

SCIENCE TIMES

Sensor Technology Embedded in Stents: A Potential New Approach to Continuous Monitoring for In Stent Stenosis, Thrombosis, and Beyond 549

Karl R. Abi-Aad, Matthew E. Welz, Ryan Hess, Bernard R. Bendok

Combined Nivolumab and Ipilimumab Is an Effective Treatment for Melanoma Brain Metastases

Jeffrey I. Traylor, John S. Kuo

Artificial Intelligence Mediated Neuroradiology

Robert M. Starke, David McCarthy, Ricardo J. Komotar, E. Sander Connolly

A Soft, Epidermal Sensor for Noninvasive, Wireless Assessment of Shunt Flow

Kevin T. Huang, David L. Penn, John H. Chi

Epidural Spinal Cord Stimulation Takes the Next Step

Andrea A. Brock, Mark A. Mahan, John D. Rolston

Through the Eyes of a Neurosurgeon – How Binocular Disparity Translates into Surgical Performance

G. Damian Brusko, Jang W. Yoon, Michael Y. Wang

Phenotypic Transformation of Astrocytes Into Tumor-Supportive Cells: Glioblastoma Cell Vesicle Release

Nitesh V. Patel, Julia R. Schneider, Kevin Kwan, John A. Boockvar

You're Not Hallucinating: Potential New Targets for Schizophrenia Treatment

Brian J.A. Gill, Farhan A. Khan, Guy M. McKhann II

Engineering Chimeric Antigen Receptors Into Homing Missiles

Kamil W. Nowicki, Michael P. D'Angelo, Raymond F. Sekula, Jr

Blueprints for a New Spinal Cord

Reid Hoshide, Rahul Jandial



On the Cover

This month's issue features 5 panels from the mural "Epic of American Civilization" by José Clemente Orozco. The cover shows the panel "Gods of the Modern World", Orozco's satirical denunciation of modern institutional education. The skeletal, robed representations of academia preside over the stillbirth of useless knowledge, oblivious to the world burning behind them. See more of Orozco's mural throughout this issue. Image: Jose Clemente Orozco, "Gods of the Modern World". Hood Museum of Art, Dartmouth: Commissioned by the Trustees of Dartmouth College. © 2019 Artists Rights Society (ARS), New York / SOMAAP, Mexico City.



Print Readers: Scan this QR code using your mobile device in order to access the online Table of Contents.

BRAIN METASTASES GUIDELINES

550

EDITOR'S CHOICE

Guidelines: Congress of Neurological Surgeons Systematic Review and Evidence-Based Guidelines for the Treatment of Adults With Metastatic Brain Tumors: Executive Summary

Jeffrey J. Olson, Steven N. Kalkanis, Timothy C. Ryken

BACKGROUND: The CNS systematic review and evidence-based clinical practice parameter guidelines for the treatment of adults with metastatic brain tumors was first published in 2010. Because of the time elapsed since that publication, an update is now indicated.

OBJECTIVE: To establish the best evidence-based management of metastatic brain tumors over all commonly used diagnostic and treatment modalities in regularly encountered clinical situations.

METHODS: Literature searches regarding management of metastatic brain tumors with whole brain radiation therapy, surgery, stereotactic radiosurgery, chemotherapy, prophylactic anticonvulsants, steroids, instances of multiple brain metastases, and emerging and investigational therapies were carried out to answer questions designed by consensus of a multidisciplinary writing group.

RESULTS: Recommendations were created and their strength linked to the quality of the literature data available.

Importantly, shortcomings and biases to the literature data are brought out so as to provide guidance for future investigation and improvements in the management of patients with metastatic brain tumors.

CONCLUSION: This series of guidelines was constructed to assess the most current and clinically relevant evidence for management of metastatic brain tumors. They set a benchmark while also highlighting important key areas for future basic and clinical research.

COMMENTARY

Commentary: Congress of Neurological Surgeons Systematic Review and Evidence-Based Guidelines for the Treatment of Adults With Metastatic Brain Tumors: Executive Summary 553

Andrew P. Carlson

BRAIN METASTASES GUIDELINES

Guidelines: Congress of Neurological Surgeons Systematic Review and Evidence-Based Guidelines on the Role of Surgery in the Management of Adults With Metastatic Brain Tumors 555

Brian V. Nahed, Christopher Alvarez-Breckenridge, Priscilla K. Brastianos, Helen Shih, Andrew Sloan, Mario Ammirati, John S. Kuo, Timothy C. Ryken, Steven N. Kalkanis, Jeffrey J. Olson

Commentary: Congress of Neurological Surgeons Systematic Review and Evidence-Based Practice Guidelines on the Role of Surgery in the Management of Adults With Metastatic Brain Tumors

Andrew P. Carlson

Commentary: Congress of Neurological Surgeons Systematic Review and Evidence-Based Practice Guidelines on the Role of Surgery in the Management of Adults With Metastatic Brain Tumors

Maya A. Babu

Guidelines: Congress of Neurological Surgeons Systematic Review and Evidence-Based Guidelines on the Role of Whole Brain Radiation Therapy in Adults With Newly Diagnosed Metastatic Brain Tumors

Laurie E. Gaspar, Roshan S. Prabhu, Alia Hdeib, D. Jay McCracken, George F. Lasker, Michael W. McDermott, Steven N. Kalkanis, Jeffrey J. Olson

Commentary: Congress of Neurological Surgeons Systematic Review and Evidence-Based Guidelines on the Role of Whole Brain Radiation Therapy in Adults With Newly Diagnosed Metastatic Brain Tumors
Kimon Bekelis

Commentary: Congress of Neurological Surgeons Systematic Review and Evidence-Based Guidelines on the Role of Whole Brain Radiation Therapy in Adults With Newly Diagnosed Metastatic Brain Tumors
Catherine A. Mazzola

Commentary: Congress of Neurological Surgeons Systematic Review and Evidence-Based Guidelines on the Role of Whole Brain Radiation Therapy in Adults With Newly Diagnosed Metastatic Brain Tumors
Sepideh Amin-Hanjani

Guidelines: Congress of Neurological Surgeons Systematic Review and Evidence-Based Guidelines on the Use of Stereotactic Radiosurgery in the Treatment of Adults With Metastatic Brain Tumors
Jerome J. Graber, Charles S. Cobbs, Jeffrey J. Olson

Commentary: Congress of Neurological Surgeons Systematic Review and Evidence-Based Guidelines on the Use of Stereotactic Radiosurgery in the Treatment of Adults With Metastatic Brain Tumors
Mateo Ziu

Commentary: Congress of Neurological Surgeons Systematic Review and Evidence-Based Guidelines on the Use of Stereotactic Radiosurgery in the Treatment of Adults With Metastatic Brain Tumors
Maya A. Babu

Guidelines: Congress of Neurological Surgeons Systematic Review and Evidence-Based Guidelines on the Role of Chemotherapy in the Management of Adults With Newly Diagnosed Metastatic Brain Tumors
Jonathan H. Sherman, Simon S. Lo, Tom Harrod, Alia Hdeib, Yiping Li, Timothy Ryken, Jeffrey J. Olson

Commentary: Congress of Neurological Surgeons Systematic Review and Evidence-Based Guidelines on the Role of Chemotherapy in the Management of Adults With Newly Diagnosed Metastatic Brain Tumors
Maya A. Babu

Guidelines: Congress of Neurological Surgeons Systematic Review and Evidence-Based Guidelines on Treatment Options for Adults With Multiple Metastatic Brain Tumors
Mario Ammirati, Brian V. Nahed, David Andrews, Clark C. Chen, Jeffrey J. Olson

Commentary: Congress of Neurological Surgeons Systematic Review and Evidence-Based Guidelines on Treatment Options for Adults With Multiple Metastatic Brain Tumors
Catherine A. Mazzola

Commentary: Congress of Neurological Surgeons Systematic Review and Evidence-Based Guidelines on Treatment Options for Adults With Multiple Metastatic Brain Tumors
Andrew P. Carlson

Commentary: Congress of Neurological Surgeons Systematic Review and Evidence-Based Guidelines on Treatment Options for Adults With Multiple Metastatic Brain Tumors
Mateo Ziu

Guidelines: Congress of Neurological Surgeons Systematic Review and Evidence-Based Guidelines on the Role of Steroids in the Treatment of Adults With Metastatic Brain Tumors

Timothy C. Ryken, John S. Kuo, Roshan S. Prabhu, Jonathan H. Sherman, Steven N. Kalkanis, Jeffrey J. Olson

Commentary: Congress of Neurological Surgeons Systematic Review and Evidence-Based Guidelines on the Role of Steroids in the Treatment of Adults With Metastatic Brain Tumors

J. Adair Prall

Commentary: Congress of Neurological Surgeons Systematic Review and Evidence-Based Guidelines on the Role of Steroids in the Treatment of Adults With Metastatic Brain Tumors

Catherine A. Mazzola

Guidelines: Congress of Neurological Surgeons Systematic Review and Evidence-Based Guidelines on the Role of Prophylactic Anticonvulsants in the Treatment of Adults With Metastatic Brain Tumors

Clark C. Chen, Robert C. Rennert, Jeffrey J. Olson

Commentary: Congress of Neurological Surgeons Systematic Review and Evidence-Based Guidelines on the Roles of Prophylactic Anticonvulsants in the Treatment of Adults With Metastatic Brain Tumors

J. Adair Prall

Commentary: Congress of Neurological Surgeons Systematic Review and Evidence-Based Guidelines on the Role of Prophylactic Anticonvulsants in the Treatment of Adults With Metastatic Brain Tumors

Mateo Ziu

Guidelines: Congress of Neurological Surgeons Systematic Review and Evidence-Based Guidelines on the Role of Emerging and Investigational Therapies for the Treatment of Adults With Metastatic Brain Tumors

J. Bradley Elder, Brian V. Nahed, Mark E. Linskey, Jeffrey J. Olson

Commentary: Congress of Neurological Surgeons Systematic Review and Evidence-Based Guidelines on the Role of Emerging and Investigational Therapies for the Treatment of Adults With Metastatic Brain Tumors

Kimon Bekelis

Commentary: Congress of Neurological Surgeons Systematic Review and Evidence-Based Guidelines on the Role of Emerging and Investigational Therapies for the Treatment of Adults With Metastatic Brain Tumors

Sepeidh Amin-Hanjani

Commentary: Congress of Neurological Surgeons Systematic Review and Evidence-Based Guidelines on the Role of Emerging and Investigational Therapies for the Treatment of Adults With Metastatic Brain Tumors

Andrew P. Carlson

Andrew P. Carlson

Commentary: Congress of Neurological Surgeons Systematic Review and Evidence-Based Guidelines on Treatment Options for Adults With Multiple Metastatic Brain Tumors

Mateo Ziu

RADIATION ONCOLOGY REVIEW SERIES

- Does Stereotactic Radiosurgery Have a Role in the Management of Patients Presenting With 4 or More Brain Metastases?** 558
Michael H. Soike, Ryan T. Hughes, Michael Farris, Emory R. McTyre, Christina K. Cramer, J.D. Bourland, Michael D. Chan

COMMENTARY

- Commentary: Does Stereotactic Radiosurgery Have a Role in the Management of Patients Presenting With 4 or More Brain Metastases?** 567
Lawrence Kleinberg, Michael Lim

REVIEW

- Impact of Powdered Vancomycin on Preventing Surgical Site Infections in Neurosurgery: A Systematic Review and Meta-analysis** 569
Pavlos Texakalidis, Victor M. Lu, Yagiz Yolcu, Panagiotis Kerezoudis, Mohammed Ali Alvi, Ian F. Parney, Jeremy L. Fogelson, Mohamad Bydon

RESEARCH—HUMAN—CLINICAL STUDIES

- Neuropsychological Changes in Patients Undergoing Treatment of Unruptured Intracranial Aneurysms** 581
Angela F. Caveney, Scott A. Langenecker, Aditya S. Pandey, Laura B. Farah, J. Alexis Ortiz, Nadia Huq, Runa Bhaumik, B. Gregory Thompson, Bruno J. Giordani, Donna Auer, Lewis B. Morgenstern
- Alterations in Cortical Thickness and Subcortical Volume are Associated With Neurological Symptoms and Neck Pain in Patients With Cervical Spondylosis** 588
Davis C. Woodworth, Langston T. Holly, Emeran A. Mayer, Noriko Salamon, Benjamin M. Ellingson
- Contribution of Intrasellar Pressure Elevation to Headache Manifestation in Pituitary Adenoma Evaluated With Intraoperative Pressure Measurement** 599
Yasuhiko Hayashi, Yasuo Sasagawa, Masahiro Oishi, Daisuke Kita, Koichi Misaki, Issei Fukui, Osamu Tachibana, Mitsutoshi Nakada
- High Pressure in Virtual Postcoiling Model is a Predictor of Internal Carotid Artery Aneurysm Recurrence After Coiling** 607
Iku Nambu, Kouichi Misaki, Naoyuki Uchiyama, Masanao Mohri, Takashi Suzuki, Hiroyuki Takao, Yuichi Murayama, Kazuya Futami, Tomoki Kawamura, Yasushi Inoguchi, Teruo Matsuzawa, Mitsutoshi Nakada
- Recovery Room Cortisol Predicts Long-Term Glucocorticoid Need After Transsphenoidal Surgery for Pituitary Tumors** 616
Amro Qaddoura, Tenzin N. Shalung, Michael P. Meier, Jeannette Goguen, Rowan Jing, Stanley Zhang, Kalman Kovacs, Michael D. Cusimano
- Image Guidance for Ventricular Shunt Surgery: An Analysis of Ventricular Size and Proximal Revision Rates** 624
Nickalus R. Khan, Michael DeCuypere, Brandy N. Vaughn, Paul Klimo, Jr

OPEN

Intracranial Neoplasms in the First Year of Life: Results of a Third Cohort of Patients From a Single Institution 636

Sebastian M. Toescu, Gregory James, Kim Phipps, Owase Jeelani, Dominic Thompson, Richard Hayward, Kristian Aquilina

Incidence and Time of Onset of Osseous Pseudoproggression in Patients With Metastatic Spine Disease From Renal Cell or Prostate Carcinoma After Treatment With Stereotactic Body Radiation Therapy 647

Pejman Jabehdar Maralani, Kathleen Winger, Sean Symons, Matylda Machnowska, Chinthaka Heyn, Ali Helmi, Aimee Chan, Chia-Lin Tseng, Arjun Sahgal

Results of Surgery for Low-Grade Brain Arteriovenous Malformation Resection by Early Career Neurosurgeons: An Observational Study 655

Nirav J. Patel, David Bervini, Behzad Eftekhari, Andrew Stewart Davidson, Daniel C. Walsh, Nazih N. Assaad, Michael Kerin Morgan

Malignancy Index Using Intraoperative Flow Cytometry is a Valuable Prognostic Factor for Glioblastoma Treated With Radiotherapy and Concomitant Temozolomide 662

Taiichi Saito, Yoshihiro Muragaki, Takahiro Shioyama, Takashi Komori, Takashi Maruyama, Masayuki Nitta, Takayuki Yasuda, Junji Hosono, Saori Okamoto, Takakazu Kawamata

Pharmacy-Mediated Antiplatelet Management Protocol Compared to One-time Platelet Function Testing Prior to Pipeline Embolization of Cerebral Aneurysms: A Propensity Score-Matched Cohort Study 673

Christoph J. Griessenauer, Abhi Jain, Alejandro Enriquez-Marulanda, Raghav Gupta, Nimer Adeeb, Justin M. Moore, Stacey A. Grassi, Shamsher S. Dalal, Christopher S. Ogilvy, Ajith J. Thomas, Clemens M. Schirmer

Comparative Safety and Efficacy of Modified TICI 2b and TICI 3 Reperfusion in Acute Ischemic Strokes Treated With Mechanical Thrombectomy 680

Nitin Goyal, Georgios Tsivgoulis, Donald Frei, Aquilla Turk, Blaise Baxter, Michael T. Froehler, J Mocco, Muhammad Fawad Ishfaq, Konark Malhotra, Jason J Chang, Daniel Hoit, Lucas Eljovich, David Loy, Raymond D. Turner, Justin Mascitelli, Kiersten Espaillet, Andrei V. Alexandrov, Adam S. Arthur

The Neurologic Assessment in Neuro-Oncology (NANO) Scale as an Assessment Tool for Survival in Patients With Primary Glioblastoma 687

Timothy H. Ung, Douglas E. Ney, Denise Damek, Chad G. Rusthoven, A. Samy Youssef, Kevin O. Lillehei, D. Ryan Ormond

Microsurgery Versus Stereotactic Radiosurgery for Brain Arteriovenous Malformations: A Matched Cohort Study 696

Ching-Jen Chen, Dale Ding, Tony R. Wang, Thomas J. Buell, Adeel Ilyas, Natasha Ironside, Cheng-Chia Lee, M. Yashar Kalani, Min S. Park, Kenneth C. Liu, Jason P. Sheehan

Venous Thromboembolism After Intraventricular Hemorrhage: Results From the CLEAR III Trial 709

Jharna N. Shah, Santosh B. Murthy, Rachel Dlugash, Nichol McBee, Issam Awad, Daniel F. Hanley, Wendy C. Ziai, on behalf of the CLEAR III Trial Investigators

- Stereotactic Radiosurgery for Acromegaly: An International Multicenter Retrospective Cohort Study** 717
 Dale Ding, Gautam U. Mehta, Mohana Rao Patibandla, Cheng-Chia Lee, Roman Liscak, Hideyuki Kano, Fu-Yuan Pai, Mikulas Kosak, Nathaniel D. Sisterson, Roberto Martinez-Alvarez, Nuria Martinez-Moreno, David Mathieu, Inga S. Grills, Kevin Blas, Kuei Lee, Christopher P. Cifarelli, Gennadiy A. Katsevman, John Y.K. Lee, Brendan McShane, Douglas Kondziolka, L. Dade Lunsford, Mary Lee Vance, Jason P. Sheehan
- Increased Hospital Surgical Volume Reduces Rate of 30- and 90-Day Readmission After Acoustic Neuroma Surgery** 726
 Robin Babadjouni, Timothy Wen, Daniel A. Donoho, Ian A. Buchanan, Steven Y. Cen, Rick A. Friedman, Arun Amar, Jonathan J. Russin, Steven L. Giannotta, William J. Mack, Frank J. Attenello
- Predicting Clinical Outcomes Following Surgical Correction of Adult Spinal Deformity** 733
 Akshay Sharma, Joseph E. Tanenbaum, Olivia Hogue, Syed Mehdi, Sagar Vallabh, Emily Hu, Edward C. Benzel, Michael P. Steinmetz, Jason W. Savage
- The Intracerebral Hemorrhage Score: A Self-Fulfilling Prophecy?** 741
 D. Jay McCracken, Brendan P. Lovasik, Courtney E. McCracken, Jason M. Frerich, Margaret E. McDougal, Jonathan J. Ratcliff, Daniel L. Barrow, Gustavo Pradilla
- Microelectrode Recordings Validate the Clinical Visualization of Subthalamic-Nucleus Based on 7T Magnetic Resonance Imaging and Machine Learning for Deep Brain Stimulation Surgery** 749
 Reuben R. Shamir, Yuval Duchin, Jinyoung Kim, Remi Patriat, Odeya Marmor, Hagai Bergman, Jerrold L. Vitek, Guillermo Sapiro, Atira Bick, Ruth Eliahou, Renana Eitan, Zvi Israel, Noam Harel
- Independent Associations With 30- and 90-Day Unplanned Readmissions After Elective Lumbar Spine Surgery: A National Trend Analysis of 144 123 Patients** 758
 Aladine A. Elsamadicy, Xinru Ren, Hanna Kemeny, Lefko Charalambous, Amanda R. Sergesketter, Shervin Rahimpour, Theresa Williamson, C. Rory Goodwin, Muhammad M. Abd-El-Barr, Oren N. Gottfried, Jichun Xie, Shivanand P. Lad
- Laser Interstitial Thermal Therapy as a Primary Treatment for Deep Inaccessible Gliomas** 768
 Ashish H. Shah, Joshua D. Burks, Simon S. Buttrick, Luca Debs, Michael E. Ivan, Ricardo J. Komotar
- The Impact of Different Postgraduate Year Training in Neurosurgery Residency on 30-Day Postoperative Outcomes** 778
 Mohamed Macki, Mohamed Fakih, Ilan Rubinfeld, Victor Chang, Beverly C. Walters
- The Preventable Shunt Revision Rate: A Multicenter Evaluation** 788
 Pooja Dave, Garrett T. Venable, Tamekia L. Jones, Nickalus R. Khan, Gregory W. Albert, Joshua J. Chern, Jennifer L. Wheelus, Lance S. Governale, Kristin M. Huntoon, Cormac O. Maher, Amy K. Bruzek, Francesco T. Mangano, Vivek Mehta, Wendy Beaudoin, Robert P. Naftel, Jade Basem, Anna Whitney, Nir Shimony, Luis F. Rodriguez, Brandy N. Vaughn, Paul Klimo, Jr

RESEARCH—HUMAN—STUDY PROTOCOLS

Scandinavian Multicenter Acute Subdural Hematoma (SMASH) Study: Study Protocol for a Multinational Population-Based Consecutive Cohort 799

Jiri Bartek Jr, Christian Laugesen, Sadia Mirza, Axel Forsse, Michael Anders Petersen, Alba Corell, Philip Wilhelm Dyhrfort, Henrietta Nittby Redebrandt, Linus Reen, Shaian Zolfaghari, Lovisa Tobieson, Björn Carlsvärd, Bo Bergholt, Asma Bashir, Preben Soerensen, Arzu Bilgin, Conny Johansson, Peter Lindvall, Petter Förander, Bo-Michael Bellander, Jacob B. Springborg, Asgeir S. Jakola

RESEARCH—ANIMAL

The Importance of Wall Apposition in Flow Diverters 804

René Aquarius, Antonius de Korte, Debby Smits, Matthew Gounis, Kiek Verrijp, Léon Driessen, William Leenders, Joost de Vries

CASE REPORTS

Liposclerosing Myxofibrous Tumor of the Cranial Vault: A Case Report 811

Jillian Ploof, Hamza Shaikh, Jenny Melli, George Jour, Alan Turtz

Giant Extra-Axial Cavernous Angioma of the Falx: Case Report 812

Alexandre Simonin, Caroline Passaplan, Sara Sancho, Angelo Rusconi, Philippe Otten

BOOK REVIEWS

Book Review: *Controversies in Spine Surgery, MIS vs OPEN: Best Evidence Recommendations* 813

Anthony H. Sin

Book Review: *Handbook of Pediatric Neurosurgery*

Eric A. Sribnick

Book Review: *Handbook of Evidence-Based Radiation Oncology, 3rd Edition*

Jim Zhong

Book Review: *Pediatric Radiation Oncology*

Bree R. Eaton

Book Review: *Modern Management of Spinal Deformities: A Theoretical, Practical, and Evidence-Based Text*

Osmond C. Wu, Manish K. Kasliwal

CORRESPONDENCE

Commentary: Addressing Concerns Regarding the Evolving “Disruptive Physician” Label 814

Cara Marie Rogers, Gary Simonds, Darlene A. Mayo, Mark E. Linskey, Jeremy Phelps

Letter: Commentary: Peritumoral Edema/Tumor Volume Ratio: A Strong Survival Predictor for Posterior Fossa Metastases

Ilyess Zemmoura, Bertrand Mathon, Aymeric Amelot

Pharmacy-Mediated Antiplatelet Management Protocol Compared to One-time Myocardial

In Reply: Commentary: Peritumoral Edema/Tumor Volume Ratio: A Strong Survival Predictor for Posterior Fossa Metastases

Antonio Meola, Kevin K. H. Chow, Steven D. Chang

Letter: Relationship Between Aneurysm Wall Enhancement in Vessel Wall Magnetic Resonance Imaging and Rupture Risk of Unruptured Intracranial Aneurysms

Yue-Nong Zhang, Yao-Ming Zhang

In Reply: Relationship Between Aneurysm Wall Enhancement in Vessel Wall Magnetic Resonance Imaging and Rupture Risk of Unruptured Intracranial Aneurysms

Nan Lv, Christof Karmonik, Qinghai Huang, Jianmin Liu

Letter: Steroid Use Associated With Increased Odds of 30-Day Mortality in Surgical Patients With Metastatic Spinal Tumors in the Setting of Disseminated Disease

Rafael De la Garza Ramos, Reza Yassari

In Reply: Steroid Use Associated With Increased Odds of 30-Day Mortality in Surgical Patients with Metastatic Spinal Tumors in the Setting of Disseminated Disease

Jonathan G. Hobbs, Edwin Ramos, Ankit I. Mehta

Letter: Should Mindfulness be Incorporated as a Mandatory Component of Neurosurgical Training?

Robert R. Jack, Chandrasekaran Kaliaperumal

ERRATA

815

DEPARTMENTS

Calendar of Events

816

Table of Contents by Topic

N11

Next Month in *Neurosurgery*

N14

Book Review: Handbook of Evidence-Based Radiation Oncology, 3rd Edition
Ashish H. Shah, Joshua D. Burks, Simon S. Burdick, Lance D. Olson, Richard S. Liaw, H. Shih-
Jim Zhong

Book Review: Pediatric Radiation Oncology
Eric R. Eason

Book Review: Modern Management of Spinal Disorders: A Theoretical, Practical, and

Evidence-Based Text
Samuel C. Wu, Manish K. Kalish

Book Review: Evidence-Based Text
Samuel C. Wu, Manish K. Kalish

Book Review: Evidence-Based Text
Samuel C. Wu, Manish K. Kalish

Book Review: Evidence-Based Text
Samuel C. Wu, Manish K. Kalish

Book Review: Evidence-Based Text
Samuel C. Wu, Manish K. Kalish

Book Review: Evidence-Based Text
Samuel C. Wu, Manish K. Kalish

Book Review: Evidence-Based Text
Samuel C. Wu, Manish K. Kalish

Book Review: Evidence-Based Text
Samuel C. Wu, Manish K. Kalish

Book Review: Evidence-Based Text
Samuel C. Wu, Manish K. Kalish