L. Ostrem, P. Talke, W.K. Sootsman, N. Levesque, J. Meyers, P.A. Starr

3:00–3:15 PM

DBS in the Internal Capsule/Ventral Striatum Improves Memory in Patients With Severe Psychiatric Disorders

C.S. Kubu, H. Azmi, B. Greenberg, D. Malone, A. Machado, G. Friehs, S. Rasmussen, P. Malloy, A.R. Rezai

3:15–3:30 PM

The Pattern of Neurovascular Compression in Patients With Hemifacial Spasm

J.S. Park, D.S. Kong, K.B. Park, K. Park

3:30–3:45 PM

Understanding Microelectrode Recording Risk in DBS

W.J. Elias, C. Sansur, N. Pouratian, K.M. Fu, R. Frysinger

3:45–4:15 PM

Translational Research From the Epilepsy Operating Room

INVITED SPEAKER – N.M. Barbaro, MD

4:15–4:30 PM

Cortical Stimulation Combined With Intensive Therapy for Nonfluent Aphasia

R.K. Erickson, L.R. Chorney, S.L. Small

4:30–4:45 PM

Surgical Treatment of Occipital Lobe Epilepsy

D.K. Binder, M. Von Lehe, T. Kral, C. Bien, MD; H. Urbach, H. Clusmann, J. Schramm

4:45–5:00 PM

Long-Term Seizure Outcome After Surgery for Focal Cortical Dysplasia

J.A. Gonzalez-Martinez, I. Najm, W. Bingaman

5:00–5:15 PM

Results and Complications of Trigeminal Neuralgia Radiosurgery in Patients Presenting With Pons Enhancement

A. Gorgulho, Z. Smith, L. Zrinzo, N. Bezruky, A.M. Moura, N. Agazaryan, M. Selch, A.A.F. De Salles

Tuesday, April 17, 2007

Plenary Session

11:55 AM–12:10 PM

Surgical Complications in 502 DBS Patients Operated Over 20 Years

A.L. Benabid, S. Chabardes, E. Seigneuret, N. Torres, L. Castana, V. Fraix, P. Krack, P. Pollak

Wednesday, April 18, 2007

Stereotactic and Functional Session

2:45–3:54 PM

Deep Brain Stimulation for Depression

MODERATOR – A.R. Rezai

3:54–4:06 PM

Surgical Complications in 800 Consecutive DBS Implants

M. Deogaonkar, N. Boulis, A. Machado, H. Azmi, P. Senatus, A. Rezai

4:06–4:18 PM

Chronic Electrical Stimulation of Antero-Ventral Internal Pallidum Improves Behavioural Disorders in Lesch-Nyhan Disease

C.L. Tancu, L. Cif, B. Biolsi, P. Coubes

4:18–4:30 PM

Analysis of Human Single Unit Activity Acquired During Deep Brain Stimulation

J.R. Toleikis, S.C. Toleikis, A. Barborica, L. Verhagen, M.K. Stunaitis, R.A.E. Bakay

4:30–4:42 PM

Deep Brain Stimulator Hardware Infections: Incidence and Management in a Large Series

K.A. Sillay, P.S. Larson, P.A. Starr

4:42–4:54 PM

Hemispherectomy for Intractable Epilepsy in Adults: The First Reported Series

S. McClelland, III, R.E. Maxwell

4:54–5:06 PM

Enhancement of Sensorimotor Behavioral Recovery in Parkinsonian Rats with a Multitarget Basal Ganglia Dopaminergic and GABAergic Transplantation Strategy

K. Mukhida, M. Hong, G. Miles, M. McLeod, B. Baghbaderani, A. Sen, L. Behie, R. Brownstone, I. Mendez

5:06–5:18 PM

Spatial Attention Does Not Significantly Enhance Electrophysiological Responses in Early Human Visual Cortex

D. Yashor, MD; W.H. Bosking, G.M. Ghose, P. Sun, J.H.R. Maunsell

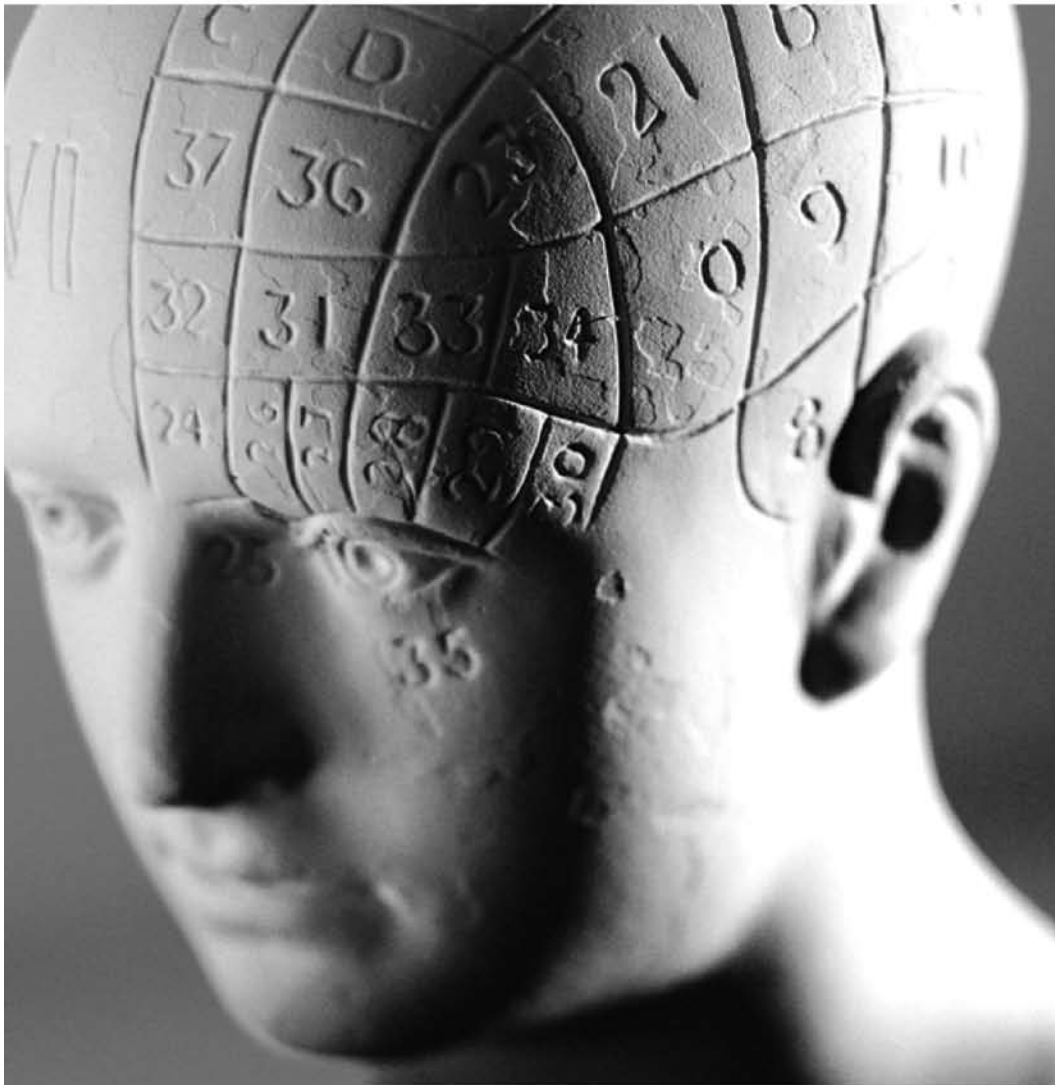
5:18–5:30 PM

A Meta-Analysis of Stereotactic Lesions for the Treatment of Psychiatric Disorders

F. Valone III, J.W. Leiphart

American Society for

Stereotactic and Functional Neurosurgery



The mission of the American Society of Stereotactic and Functional Neurosurgery is to foster the use of stereotactic and functional neurological methods for the treatment of diseases of the nervous system. Our goal is to advance stereotactic and functional neurosurgery and related sciences, to improve patient care, to support meaningful basic and clinical research, to provide leadership in undergraduate and graduate education and continuing education, and to provide administrative facilities necessary to meet these goals. Further, the Society will provide a forum for the review of the basic form and function of the human nervous system in order to improve stereotactic and/or functional neurosurgical procedures that alleviate human disease and suffering through diagnosis or treatment of the function of the nervous system. We will also establish standards for the performance of stereotactic surgery through the meeting relevant to stereotactic and functional neurosurgery.

Save the date:

*the next biannual meeting of the ASSFN
will be in Vancouver, 1–4 June 2008!*

<http://assfn.org>



From the Editor: Definition of Stereotactic Radiosurgery



Konstantin Slavin, MD

During the last several years, discussion about the definition and limits of stereotactic radiosurgery has attracted much attention. Heated arguments arose not only between representatives of different specialties but also within neurosurgery itself. Main concerns included two important issues: (1) can “radiosurgery” be delivered in more than one session, and, if so, (2) where does stereotactic radiosurgery delivered in multiple sessions end and stereotactic radiotherapy begin? In an attempt to answer these issues and reach consensus with our radiation oncology colleagues, the AANS and CNS created the Stereotactic Radiosurgery Task Force under the auspices of the AANS/CNS Washington Committee. The results of this task force’s extensive work have now been published (Barnett et al., *J Neurosurg* 106:1–5, 2007).

Based on a thorough review of history and the current state of stereotactic application of focused energy—the concept originally designed and implemented by Lars Leksell and subsequently modified by generations of neurosurgeons—the task force came up with the contemporary definition of stereotactic radiosurgery that was subsequently sanctioned by AANS, CNS and the American Society for Therapeutic Radiology and Oncology.

This definition states:

- Stereotactic Radiosurgery is a distinct discipline that utilizes externally generated ionizing radiation in certain cases to inactivate or eradicate (a) defined target(s) in the head or spine without the need to make an incision. The target is defined by high-resolution stereotactic imaging. To assure quality of patient care the procedure involves a multidisciplinary team consisting of a neurosurgeon, radiation oncologist, and medical physicist.
- Stereotactic Radiosurgery (SRS) typically is performed in a single session, using a rigidly attached stereotactic guiding device, other immobilization technology and/or a stereotactic image-guidance system, but can be performed in a limited number of sessions, up to a maximum of five.
- Technologies that are used to perform SRS include linear accelerators, particle beam accelerators and multisource Cobalt-60 units. In order to enhance precision, various devices may incorporate robotics and real time imaging.

Progress in radiobiology, development of new and improved devices, and broadened clinical indications for radiosurgery are sure to render this new definition outdated at some point. As Barnett and colleagues note, this process of evolution and our relationship to it was summarized by John F. Kennedy: “Change is the law of life. And those who look only to the past or present are certain to miss the future.”

Application for New Membership

American Society for Stereotactic and Functional Neurosurgery



American Association of Neurological Surgeons



Name _____

Office Address _____

City _____ State _____ Country _____

Phone _____ Fax _____ E-mail _____

Residency Training Program: _____ Years: _____

Medical School: _____

Specialty (circle): Neurosurgery Neurology Other: _____

AANS Member: Yes No CNS Member: Yes No

Interests in Stereotactic and Functional Neurosurgery: (please circle)

Movement Disorders Pain Epilepsy Psychosurgery Tumors Biomedical Engineering Radiosurgery

Determine and circle your membership category:

Category	Yearly Fee	Description
Active	\$325	For practicing neurosurgeons in the United States or Canada who have completed residency/fellowship
Resident/Fellow	\$25	One-time fee (not yearly). For neurosurgical trainees currently in residency or fellowship
Senior	Free	For neurosurgeons who are retired and over 65 years old
Associate	\$50	For non-neurosurgeons

The benefits of Active membership include:

- Membership in the AANS/CNS Section on Stereotactic and Functional Neurosurgery
- Membership in the World Society for Stereotactic and Functional Neurosurgery
- Reduced fees for the biennial ASSFN meetings
- Subscription to the journal Stereotactic and Functional Neurosurgery (including online access)

The benefits of all other membership categories are:

- Membership in the AANS/CNS Section on Stereotactic and Functional Neurosurgery

- Reduced fees for the biennial ASSFN meetings
- Eligibility to subscribe to the journal Stereotactic and Functional Neurosurgery (including online access) at the reduced rate of \$135. If you are joining the ASSFN as a Resident/Fellow, Associate, or Senior member and wish to have the journal subscription, a check for \$135 payable to the ASSFN with ASSFN journal referenced in the memo field can be sent to ASSFN c/o AANS, 5550 Meadowbrook Drive, Rolling Meadows, IL 60008, and check this box:
 YES I would like to receive the society journal at the reduced rate and have separately sent my check to the ASSFN in care of the AANS as described above.

There are two ways to become an ASSFN member: Apply online at www.MyAANS.org (for Active member applications only), or mail this application form and check for appropriate fee (see table above) made out to ASSFN to: ASSFN, c/o AANS, 5550 Meadowbrook Drive, Rolling Meadows, IL 60008. For questions or concerns, contact the current (2006-2008) treasurer.

ASSFN–AANS/CNS Section on Stereotactic and Functional Neurosurgery

5550 Meadowbrook Drive
Rolling Meadows, Illinois 60008

ASSFN Officers and Executive Council

Officers

Michael Schulder, MD
President

Philip A. Starr, MD, PhD
Vice-President

Ali R. Rezai, MD
Secretary-Treasurer

Andres M. Lozano, MD, PhD
Past President

Executive Council

Gordon H. Baltuch, MD (2003–2007)
Jamie M. Henderson, MD (2003–2007)
Konstantin V. Slavin, MD (2003–2007)
Nicholas M. Boulis, MD (2004–2008)
Emad N. Eskandar, MD (2004–2008)
Kelly D. Foote, MD (2006–2010)
Kathryn L. Holloway, MD (2006–2010)
Michael G. Kaplitt, MD, PhD (2006–2010)
Paul S. Larson, MD (2006–2010)
Joshua M. Rosenow, MD (2006–2010)

Upcoming Meetings—Mark Your Calendar!

One of the purposes of this newsletter is to inform all ASSFN members about upcoming meetings and conferences of interest. Meeting organizers are encouraged to contact the newsletter editor, Konstantin Slavin, MD, with information regarding future meetings.

75th Annual Meeting of the AANS

Celebrating 75 years of AANS!
Washington, D.C.
April 14–19, 2007
www.aans.org/annual/2007/default.asp

Conference of the Colombian Society for Stereotactic and Functional Neurosurgery

Cartagena, Colombia
Las Americas Hotel Convention Center
April 30–May 2, 2007
Contact Dr. Jairo Espinosa at espinosajairo@gmail.com.

1st International Meeting on Stereotactic and Functional Neurosurgery & 8th Meeting of the Brazilian Society for Stereotactic and Functional Neurosurgery

Rio Quente, Goias, Brazil
Rio Quente Resorts
May 16–19, 2007
www.scripventos.net/bssfn2007

8th Bi-Annual Congress of the International Stereotactic Radiosurgery Society

San Francisco, Calif.
Palace Hotel
June 23–27, 2007
www.isrs2007.org

56th National Congress of the Society of Italian Neurosurgery/Joint Meeting With the CNS

Rome, Italy
Cavalieri Hilton Hotel
June 24–27, 2007
www.sinch2007-neurosurgery.csrcongressi.com

13th European Congress of Neurosurgery/Joint Meeting With the CNS

Glasgow, United Kingdom
Scottish Exhibition & Conference Centre
Sept. 2–7, 2007
<http://www.eans2007.com/index.cfm>

2nd Congress of International Society of Reconstructive Neurosurgery and 5th Scientific Meeting of WFNS Neurorehabilitation Committee

Taipei, Taiwan
Taipei International Convention Center
Sept. 13–16, 2007
www.isrn2007.org

2007 Congress of Neurological Surgeons Annual Meeting

San Diego, Calif.
Sept. 15–20, 2007
<http://www.neurosurgcon.org/meetings/2007/index.asp>