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Care, teaching and innovation are the guiding principles of our department

The core mission of the Department of Neurological Surgery at the University of Pittsburgh and UPMC is to provide the best possible care for our patients, one patient at a time. We are committed to teaching the next generation of neurosurgical leaders. And, through research and ingenuity, we bear the responsibility to innovate and develop safer and more effective ways to treat neurological diseases.

Care: We are entering an exciting and challenging time in the delivery of health care, on both a regional and national level. With the implementation of the Affordable Care Act, there has been a shift in the financial responsibility that each patient must now bear for their care. More than ever, we must develop treatment protocols that provide the best possible value for the care provided. We continue to develop treatment pathways, standardizing the highest quality of care while critically reviewing the cost of such care. We remain committed to providing individualized patient-centric tailored care, taking advantage of our vast and varied experience in treating both common, as well as, complex and rare neurological diseases.

Teaching: We remain committed to training the next generation of leading academic neurosurgeons. We continue to attract the best and the brightest residents to our program. It is our responsibility to train and provide the tools to this most remarkable group of individuals so they can develop the neurosurgery of the future. I know the future of neurosurgery is bright and is in good hands. I am proud that UPMC continues to attract a large number of national and international neurosurgical leaders to train in our laboratories and courses.

Innovation: By definition, improving the care of patients with neurosurgical diseases requires constant innovation and oversight of our results. New techniques do not always translate into better results. Outcome assessment is a great focus of our work. This is the only way to assure that “new” translates to “better.” Another key component, new and better must be cost effective and the proposition of value of health care is something we are keenly analyzing and implementing. Through research and ingenuity, our department is intimately involved in developing the neurosurgery of the future.

Care, teaching and innovation are the guiding principles of the University of Pittsburgh Department of Neurological Surgery. Keeping true to our mission, our goals are clear and we are fully committed—as we have been in the past—to do what it takes to remain a leader in the present and into the future. Our mission is to change neurosurgery and to provide the very best we can for our patients...one patient at a time. This annual report describes our current work towards these goals.

Robert M. Friedlander, MD
Chairman, Professor of Neurological Surgery
Walter E. Dandy Professor of Neurological Surgery
Introduction
Sites of Service
• UPMC Hospitals:
  Children’s Hospital of Pittsburgh of UPMC
  Magee-Womens Hospital of UPMC
  UPMC East
  UPMC Hamot (Erie)
  UPMC McKeesport
  UPMC Mercy*
  UPMC Passavant
  UPMC Presbyterian*
  UPMC St. Margaret
  UPMC Shadyside
  * Level 1 trauma facility

• Non-UPMC Hospitals:
  Excela Health System (Latrobe Area & Westmoreland Regional Hospitals)
  Indiana Hospital
  Monongahela Valley Hospital
  VA Pittsburgh Healthcare System

• Outpatient Offices:
  Seven (fully staffed sites; 20 time share sites covering western Pennsylvania

Residency
• Three to four chief residents matriculate annually.

Major Service Lines
 Community based general neurosurgery (East, Mercy, Passavant, Westmoreland)
 Complex instrumented spine including scoliosis
 Endoneurovascular interventional radiology
 Image-guided neurosurgery (frame based, frameless, intraoperative CT scan)
 Neurophysiology intraoperative monitoring
 Pain management
 Pediatric neurosurgery
 Skull base lesions; endoscopic endonasal approach
 Surgical neuro-oncology
 Stereotactic radiosurgery (Gamma Knife, Cyber Knife)
 Epilepsy & movement disorders
 Human neural prosthetics program

PSD Clinical Productivity (fy 2014)
 Procedures: 10,288
 Work RVUs: 436,239

UPP Research Productivity (fy 2014)
 Directs: $4,949,048
 Indirects: $1,802,590
 Philanthropic Support: $925,011
 Grant Projects: 109

UPP Financial Productivity (fy 2014)
 Gross charges: $126,847,866
 Net patient revenue: $25,038,365
 Collection percentage: 19.9%
 Net days in AR: 35
 AR > 90 days (%): 13.9%
Surgical Services by Procedure Type
2013-14 Procedures (n=10,288)

- Vascular, RAD_Dx: 10.2%
- Vascular, RAD_INR: 4.1%
- Spine, Tumor: 1.6%
- Vascular, Open: 1.6%
- Crani/(SDH, EDH, ICH): 3.8%
- Crani: 6.9%
- Crani/MVD: 1.8%
- Crani/Tumor: 5.0%
- EEA: 3.0%
- SRS, Head: 9.2%
- SRS, Spine: 0.8%
- CSF Diversion: 4.8%
- Peripheral Nerve: 2.3%
- Other: 2.4%
- Minor: 2.5%

Surgical Services by Hospital
2013-14 Procedures (n=10,288)

- Presbyterian: 50.1%
- Excela: 5.3%
- McKeesport: 0.3%
- Mercy: 11.3%
- Hamot: 0.3%
- Shadyside: 9.1%
- Indiana: < 0.1%
- Magee: 1.7%
- Passavant: 10.8%
- Mon Valley: 0.3%
- Children's: 10.8%
Faculty, Residents and Visitors
Faculty, Residents and Visitors
Faculty

Full-Time Faculty
• Chairman and Professor:
  Robert M. Friedlander, MD, MA

• Professors:
  C. Edward Dixon, PhD
    (Vice Chairman, Research)
  Peter C. Gerszten, MD, MPH
    (Vice Chairman, Quality Improvement)
  Larry W. Jenkins, PhD
    (Retired effective October 2013)
  L. Dade Lunsford, MD
  John J. Moossy, MD
  Hideho Okada, MD, PhD
    (Left department July 2014)
  Ian F. Pollack, MD
    (Vice Chairman, Academic Affairs)
  Mingui Sun, PhD

• Associate Professors:
  Jeffrey Balzer, PhD
  Paul A. Gardner, MD
    (Vice Chairman, Surgical Services)
  Adam S. Kanter, MD
  Ajay Niranjan, MD, MBA
  David O. Okonkwo, MD, PhD
    (Vice Chairman, Clinic Operations)

• Assistant Professors:
  Nduka Amankulor, MD
  David J. Bissonette, PA-C, MBA
    (Executive Administrator)
  Diane L. Carlisle, PhD
  Donald J. Crammond, PhD
  Andrew F. Ducruet, MD
  Johnathan Engh, MD
  Juan C. Fernandez-Miranda, MD
  Avniel Ghuman, PhD
  Paola Grandi, PhD
  Stephanie Greene, MD
  Miguel Habeych, MD, MPH
  Brian Jankowitz, MD
  Edward A. Monaco III, MD, PhD
  Jamie Pardini, PhD
  Ava Puccio, PhD, RN
  Shengjun Ren, PhD
  R. Mark Richardson, MD, PhD
  Raymond Sekula Jr, MD, MBA
  Mandeep Tamber, MD, PhD
  Elizabeth Tyler-Kabara, MD, PhD
  Yu Zhang, PhD

• Clinical Professors:
  Adnan A. Abla, MD
  Matt El-Kadi, MD, PhD
    (Vice Chairman, UPMC Passavant)
  Joseph C. Maroon, MD
  Daniel A. Wecht, MD, MSc

• Clinical Professor Emeritus:
  Peter Sheptak, MD

• Clinical Associate Professors:
  Michael J. Rutigliano, MD, MBA
  Parthasarathy D. Thirumala, MD
  David S. Zorub, MD

Faculty and residents at 2014 resident graduation dinner held at Pittsburgh Golf Club on June 14.
Faculty, Residents and Visitors

Faculty

• Clinical Assistant Professors:
  Eric M. Altschuler, MD
  J. Brad Bellotte, MD
  J. William Bookwalter III, MD
  Daniel M. Bursick, MD
  David J. Engle, MD
  David L. Kaufmann, MD
  Vincent J. Miele, MD
  Monte B. Weinberger, MD
  Matthew M. Wetzel, MD

• Research Assistant Professors:
  Yue-Fang Chang, PhD
  Wendy Fellows-Mayle, PhD
  Esther Jane, PhD
  Wenyan Jia, PhD
  Hideyuki Kano, MD, PhD
  Rekha Pal, PhD
  (Left department September 2013)
  Daniel Premkumar, PhD
  Hong Qu Yan, MD, PhD

• Clinical Instructor:
  Jeff Bost, PA-C

Joint Appointments in Neurological Surgery

Michael Bell, MD
  (Critical Care Medicine)
Karim E. Byers, MD, MS
  (Medicine)
Michael Collins, MD
  (Orthopedic Surgery)
David Crippen, MD
  (Critical Care Medicine)
William Fielding Donaldson, MD
  (Orthopedic Surgery)
John C. Flickinger, MD
  (Radiation Oncology)
Ferenc E. Gyulai, MD
  (Anesthesiology)
Barry E. Hirsh, MD
  (Otolaryngology)
Tudor G. Jovin, MD
  (Neurology)
James D. Kang, MD
  (Orthopaedic Surgery)
Steven L. Kanter, MD
  (Senior Associate Dean, Medicine)
Frank S. Lieberman, MD
  (Neurology)
Rosa Lynn B. Pinkus, PhD
  (Medicine)
Kees Hugo Polderman, MD
  (Critical Care Medicine)
Margaret Reidy, MD
  (Physical Medicine and Rehabilitation)
William F. Rothfus, MD
  (Radiology)
Walter Schneider, PhD
  (Psychology)
Lori Anne Shutter, MD
  (Critical Care Medicine)
Carl H. Snyderman, MD
  (Otolaryngology)
S. Tanya Stefko, MD
  (Ophthalmology)
Peter L. Strick, PhD
  (Neurobiology)
Lawrence R. Wechsler, MD
  (Neurology)
Steven L. Whitehurst, MD
  (Anesthesiology)

Adjunct Faculty

James Burke, MD
Paul David Nussbaum, PhD

UPMC Hamot

Efkan Colpan, MD
Elio Demeira, MD
William Diefenbach, MD
Isam Khoja, MD
Primary Residents and Visitors

Residents

Chief Residents
Christopher Bonfield, MD  
Medical School: Pittsburgh  
Undergraduate School: Pennsylvania  
Hometown: Pittsburgh, Pa.

Ramesh Grandhi, MD  
Medical School: Medical College of NY  
Undergraduate School: Duke  
Hometown: White Plains, N.Y.

PGY-5
Ali Kooshkabadi, MD  
Medical School: Johns Hopkins  
Undergraduate School: Wake Forest  
Hometown: Atlanta, Ga.

Robert Miller, MD  
Medical School: Sanford, South Dakota  
Undergraduate School: Colorado State  
Hometown: Denver, Colo.

PGY-4
Christopher Deibert, MD  
Medical School: Pittsburgh  
Undergraduate School: Goucher College  
Hometown: Pottsville, Pa.

Zachary Tempel, MD  
Medical School: Indiana  
Undergraduate School: Miami  
Hometown: Indianapolis, Ind.

PGY-6
Kimberly A. Foster, MD  
Medical School: Chicago, Pritzker  
Undergraduate School: Michigan  

Phillip V. Parry, MD  
Medical School: Tulane  
Undergraduate School: Wake Forest  

Paul S. Richard, MD  
Medical School: Tulane  
Undergraduate School: Texas, Austin  
Hometown: Mandeville, La.

Nathan Zwagerman, MD  
Medical School: Wayne State  
Undergraduate School: Calvin College  

2014 graduating chief residents Christopher Bonfield and Ramesh Grandhi.
#### Faculty, Residents and Visitors

**Residents**

**PGY-3**
- Phillip Lee, MD, PhD
  - Medical School: Pittsburgh
  - Undergraduate School: George Washington
  - Hometown: Kingsport, Tenn.

- David Panczykowski, MD
  - Medical School: Miami
  - Undergraduate School: Clemson

- Gregory Weiner, MD
  - Medical School: Tulane
  - Undergraduate School: California, Berkeley
  - Hometown: Los Angeles, Calif.

- Georgios Zenonos, MD
  - Medical School: Athens
  - Undergraduate School: N/A
  - Hometown: Pafos, Cyprus

**PGY-2**
- William Ares, MD
  - Medical School: Vermont
  - Undergraduate School: Johns Hopkins
  - Hometown: Malverne, N.Y.

- Stephen A. Johnson, MD
  - Medical School: Penn
  - Undergraduate School: Penn
  - Hometown: Spring Lake, N.J.

- W. Christopher Newman, MD
  - Medical School: Florida
  - Undergraduate School: Harvard
  - Hometown: Longwood, Fla.

- Christian B. Ricks, MD
  - Medical School: Baylor
  - Undergraduate School: Brigham Young
  - Hometown: Scarsdale, N.Y.

**PGY-1**
- Amir H. Faraji, MD, PhD
  - Medical School: Pittsburgh
  - Undergraduate School: Florida
  - Hometown: Clearwater, Fla.

- Gurpreet S. Gandhoke, MD
  - Medical School: NDMVP Samaj’s Medical College
  - Undergraduate School: University of Pune
  - Hometown: Pune, India

- David J. Salvetti, MD
  - Medical School: Virginia
  - Undergraduate School: Vanderbilt

- Samuel S. Shin, MD, PhD
  - Medical School: Pittsburgh
  - Undergraduate School: California/San Diego
  - Hometown: Seoul, Korea

- Benjamin M. Zussman, MD
  - Medical School: Jefferson Medical College
  - Undergraduate School: Haverford

### New Residents for 2014-15

**Kimberly A. Foster**
- Medical School: Rutgers
- Undergraduate School: College of New Jersey
- Hometown: Flemington, N.J.

**Phillip V. Parry**
- Medical School: Rutgers
- Undergraduate School: Arizona State

**Paul S. Richard**
- Medical School: Harvard
- Undergraduate School: Case Western Reserve
- Hometown: Kaneohe, Hawaii

**Jeremy Stone, MD**
- Medical School: Hawaii
- Undergraduate School: Drexel
- Hometown: Keedysville, Md

**Daniel Tonetti, MD**
- Medical School: Pittsburgh
- Undergraduate School: Drexel
- Hometown: Keedysville, Md
Each year the department hosts the Stuart Rowe Society Lectureship and Research Day, a special day intended to showcase research activities in the field of neurological surgery.

The day is held in honor of Stuart Niles Rowe, widely considered the founding figure of neurosurgery training in Pittsburgh. In 1936, Rowe established the base of what would later become the University of Pittsburgh Department of Neurological Surgery.

During this special day, a series of talks are presented by department residents, each spotlighting a topical research issue relevant in the field of neurosurgery. These talks are followed by discussion, moderated by a prominent visiting professor. The 2013 honored guest was Chris Shaffrey, MD, of the University of Virginia.

(See photos of the 2013 Stuart Rowe Research and Lectureship Day on page 54.)

2013 Stuart Rowe Lecturer

Chris Shaffrey, MD
Harrison Distinguished Professor
Spine Division Director
University of Virginia School of Medicine

Past Stuart Rowe Lecturers

2012
James Rutka
University of Toronto

2011
Henry Brem, MD
Johns Hopkins University

2010
Ralph G. Dacey, Jr., MD
Washington University

2009
Edward H. Oldfield, MD
University of Virginia

2008
Patrick J. Kelly, MD
New York University

2007
John A. Jane, Sr, MD, PhD
University of Virginia

2006
M. Sean Grady, MD
University of Pennsylvania

2005
Gary Steinberg, MD, PhD
Stanford University
## Faculty, Residents and Visitors
### Visiting Scholars & Observers

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Institution</th>
<th>Country</th>
<th>Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kumar Abhinav, MBBS</td>
<td>Visiting Research Fellow</td>
<td>Cranial Base Surgery</td>
<td>Bristol, United Kingdom</td>
<td>(March 1, 2013 - January 31, 2015)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Frenchay Hospital</td>
<td></td>
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</tr>
<tr>
<td>Michele Aizenberg, MD</td>
<td>Visiting Observer</td>
<td>Neurosurgery</td>
<td>University of Nebraska</td>
<td>(July 18, 2013)</td>
</tr>
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<td></td>
<td>Lincoln, Neb.</td>
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</tr>
<tr>
<td>Elton Bezerra, MD</td>
<td>Visiting Clinical Observer</td>
<td>Cranial Base Surgery</td>
<td>Conjunto Hospitalar do Mandaqui</td>
<td>(January 6 - March 21, 2014)</td>
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<td>Sao Paulo, Brazil</td>
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</tr>
<tr>
<td>Ayhan Comert, MD</td>
<td>Visiting Research Fellow</td>
<td>Cranial Base Surgery</td>
<td>Ankara University</td>
<td>(March 1 - May 5, 2014)</td>
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<tr>
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<td>Ankara, Turkey</td>
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<tr>
<td>Volodymyr Dyakiv, MD</td>
<td>Visiting Clinical Observer</td>
<td>Cranial Base Surgery</td>
<td>Lviv Municipal Emergency Hospital</td>
<td>(October 14-26, 2013)</td>
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<td>Lviv, Ukraine</td>
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<tr>
<td>Sebastien Fournier, PhD</td>
<td>Visiting Fellow</td>
<td>Center for Clinical Neurophysiology</td>
<td>Hôpital de l'Enfant-Jésus</td>
<td>(August 15 - December 15, 2013)</td>
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<td></td>
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<td></td>
<td>Quebec City, Canada</td>
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<tr>
<td>Luciano Ricardo Franca da Silva, MD</td>
<td>Visiting Clinical Observer</td>
<td>Cranial Base Surgery</td>
<td>Curitiba, Brazil</td>
<td>(October 14-18, 2013)</td>
</tr>
<tr>
<td>Dakuan Gao, MD</td>
<td>Visiting Clinical Observer</td>
<td>Cranial Base Surgery</td>
<td>Xi’an, China</td>
<td>(January 2 - March 20, 2014)</td>
</tr>
<tr>
<td>Sumin Geng, MD, PhD</td>
<td>Visiting Clinical Observer</td>
<td>Cranial Base Surgery</td>
<td>Capital Medical University/Beijing Tiantan Hospital</td>
<td>(June 1 - August 31, 2014)</td>
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<td>Beijing, China</td>
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<tr>
<td>Ricardo Gil Simoes, MD</td>
<td>Visiting Clinical Observer</td>
<td>Cranial Base Surgery</td>
<td>University Autonoma</td>
<td>(October 14 - December 13, 2013)</td>
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<td></td>
<td>Madrid, Spain</td>
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<tr>
<td>Jamie Van Gompel, MD</td>
<td>Visiting Clinical Observer</td>
<td>Cranial Base Surgery</td>
<td>Mayo Clinic</td>
<td>(August 5-13, 2013)</td>
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<td>Rochester, Minnesota</td>
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<tr>
<td>Ye Gong, MD, MD, PhD</td>
<td>Visiting Clinical Observer</td>
<td>Cranial Base Surgery</td>
<td>Huashan Hospital/Fudan University</td>
<td>(July 31 - August 13, 2013)</td>
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<td>Shanghai, China</td>
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<tr>
<td>Laura Gonzalez-Garcia, MD</td>
<td>Visiting Clinical Observer</td>
<td>Cranial Base Surgery</td>
<td>Carlos Haya University Hospital</td>
<td>(March 1 - April 30, 2014)</td>
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<td>Malag, Spain</td>
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</tr>
<tr>
<td>Taylor Golden</td>
<td>Student Observer</td>
<td>Neurosurgery</td>
<td>St. Francis University</td>
<td>(January - February 2014)</td>
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<td>Loretto, Pa.</td>
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</tr>
<tr>
<td>Name</td>
<td>Title</td>
<td>Field</td>
<td>Institution</td>
<td>Duration</td>
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<tr>
<td>Guodong Huang, MD</td>
<td>Visiting Clinical Observer</td>
<td>Cranial Base Surgery</td>
<td>Shenzhen Second People’s Hospital</td>
<td>(October 1 - December 31, 2013)</td>
</tr>
<tr>
<td>Weihong Jiang, MD, PhD</td>
<td>Visiting Research Fellow</td>
<td>Cranial Base Surgery</td>
<td>Central South University</td>
<td>(July 10, 2013 - July 4, 2014)</td>
</tr>
<tr>
<td>Bagathsingh Karuppanan, MBBS, MS, MCh</td>
<td>Visiting Clinical Observer</td>
<td>Cranial Base Surgery</td>
<td>Meenakshi Mission Hospital &amp; Research Centre</td>
<td>(March 24 - April 3, 2014)</td>
</tr>
<tr>
<td>Tomohiro Kawaguchi, MD, PhD</td>
<td>Visiting Clinical Observer</td>
<td>Cranial Base Surgery</td>
<td>Tohoku University</td>
<td>(April 21 - May 9, 2014)</td>
</tr>
<tr>
<td>Manisha Kintali</td>
<td>Visiting Student</td>
<td>Neurosurgery</td>
<td>University of Pittsburgh</td>
<td>(July 29-30, 2013)</td>
</tr>
<tr>
<td>Ender Koktekir, MD</td>
<td>Visiting Clinical Observer</td>
<td>Cranial Base Surgery</td>
<td>Selcuk University</td>
<td>(December 1, 2013 - March 1, 2014)</td>
</tr>
<tr>
<td>Adi Krupski</td>
<td>Visiting Student</td>
<td>Neurosurgery</td>
<td></td>
<td>(July 15-16, 2013)</td>
</tr>
<tr>
<td>Qi Li, MD, PhD</td>
<td>Visiting Clinical Observer</td>
<td>Cranial Base Surgery</td>
<td>Jiaotong University</td>
<td>(March 1 - May 31, 2014)</td>
</tr>
<tr>
<td>Radim Lipina, MD, PhD</td>
<td>Visiting Clinical Observer</td>
<td>Cranial Base Surgery</td>
<td>University Hospital Ostrava</td>
<td>(October 28 - November 22, 2013)</td>
</tr>
<tr>
<td>Charles Mace, MD</td>
<td>Visiting Observer</td>
<td>Neurosurgery</td>
<td>Springfield Neurological and Spine Institute</td>
<td>(November 7, 2013)</td>
</tr>
<tr>
<td>Antonio Meola, MD</td>
<td>Visiting Research Fellow</td>
<td>Cranial Base Surgery</td>
<td>University of Pisa</td>
<td>(March 1 - December 31, 2014)</td>
</tr>
<tr>
<td>Ming Song, MD</td>
<td>Visiting Observer</td>
<td>Neurosurgery</td>
<td>Attending Neurosurgeon/Deputy Director</td>
<td>(July 19, 2013)</td>
</tr>
<tr>
<td>Yaseen Mirza, MD</td>
<td>Visiting Clinical Observer</td>
<td>Cranial Base Surgery</td>
<td>Emergency Teaching Hospital</td>
<td>(October 14-18, 2013)</td>
</tr>
<tr>
<td>Yujiro Obikane, MD</td>
<td>Visiting Research Fellow</td>
<td>Cranial Base Surgery</td>
<td>Kameda Medical Center</td>
<td>(April 1, 2013 - February 28, 2014)</td>
</tr>
</tbody>
</table>
Faculty, Residents and Visitors

Visiting Scholars & Observers

Hushyar Omar, MD
*Visiting Clinical Observer*
Cranial Base Surgery
Emergency Teaching Hospital
Duhok, Iraq
(October 14-18, 2013)

Nigam Padhiar
*Visiting Student*
Neurosurgery
University of Pittsburgh Health Career Scholars Academy
Pittsburgh, Pa.
(July 10, 2013)

Juan Carlos Rial-Basalo, MD
*Visiting Clinical Observer*
Cranial Base Surgery
Hospital Central de Asturias
Oviedo, Spain
(May 5-16, 2014)

Zhaohou Shi, MD
*Visiting Research Fellow*
Cranial Base Surgery
Fourth Military Medical University
Xi’an, China
(April 1 - October 1, 2014)

Ming Song, MD
*Visiting Clinical Observer*
Cranial Base Surgery
Capital University/11th Teaching Hospital
Beijing, China
(June 1 - August 31, 2013)

Hamdi Sukkarieh, MD
*Visiting Observer*
Spinal Surgery
American Univ. of Beirut Medical Center
Beirut, Lebanon
(March 2014)

Yuhao Sun, MD, PhD
*Visiting Clinical Observer*
Cranial Base Surgery
Shanghai Jiao Tong University
Shanghai, China
(May 5 - June 20, 2014)

Xiaoguang Tong, MD
*Visiting Clinical Observer*
Cranial Base Surgery
Tianjin Huaniu Hospital,
Tianjin City, China
(January 24 - February 7, 2014)

Alberto Torres-Diaz, MD
*Visiting Clinical Observer*
Cranial Base Surgery
Bellvitge Hospital
Barcelona, Spain
(July 1-26, 2013)

Babar Vaqas, MD
*Visiting Clinical Observer*
Cranial Base Surgery
Imperial College NHS Trust
Gloucester, United Kingdom
(October 14-18, 2013)

Denildo Verissimo, MD
*Visiting Research Fellow*
Cranial Base Surgery
Faculdade Evangelica do Parana
Curitiba, Brazil
(March 1 - August 31, 2014)

Delia Vinas, MD
*Visiting Clinical Observer*
Cranial Base Surgery
Fundacion Jimenez Diaz Hospital
Madrid, Spain
(November 4 - December 13, 2013)

Chongren Wang, MD
*Visiting Research Fellow*
Cranial Base Surgery
Zhengzhou University
Zhengzhou, China
(October 1, 2013 - October 1, 2014)

Wei-hsin Wang, MD
*Visiting Research Fellow*
Cranial Base Surgery
Taipei Veterans General Hospital
Taipei, Taiwan
(December 1, 2013 - December 31, 2014)
Faculty, Residents and Visitors
Visiting Scholars & Observers

Hongquan Wei, MD
Visiting Research Fellow
Cranial Base Surgery
First Hospital of China Medical University
Shenyang, China
(July 1, 2012 - December 31, 2013)

Zhiqun Wu, MD
Visiting Research Fellow
Cranial Base Surgery
Dalian Municipal Central Hospital
Dalian, China
(March 1 - September 30, 2013)

Qing Xie, MD, PhD
Visiting Clinical Observer
Cranial Base Surgery
Huashan Hospital/Fudan University
Shanghai, China
(July 15 - August 13, 2013)

Yong Yao, MD
Visiting Clinical Observer
Cranial Base Surgery
Peking Union Medical College Hospital
Beijing, China
(July 15-31, 2013)

Masanori Yoshino, MD
Visiting Research Fellow
Cranial Base Surgery
University of Tokyo
Tokyo, Japan
(May 19 - March 31, 2015)

Francesco Zenga, MD
Visiting Clinical Observer
Cranial Base Surgery
University of Torino
Torino, Italy
(November 4 - 12, 2013)

Bo Zhang, MD
Visiting Clinical Observer
Cranial Base Surgery
First Affiliated Hospital
Dalian, China
(July 15-30, 2013)

Xi-an Zhang, MD, PhD
Visiting Research Fellow
Cranial Base Surgery
Southern Medical University
Guangzhou, China
(March 1, 2013 - July 31, 2014)
Course Participants

Principles & Practice of Gamma Knife Radiosurgery

• July 8-12, 2013:
  Nikunj Patel, Bristol, UK
  Alison Cameron, Bristol, UK
  Christopher Herbert, Bristol, UK
  Edison Valle, New Orleans, La.
  Tony J. Wang, New York, N.Y.
  Meredith Adams, Minneapolis, Minn.
  Gokalp Silav, Istanbul, Turkey
  Hilaç Acar, Istanbul, Turkey
  Hale Basak Ozkok, Istanbul, Turkey
  Elaine Montchal, Manhasset, N.Y.
  Ilhan Elmaci, Istanbul, Turkey
  Fatih Han Boalukbasi, Istanbul, Turkey
  Ashesh Mehta, Great Neck, N.Y.
  Steven Harrell, Orlando, Fla.
  Brandi Ligon, Orlando, Fla.

• September, 16-20, 2013:
  Suguna Pappu, Albuquerque, N.M.
  Sameer Sheth, New York, N.Y.
  Robert Gilliam, Kansas City, Mo.
  Darwin L. Zellmer, Anchorage, Ark.
  Mark eisenberg, Great Neck, N.Y.
  Mackenzie McGee, Peoria, Ill.
  Suresh Magge, Washington, DC
  Dennis Cheek, Billings, Mont.
  Raj Narayan, Manhasset, N.Y.
  Gopi Solaiappan, Fresno, Calif.
  Nicole Bunda, Morgantown, W.Va.
  Jun Lu, Syracuse, N.Y.
  John Schallenkamp, Billings, Mont.
  Snehal Desai, Houston, Texas
  Maria Thomas, St. Louis, Mo.
  Julius D. Zant, Salisbury, Md.
  Xijun Meng, Shaanxi Province, China
  Elaine Montchal, Manhasset, N.Y.
  Courtney Chappell, Orlando, Fla.

• November 11-15, 2013:
  Ramazan Sari, Istanbul, Turkey
  Mehmet Tonge, Istanbul, Turkey
  Juan Torres-Reveron, New Haven, Conn.
  Eric M. Deshaies, Syracuse, N.Y.
  Malika Siker, Milwaukee, Wis.
  Gavin P. Dunn, St. Louis, Mo.
  Eugen J. Dolan, Billings, Mont.
  Roberto Rey-Dios, Jackson, Miss.
  Alastair Hoyt, Phoenix, Ariz.
  Lynn Fitzgerald, Dallas, Texas
  Wael Asaad, Providence, R.I.
  Zhifei Wen, Houston, Texas
  Sherise D. Ferguson, Houston, Texas
  David M. Panczykowski, Pittsburgh, Pa.
  Justin Vinci, New Haven, Conn.
  Ronald Benveniste, Miami, Fla.
  Deus Cielo, Providence, RI
  Kuei-Hua Lin, Shreveport, LA

• January 13-17, 2014:
  William S. Cobb, Ridgewood, N.J.
  W. Christopher Fox, Ridgewood, N.J.
  Patrick P. Mastroianni, Bridgeport, Conn.
  Antonios Mammas, Newark, N.J.
  Sara Rahnema, Atlanta, Ga.
  Ram Vasudevan, San Antonio, Texas
  Kimmen Quan, Pittsburgh, Pa.
  Mark Piedra, Billings, Mont.
  James M. Brindle, Providence, R.I.
  Eduardo Lovo, San Salvador, E.S.
  Ravi Krishnapillai, Malaysia
  Charles C. Duncan, New Haven, Conn.
  Robert F. James, Greenville, N.C.
  Ji-ho Jung, Pittsburgh, Pa.
  Francisco Vaz Guimaraes Filho, Pittsburgh, Pa.
  Jungwon Park, Pittsburgh, Pa.
  Anil Nanda, Shreveport, La.

• March 17-21, 2014:
  Ramazan Sari, Istanbul, Turkey
  Mehmet Tonge, Istanbul, Turkey
  Juan Torres-Reveron, New Haven, Conn.
  Eric M. Deshaies, Syracuse, N.Y.
  Malika Siker, Milwaukee, Wis.
  Gavin P. Dunn, St. Louis, Mo.
  Eugen J. Dolan, Billings, Mont.
  Roberto Rey-Dios, Jackson, Miss.
  Alastair Hoyt, Phoenix, Ariz.
  Lynn Fitzgerald, Dallas, Texas
  Wael Asaad, Providence, R.I.
  Zhifei Wen, Houston, Texas
  Sherise D. Ferguson, Houston, Texas
  David M. Panczykowski, Pittsburgh, Pa.
  Justin Vinci, New Haven, Conn.
  Ronald Benveniste, Miami, Fla.
  Deus Cielo, Providence, RI
  Kuei-Hua Lin, Shreveport, LA

• May 5-9, 2014:
  Rajinder Kumar, New Delhi
  Matthew L. Carlson, Nashville, TN
  Pierre Charpentier, Philadelphia, PA
  Joseph Panoff, Miami, Fl
Faculty, Residents and Visitors

Course Participants

Saffet Tuzgen, Istanbul, Turkey
Mustafa Aziz Hatifobiu, Istanbul, Turkey
Qianyi Xu, Mt. Laurel, NJ
Courtney Voelker, Los Angeles, CA
Kerime Akdur, Istanbul, Turkey
Audrey Calzada, Los Angeles, CA
Brian K. Yeh, New York, NY
Joshua Seinfeld, Aurora, CO
Nicholas Sanfilippo, New York, NY
Alexander Georgiades, Indianapolis, IN
Mehmet Hadan Seyithanoglu, Istanbul, Turkey
Alpaslan Mayadagli, Istanbul, Turkey
Shiv Srivastava, Indianapolis, IN
Arnold Markoe, Miami, FL

Minimally Invasive Endoscopic Surgery of the Cranial Base and Pituitary Fossa

• August 14-17, 2013:
  Taylor Abel, Iowa City, Iowa,
  Mohammad H. Al-Bar, Miami, Fla.,
  Puya Alikhani, Tampa, Fla,
  Abdulaziz Alqahtani, Varese, Italy
  Rachel Arffa, Temple, Texas,
  Hassan Arshad, Buffalo, N.Y.,
  Michael Cooter, Greenville, S.C.,
  Jennifer Cracchiolo, Philadelphia, Pa.,
  Brian Dalm, Iowa City, Iowa,
  Laura Dominguez, Richmond, Va.,
  Rafael Fitipaldi, Cuiaba, Brazil
  Chris French, Syracuse, N.Y.,
  Ye Gong, Shanghai, China
  Andrew Grossbach, Iowa City, Iowa,
  Mathew Dorrard Guimaraes, Varginha, Brazil
  Jafar Jafar, New York, N.Y.,
  Diana Jho, Pittsburgh, Pa.,
  Alexandra Kejner, Birmingham, Ala.,
  M. Abraham Kurikose, Buffalo, N.Y.,
  Virgilio Matheus, Cleveland, Ohio,
  Bryan McRae, Indianapolis, Ind.,
  Ivan Mendez-Benegas Silva, Madrid, Spain
  Chirag Patel, Newark, N.J.
  Manuel Pedrosa Sr., Madrid, Spain
  Randall Plant, Anchorage, Alaska,
  Jeff Poffenbarger, Fredericksburg, Va.,
  Luiz Vicente Rizzo Castaneira, Sao Paulo, Brazil
  Asli Sahin-Yilmaz, Istanbul, Turkey
  Shahzad Shams, Lahore, Pakistan
  Ming Song, Beijing, China
  Jose Eduardo Souza Dias Jr., Sao Paulo, Brazil
  Amalia Steinberg, Anchorage, Alaska,
  Kyle Swanson, Madison, Wis.
  Jamie J. Van Gompel, Rochester, Minn.
  Peter Volsky, Norfolk, Va.
  Evan Walgama, Dallas, Texas
  Qing Xie, Shanghai, China
  William Yao, Houston, Texas

• November 13-16, 2013:
  Jose Ramon Abadi, Caracas, Venezuela
  Jonathan Benjamin, Romford, United Kingdom
  Maxwell Boakye, Louisville, Ky.
  Renato Capuzzo, Sao Paulo, Brazil
  Joseph Chabot, Albertson, N.Y.
  Carlos Clara, Sao Paulo, Brazil
  David Cohan, Buffalo, N.Y.
  Joris De Medts, Roeselare, Belgium
  Marlon Diaz, Caracas, Venezuela
  Brian Dunham, Philadelphia, Pa.
  Roger Farmer, Morgantown, W.Va.
  Mansoor Foroughi, Birmingham, United Kingdom
  Edgardo Dante Franciosi, Cordoba, Argentina
  Babak Givi, New York, N.Y.
  Wesley Hicks Jr., Buffalo, NY.
  Takuichiro Hide, Kumamoto, Japan
  Ohad Hilly, Tel Aviv, Israel
  Alissa Kanaan, Pittsburgh, Pa.
  Alexandre Karkas, Grenoble, France
  Peter Lindvall, Umea, Sweden
  James Jesus Martinex-Anda, Mexico City, Mexico
  Iman Naseri, Jacksonville, Fla.
  Vicente Enrique Oddo Sr., Cordoba, Argentina
  David Panczykowski, Pittsburgh, Pa.
  Giancarlo Pecorari, Torino, Italy
  Matthew Rigby, Halifax, Canada
  Mark Rizzi, Philadelphia, Pa.
  Paul Schalch, Carbondale, Ill.
  Raghunath Shanbag, Dharwad, India
  Alice K.Y. Siu, Hong Kong, Hong Kong
  Daryoush Tavanaeinpour, Jacksonville, Fla.
  Sanguansak Thanaviratananich, Khon Kaen, Thailand
  Anh Truong, Sacramento, Calif.
  Raymond Tsang, Hong Kong, Hong Kong
  Jose Valerio, Weston, Fla.
  Dimitri Vanhauwaert, Zonnebeke, Belgium
Faculty, Residents and Visitors

Course Participants

Deepak Varshney, Noida, India
Welby Winstead, Louisville, Ky.
Shigetoshi Yano, Kumamoto, Japan
Francesco Zenga, Torino, Italy
Georgios Zenonos, Pittsburgh, Pa.

• April 30-May 3, 2014:
Aadel Al Murawwi, Abu Dhabi, UAE
Martyn Barnes, Auckland, New Zealand
Lei Chen, Beijing, China
Man Wai Chow, Hong Kong
Will Copeland, Rochester, Minn.
Brian D’Anza, Danville, Pa.
Nichole Dean, Birmingham, Ala.
Rahul Dubey, Oxford, United Kingdom
Kimberly Foster, Pittsburgh, PA,
Antonia Garcia Iglesias, Cordoba, Spain
Denis Golbin, Moscow, Russia
Salina Husain, Kuala Lumpur, Malaysia
Tomohiro Kawaguchi, Sendai, Japan
Ksenia Klimenko, Moscow, Russia
Daniel Klinger, Dallas, Texas
Rohan Lall, Chicago, Ill.
Ming-Ying Lan, Taipei, Taiwan
Lewis Leng, San Francisco, Calif.
Bruno Lobo, Porto Velho, Brazil
Yu-Jen Lu, San Francisco, Calif.
Aditi Mandpe, San Francisco, Calif
Claudiu Matei Sr., Sibiu, Romania
Juan Portela, Dorado, Puerto Rico
Jim Reidy, Gilbert, Ariz.
Juan Carlos Rial-Basalo, Oviedo, Spain
Malan Roux, Westville, South Africa
Mitesh Shah, Indianapolis, Ind.
Rabia Shihada, Baltimore, Md.
Alan Shikani, Baltimore, Md.
Xuefei Shou, Shanghai, China
Yuhao Sun, Shanghai, China
Jonathan Ting, Indianapolis, Ind.
Alvaro Toledano, Cordoba, Spain
Yongfei Wang, Shanghai, China
Chunlong Zhong, Shanghai, China
History
Neurological surgery in Pittsburgh began in 1936 with the arrival of Stuart Niles Rowe, MD, a promising young surgeon trained under the auspices of Charles M. Frazier in Philadelphia. Rowe’s arrival marked the birth of a dedicated neurosurgical division that would become a leader in the field. His move here was prompted by a letter from L.H. Landon, Sr., MD, the chief of general surgery at West Penn Hospital, emphasizing the need for a formally trained neurosurgeon in Pittsburgh. It is said that Rowe won a coin toss over William J. Gardner for the opportunity to migrate to the Pittsburgh area and set up practice. Gardner subsequently moved to the Cleveland area and developed his own neurosurgical center.

Rowe, a Michigan native, developed a strong clinical practice based on the loosely affiliated community hospitals in the Pittsburgh area. He focused his research activities at the University of Pittsburgh and wrote several pioneering papers on the neurosurgical treatment of pain, brain abscess and cerebral trauma. An avid sportsman and devoted father, he dedicated at least one day a week to physical fitness and family life. Rowe began the first formal residency program at West Penn Hospital in 1949 and consolidated this program at Presbyterian University Hospital within the University of Pittsburgh in 1952. Another program was also established at Mercy Hospital in 1949 under the direction of Floyd Bragden, MD, who arrived in Pittsburgh three years after Rowe. Dr. Bragden, trained by Jefferson Browder at Kings County Hospital in New York, was a Pittsburgh native and a well-known acoustic tumor surgeon.

The first woman to practice neurosurgery in the area was Dorothy Klinke Nash, MD. Having completed training in both neurology and neurosurgery at Bellevue Hospital under the guidance of Byron Stookey in the late 1920s, Nash moved to the Pittsburgh area in 1936 but did not gain hospital appointment until a chance meeting with Morris Abel Slocum, MD, the chief of general surgery at St. Margaret Hospital. At the time, Nash worked at the blood bank. While drawing Slocum’s blood, he determined Nash’s background in neurosurgery and immediately appointed her to a staff position. This appointment was a landmark in that she became the first woman to practice neurosurgery in the United States and, thereby, pioneered the way for other women in the field. Shortly thereafter, she was appointed to the hospital staff at the university under Rowe. A graduate of Bryn Mawr College and the Columbia College of Physicians and Surgeons, Nash was named Pennsylvania Woman of the Year in 1957.

Rowe volunteered for military service in World War II, served as an Army lieutenant colonel, and treated casualties triaged to a southern England military hospital. Upon return to Pittsburgh at the end of the war, he resumed control of the neurosurgery service at the university, which was then a division of General Surgery. Rowe embarked on a mission to unify the service, which performed operations at many local hospitals. He also began to train residents.

His own training firmly based in academic neurosurgery, Rowe sought to acquire residents with a commitment to research, teaching and independent thought. The conference schedule included joint conferences with the Mercy Hospital neurosurgical program and a monthly journal club that convened after a dinner at Rowe’s home.

Anthony Fredrick Susen, MD, joined the university in 1953 as a clinical instructor after completing his training at both Bowman Gray Medical School and Harvard. The Illinois native graduated from Dartmouth College and Harvard Medical School. Susen held the same belief as Rowe: that residency training programs should be designed to teach not only exceptional surgical technique, but also the critical clinical decision-making skills. Susen supported Rowe’s beliefs in training residents and emphasized the need for thorough literature review and independent research as a means of broadening clinical knowledge.
Rowe and Susen worked together into the 1960s. In 1964, Henry Bahnson, MD, the chair of General Surgery, appointed Sidney Goldring, MD, of St. Louis to be the first chief of the Division of Neurological Surgery. After two years, Dr. Goldring returned to St. Louis as a professor of neurosurgery and subsequently was named chairman at Washington University. In 1966, Susen was named acting chief and, under his direction, other facilities including Children’s Hospital and the Veterans Administration Medical Center, became part of the service.

In 1971, Peter Joseph Jannetta, MD, was appointed professor and chairman of the newly formed Department of Neurological Surgery and served in the post for 25 years. Dr. Jannetta is universally known for his work in the treatment of cranial nerve disorders, developing a microvascular decompression procedure—widely known as the Jannetta Procedure—that offers trigeminal neuralgia patients an effective therapeutic alternative when medications fail. Although Dr. Jannetta’s scientific and leadership contributions are significant, perhaps his greatest achievement is the legacy of outstanding international leaders he trained in neurosurgery. During his tenure, he trained 49 residents—including four future department chairmen—and was honored with an endowed professorship, appropriately named after Walter E. Dandy—considered one of the founding fathers of neurosurgery. In June of 2000, Dr. Jannetta retired from the University of Pittsburgh and, subsequently, took a position with Allegheny General Hospital.

In 1997, L. Dade Lunsford, MD, was selected as the second department chairman. In the ensuing decade, Dr. Lunsford guided the department to an elite position in the academic community. Under his guidance, the department established itself as one of the top academic...
neurosurgical departments in the country—continuing Dr. Jannetta’s tradition of training strong, well-rounded residents—and developed into one of the most extensive neurological research programs in the nation. Dr. Lunsford also established the department as one of the leading stereotactic radiosurgical programs in the world. In 1987, he was responsible for bringing the Gamma Knife to the University of Pittsburgh, the first center in the United States to offer this state-of-the-art, minimally invasive form of brain surgery. The university now has three such devices and is a world leader in Gamma Knife treatment and education, having treated more than 12,000 patients.

In June of 2006, Dr. Lunsford announced his decision to step down as department chair in order to devote more time to his clinical work, clinical investigation, and resident and fellow training. University of Pittsburgh School of Medicine dean, Arthur S. Levine, MD, appointed Amin Kassam, MD, co-director of the department’s minimally invasive program, interim chair of the department. Dr. Kassam was subsequently appointed chairman by Dr. Levine in May of 2007. In June of 2009, Dr. Kassam resigned as chairman.

On June 1, 2010, Robert M. Friedlander, MD, a noted cerebrovascular and neuro-oncologic surgeon, became the fourth chair in the department’s history. Dr. Friedlander carved a prominent career as a clinician and scientist at Harvard Medical School and Women’s Hospital in Boston before coming to Pittsburgh. His strong leadership in both clinical and research areas has further established the University of Pittsburgh Department of Neurological Surgery as a world-leader in the academic neurosurgical field.

In June of 2011, the University of Pittsburgh Department of Neurological Surgery residency program was ranked as the most productive residency program in the nation in terms of graduates remaining and contributing in academic neurosurgery, according to a study published online in the *Journal of Neurosurgery*.

The study’s authors sought to determine those programs that produce a high number of graduates remaining within academic programs and the contribution of these graduates to academic neurosurgery. In the study, 97 academic neurosurgery departments with 986 faculty members were analyzed. All data regarding training program and medical school education were compiled and analyzed according to the center from which each faculty member graduated. The neurosurgery training program at the University of Pittsburgh produced the highest number of academic neurosurgeons in this sample.

A few months prior to the publication of that article, the department ranked first in academic output in top-tier specialty journals among all departments of neurosurgery across the United States and Canada, according to a similar study also published in the *Journal of Neurosurgery*. In this 2010 study, researchers applied the h index (a reflection of the number of papers and citations of an individual) to 99 American and 14 Canadian neurosurgery departments with residency programs. The results showed that the University of Pittsburgh Department of Neurological Surgery had the highest h score for the number of papers published by its faculty in the *Journal of Neurosurgery* and *Neurosurgery* from 2000 to 2009.

**Goals/Mission**

The Department of Neurological Surgery at the University of Pittsburgh began more than 75 years ago with a commitment to patient care, education and research. Today these goals are still paramount in our pursuit of excellence: first, to provide outstanding care to patients with neurological disease; second, to equip neurosurgeons of the future with state-of-the-art techniques and analytical skills to lead the field of neurosurgery; and third, to foster research designed to enhance the treatment of diverse diseases affecting the nervous system. Although the faculty has had a wide variety of interests over the years, their unity of vision has been remarkable in this regard.
Department Overview

Organization
The main offices of the Department of Neurological Surgery at the University of Pittsburgh are housed on the fourth floor of UPMC Presbyterian. The 2013-14 full-time faculty includes seven professors, five associate professors and 21 assistant professors. In addition, there are 17 clinical faculty, seven research faculty and 24 residents at various levels of training. The support staff includes more than 200 physician assistants, clinical coordinators, administrative assistants, nurses, technicians and other personnel.

The department has created a unique environment where “centers of excellence and focused programs” flourish. In this model, neurosurgical subspecialists devote time to research and patient care in focused programs. The use of centers of excellence has strengthened neurosurgery at the University of Pittsburgh and facilitated attainment of our mission.

• Comprehensive Center for Cerebrovascular Neurosurgery
The Comprehensive Center for Cerebrovascular Neurosurgery at the University of Pittsburgh Medical Center is a subspecialized multidisciplinary clinical unit that evaluates and treats all forms of vascular disorders of the brain and spinal cord. Given the high volume of cases managed by the center, it serves as a national and international resource for the management of patients with complex cerebrovascular disease, including aneurysms, arteriovenous malformations (AVMs), carotid disease, Moya-Moya, and cavernous malformations. With a group of highly subspecialized physicians, center faculty prospectively assess patients and provide broad state-of-the-art treatment options. Since cerebrovascular disease can often be treated using a spectrum of complementary techniques, experts evaluate cases and provide recommendations with the goal of minimizing risks and maximizing long-term efficacy.

Challenging cases are reviewed prospectively in our weekly multidisciplinary cerebrovascular conference. All the key subspecialists are represented and discuss the individual features of each case. Individual consideration is given to each patient to tailor the most effective therapy taking into consideration a number of important features including patient age, overall health status, and specific anatomical consideration of their vascular abnormality.

• Human Neural Prosthetics Program
The Human Neural Prosthetics Program is the result of a multidisciplinary effort to explore the utilization of brain computer interfaces for improving the lives of patients with motor disabilities. In 2007, a collaborative group was established—representing expertise in engineering, neuroscience and rehabilitation—to promote clinical trial using brain computer interfaces to control a robotic arm.

Elizabeth Tyler-Kabara, MD, PhD, and Wei Wang, MD, PhD (Department of Physical Medicine & Rehabilitation) obtained an initial grant to evaluate micro-ECoG grids in patients in the Epilepsy Monitoring Unit. Data from this study demonstrated that patients could utilize a brain computer interface to control a computer cursor. This grant served as the kick-start for two clinical trials.

In the first, quadriplegic patients are implanted with a custom-designed ECoG grid for up to 30 days. The first subject was able to obtain consistent three-dimensional cursor control using a 3D visual environment. He was also able to successfully control a robotic arm. Additional subjects will train using both a virtual reality environment and robotic arms. The Cortical Control of a
Dextrous Prosthetic Hand study is funded by National Institute of Neurological Disorders and Stroke (NINDS) and Andrew B. Schwartz, PhD (Department of Neurobiology) is the principle investigator.

A second study utilizes microelectrode arrays that penetrate the surface of the brain. This study is funded Defense Advanced Research Projects Agency (DARPA) and is part of the Revolutionizing Prosthetics Program, Phase 3 study for which Michael L. Boninger, MD, chairman of the Department of Physical Medicine & Rehabilitation, is the principle investigator. In the study, two 96-channel electrode arrays were implanted into the brain of a quadriplegic patient. This patient has been able to obtain control of up to 10 degrees of freedom. Using seven degrees of freedom, she has been able to utilize the robotic arm to perform standardized rehabilitation tasks, such as placing objects on a shelf. Once FDA approval was obtained, she was able to interact personally with the robotic arm and was able to grasp a food item and feed herself. She has currently been implanted for greater than one year and continues to have control of the robotic arm.

Future studies are currently under development. Researchers are working on FDA approval for chronic ECoG implantation. Investigators hope to begin up to one-year studies soon. As part of the Revolutionizing Prosthetics Program, Phase 3 study, investigators have obtained FDA approval to place stimulating arrays in conjunction with recording arrays in anticipation of adding sensory feedback to the control of the robotic arm. Finalization of Institutional Review Board (IRB) and Data and Safety Monitoring Board (DSMB) approval are ongoing.

• Center for Cranial Base Surgery
Cranial base surgery has a long tradition at the University of Pittsburgh. The UPMC Center for Cranial Base Surgery—under the current direction of Paul Gardner, MD, of the Department of Neurosurgery and Carl H. Snyderman, MD, MBA, of the Department of Otolaryngology—is the first skull base center to be established in North America and has pioneered both transcranial microscopic and endoscopic endonasal approaches to the skull base and brain. L. Dade Lunsford, MD at UPMC was also the first center in the United States to introduce radiosurgery for the non-operative treatment of skull base tumors.

Experts at the UPMC Center for Cranial Base Surgery continue to lead the field of minimally invasive brain surgery by developing new techniques, tools and approaches that have made it possible to access many tumors, regardless of size, and remove them through the nostrils. Since 1997, more than 2,500 endonasal surgeries have been performed in adults and children, making UPMC one of the busiest centers in the world for the surgical treatment of tumors of the pituitary region and cranial base. Children’s Hospital of Pittsburgh of UPMC is unique in its ability to provide comprehensive skull base surgery with a dedicated skull base team, combining out adult experience under the leadership of pediatric neurosurgeon Elizabeth Tyler-Kabara, MD, PhD.

Drs. Gardner and Snyderman, along with associate director Juan Fernandez-Miranda, MD, Tonya Stelko, MD, Elizabeth Tyler-Kabara, MD, PhD, Eric Wang, MD, Barry Hirsch, MD, Yael Raz, MD and Andrew McCall, MD, comprise a team of experts in cranial base surgery, advancing patient care through clinical outcomes studies, in-depth anatomical study, molecular science and genetics research and an international training program.

The concept of team surgery allows the centre to select the best surgical approach for each tumor, with a surgical plan designed around the particular needs of the individual patient. Treatment is designed to offer the best surgical outcome with the least side effects and maximal preservation of function. A full array of transcranial approaches, minimally invasive key-hole approaches and endoscopic endonasal approaches (EEAs) are routinely applied with proven and studied success.
The UPMC Center for Cranial Base Surgery is also a major teaching destination for surgeons and other health care professionals looking to learn more about these techniques. Faculty teach three to four courses per year at UPMC, featuring live cases and hands-on lab work. They also travel the world teaching these procedures.

• **Center for Cranial Nerve and Brainstem Disorders**
  The Center for Cranial Nerve and Brainstem Disorders, under the direction of Raymond F. Sekula Jr., MD, joins experts in a variety of medical disciplines, including neurosurgery, neurology, neuropsychology, radiology, anesthesia, neuro-oncology, and neuro-otology with the intent of providing the most advanced care for a variety of brain disorders. The goal of the center is to provide the very best outcomes for patients with a variety of disorders in the most minimally invasive manner.

Building upon pioneering work accomplished by University of Pittsburgh faculty over the past four decades, the Center for Cranial Nerve and Brainstem Disorders is the international leader in the management of trigeminal neuralgia, hemifacial spasm and glossopharyngeal neuralgia. In addition, the center continues to expand and pioneer treatments directed at other abnormalities in and around the brainstem.

The center is driven by outcome-based clinical research and basic science research projects aimed at understanding the biologic mechanisms of diseases within the realm of the center. In recent years, this research has resulted in improved outcomes for patients and new therapies for a variety of disorders.

• **Neurosurgical Oncology Program**
  The University of Pittsburgh’s Neurosurgical Oncology Program includes leading neurosurgeons, neuro-oncologists, radiation oncologists, neuropathologists, researchers, rehabilitation experts, nurses and support staff. This multidisciplinary team delivers compassionate and sophisticated care and uses the latest technologies to treat patients with tumors of the brain, spine and skull base. Education, support and counseling for family members are important parts of the program.

The Neurosurgical Oncology Center features three primary divisions: the Adult Neurosurgical Oncology Program, the Pediatric Neurosurgical Oncology Program, and the Brain Tumor Program located at the Hillman Cancer Center of the University of Pittsburgh Cancer Institute (UPCI). The Brain Tumor Program supports clinical trials and basic science research for patients with brain tumors and is led by Ian Pollack, MD.

The Adult Neurosurgical Oncology Center is dedicated to providing the best treatment available for patients with both benign and malignant tumors of the brain and spine. Johnathan Engh, MD, serves as director of the center, and Nduka Amankulor, MD is associate director. In addition to its clinical mission, the adult neurosurgical oncology program is equally dedicated to the development of more effective therapies for these diseases. It includes the work of numerous other faculty within the department.

This center has been a leader in the implementation of cutting-edge technologies such as stereotactic radiosurgery using the Gamma Knife, Cyberknife, and image-guided tumor resection using intraoperative CT and MRI. In addition, minimally invasive techniques for tumor removal using intracranial endoscopic port surgery (Neuroendosport™) and endoscopic endonasal approaches to the skull base have been pioneered at this center. The use of advanced imaging modalities, such as high definition white matter fiber tract imaging and magnetoencephalography, has also facilitated better outcomes for selected patients with tumors.
As an international referral center for both adult and pediatric brain tumors, the center ranks among the top neuroscience programs in the nation. Faculty members provide consultation and guidance for local, national and international referrals. Patients with both primary brain and spine tumors and metastatic tumors are seen in the Hillman Cancer Center in a multidisciplinary clinic that includes representation from neurosurgery, neuro-oncology and radiation oncology. A weekly multidisciplinary neuro-oncology tumor board is a forum for a team of specialists to review patient problems and to formulate management recommendations. The tumor board draws from the expertise of the neurosurgery, neurology, radiology, pathology and radiation oncology faculty at UPMC. Similarly, there is a weekly skull base tumor board with involvement from otolaryngology/head and neck cancer specialists, neuro-ophthalmology, radiology, and adult and pediatric neurosurgery.

Our team is also actively studying other neurological complications of systemic cancer and its treatment, including stroke, neurobehavioral disorders, neurological complications of chemotherapy and/or radiation therapy, and paraneoplastic neurological syndromes, in collaboration with medical neuro-oncologists Frank Lieberman, MD, and Jan Drappatz, MD.

The University of Pittsburgh is a member of the American Brain Tumor Consortium, which conducts clinical trials to evaluate novel chemotherapy and molecular treatments for adults with malignant primary brain tumors. In addition to membership in this group, the site is one of the few in the country that is also a member of the Pediatric Brain Tumor Consortium and the Collaborative Ependymoma Research Network, highlighting the breadth of the neuro-oncology expertise across the age spectrum. The University of Pittsburgh serves as the coordinating center for the North American Gamma Knife Consortium, which links 18 academic centers of excellence in radiosurgery. Moreover, investigators have been at the forefront of development of innovative biological therapeutic approaches for patients with brain tumors, such as immunotherapy using brain tumor vaccines and radiosurgery coupled with bevacizumab.

The Spine Oncology Radiosurgery Program, led by Peter C. Gerszten, MD, MPH, is the most experienced center in the world in using radiosurgery to treat a wide variety of both malignant and benign spinal and paraspinal tumors. This highly effective therapy is both safe and painless, and avoids many of the risks associated with open surgery.

**Spine Services Division**

The Neurosurgical Spine Division at the University of Pittsburgh is a multidisciplinary organization composed of specialists in the fields of neurological surgery, physical therapy, interventional neuroradiology, physical medicine and rehabilitation. Specialists from these fields work together as a unified group to provide the highest quality care for patients and athletes who have spine injuries; scoliosis or deformity; painful disc conditions; and neck, arm, back or leg pain related to the spinal nerves.

Adam S. Kanter, MD, is chief of the department’s spine service and leads the minimally invasive spine program. He also directs the neurosurgical spine fellowship program. David O. Okonkwo, MD, PhD, leads the spinal deformity program, and Peter C. Gerszten, MD, MPH, leads the percutaneous and spine radiosurgery programs. The community division is led by Joseph Maroon, MD, and Matt El-Kadi, MD, PhD.

The Neurosurgery Spine Services Division offers comprehensive care for all types of spinal disorders, including degenerative, traumatic, athletic and cancer conditions. The initial treatment approach is typically non-surgical, with surgical options reserved for patients/athletes with recurrent or disabling symptoms or progressive deficits. Complete diagnostic testing of all spinal and nerve disorders is available through the center.
The minimally invasive program, led by Dr. Kanter, utilizes state-of-the-art portal techniques, avoiding as much tissue trauma as possible and providing as short of a hospital stay as possible. The spinal deformity program, led by Dr. Okonkwo, offers full-scale analysis, longitudinal tracking, and treatment interventions for patients with scoliosis and other spinal deformities. These two neurosurgeons often collaborate to successfully combine their unique skills and lead the field in offering minimally invasive solutions to patients with spinal deformity conditions.

The spine radiosurgery program, led by Dr. Gerszten, is one of the most experienced centers in the world in providing a highly effective, safe, and painless method of treating a wide variety of malignant and benign spine and paraspinal tumors without the need for open surgery.

Dr. Kojo Hamilton joined the team in the summer of 2014 bringing a unique expertise in the fields of spine trauma and cervical deformity correction. He has been tasked with facilitating academic protocols and instruction throughout the expanding healthcare system.

Within the division is the Center for Surgical Pain Management led by John J. Moossy, MD. This program provides a variety of surgical options for the management of medically intractable pain syndromes. The range of treatment varies from neuroaugmentation (i.e., spinal cord stimulation and intrathecal opioids) to surgical decompression and ablative procedures.

**Center for Image-Guided Neurosurgery**

The Center for Image-Guided Neurosurgery, led by L. Dade Lunsford, MD, incorporates the expertise of individuals in image-guided stereotactic and functional neurosurgery, brain tumor surgery, Gamma Knife radiosurgery, neuro-oncology, radiation oncology and neuroradiology. Ajay Niranjan, MD, MBA, is associate director of the center. Edward Monaco III, MD, PhD, joined the center in July of 2013. The goal of the center is to provide quality patient care using minimal access or minimally invasive stereotactic and radiosurgery technology, high resolution neuroimaging and advanced computer systems. In 1981, the center was the first U.S. center to install a dedicated computed tomography (CT) scanner in a unique stereotactic operating room suite. The suite was updated in 2009.

As the first North American group to initiate a clinical program for Gamma Knife stereotactic radiosurgery in 1987, the Center for Image-Guided Neurosurgery continues to be a leader in this field. Currently two Gamma Knife units are located at UPMC Presbyterian. Our center owns the distinction of being one of the few clinical sites in the world with two clinical units. In the fall of 2007, the Leksell Gamma Knife Perfexion™ was installed here. This newest generation Gamma Knife unit incorporates advanced robotics, expands the role of radiosurgery to include extracranial targets, provides greater patient access, and enhances patient safety. Gamma Knife technology represents one of the most advanced means available to help patients with brain tumors, arteriovenous malformations (AVMs), and pain or movement disorders. More than 12,700 patients have undergone stereotactic radiosurgery at UPMC Presbyterian. In addition, spinal radiosurgery using several radiosurgical systems is offered under the direction of Peter Gerszten, MD, who serves as the Peter E. Sheptak Endowed Chair in Spinal Neurological Surgery.

The Center for Image-Guided Neurosurgery is also an international training site for radiosurgery and minimally invasive neurosurgery, holding six weeklong training courses per year. Over the last 20 years, more than 1,700 neurosurgeons, neurootologists, radiation oncologists, medical physicists, and nurses have been trained at this center. These courses are among the highest rated post-graduate courses offered at the University of Pittsburgh.
Department Overview

The center also has a dedicated Elekta NeuroMag® magnetoencephalography (MEG) unit that performs brain mapping in patients with structural brain lesions, epilepsy, trauma, and degenerative brain disorders. Dr. Niranjan is the operations director of the MEG project.

In addition, the center conducts numerous clinical, long-term outcome research projects and is the coordinating center for the North American Gamma Knife Consortium (NAGKC), a multi-institutional international clinical cooperative group of centers of excellence performing stereotactic radiosurgery using the Leksell Gamma Knife. The NAGKC currently has members from the US, Canada, and Taiwan. Multiple retrospective clinical trials have been published or are underway. Three prospective clinical trials have begun. More than 5,000 articles have now been published worldwide in the field of stereotactic radiosurgery. The University of Pittsburgh has the highest number of studies that have been cited more than 100 times. More than 500 peer reviewed articles, several hundred book chapters, and eleven books have been published by individuals affiliated with this center since it opened in 1981.

This multidisciplinary center includes the clinical and research efforts of neurosurgeon Hideyuki Kano, MD, PhD, and radiation oncologists John Flickinger, MD; Yoshio Arai, MD; Susan Rakfal MD, Duk il Sung, MD, and Melvin Deutsch, MD. The participating medical physics group consists of Andy Xu, PhD; Jagdish Bhatnagar, ScD; Mubina Quadar, PhD; Jong Oh Kim, PhD, and Greg Bednarz, PhD. Grace Yum provides assistance in medical informatics.

More than 100 US or international fellows have received training at this center since 1987. The center provides an opportunity for advanced training in image-guided surgery and stereotactic radiosurgery at the fellowship level. This one-year opportunity is approved by the Society of Neurological Surgeons Committee on Advanced Specialty Training (CAST).

• Pediatric Neurosurgery

The Pediatric Neurosurgery Division at Children’s Hospital of Pittsburgh of UPMC is led by Ian Pollack, MD, and includes three other full-time faculty, Elizabeth Tyler-Kabara, MD, PhD, Stephanie Greene, MD, and Mandeep Tamber, MD, PhD. The division provides care for children with tumors, spinal and cranial deformities, vascular malformations, spasticity and epilepsy, and peripheral nerve disorders, and has gained international recognition for the treatment of pediatric brain tumors, cerebral palsy and traumatic brain injury.

The center’s neurosurgeons work closely with specialists in pediatrics, surgery, radiation therapy, oncology, physical therapy, orthopedics, plastic surgery, critical care and social services. Through its neuro-oncology program, the center provides comprehensive, multi-disciplinary care for patients with brain and spinal cord tumors, in collaboration with the oncology and radiation therapy programs. Patients may be eligible for treatment in one of many innovative research protocols at Children’s Hospital. These protocols—several of which are unique to Children’s or available at only a few centers throughout the country—provide Children’s patients access to new treatments and promising studies. Dr. Pollack is the institutional principal investigator and chair of the Neurosurgery Committee in the Pediatric Brain Tumor Consortium, supported by the National Cancer Institute to perform cutting-edge clinical trials in children with brain tumors, and serves as the principal investigator on several studies involving vaccine-based immunotherapy for children with challenging brain tumors.

In addition, Dr. Tyler-Kabara has helped to pioneer the use of endoscopic endonasal approaches to the skull base in the pediatric population. Children’s Hospital offers this minimally invasive approach to skull base pathologies even in children under the age of five. The clinical program is augmented by NIH-funded, laboratory-based research initiatives examining molecular markers of prognosis and novel treatment strategies in patients with glial tumors and ependymomas.
The division is an integral collaborator in the Cleft-Palate and Craniofacial Center in the management of children with craniofacial disorders. Because children with complex craniosynostosis often require a staged approach to the treatment of their cranial, midfacial and lower facial deformities, close multidisciplinary follow-up is maintained throughout childhood and adolescence in order to optimize long-term functional and cosmetic outcome.

The Surgical Epilepsy Program is the only center in the region able to provide comprehensive evaluation and surgical treatment options for children with intractable epilepsy. Dr. Tamber, the lead epilepsy neurosurgeon, collaborates closely with epileptologists within the Division of Pediatric Neurology. A comprehensive pre-surgical evaluation, using state-of-the-art neuro-imaging resources, is carried out to identify the specific site in the brain causing seizures and to determine its relationship to important functional areas of the brain. Surgical candidates benefit from a full spectrum of treatment options, ranging from lesionectomies (guided by intraoperative electrocorticography), tailored cortical resections following a period of invasive subdural EEG monitoring, corpus callosotomies and hemispherectomies. Other patients may benefit from vagus nerve stimulation. Children’s Hospital of Pittsburgh of UPMC has implanted more than 350 vagus nerve stimulators (VNS) making it one of the busiest VNS programs in the country.

The program is also involved in cutting edge clinical and basic research focused on developing and applying new and improved treatments for children with movement disorders. The Spasticity and Movement Disorders Clinic, led by Dr. Tyler-Kabara, is made up of a team of pediatric medical professionals who specialize in the comprehensive, multidisciplinary evaluation and treatment of children and young adults with spasticity and other movement disorders, such as dystonia, chorea, athetosis and tremor. The purpose of the clinic is to determine whether a patient would benefit from treatment with oral medications, intrathecal baclofen, selective dorsal rhizotomy, intramuscular botox injection, deep brain stimulation or other therapies.

The division is also actively involved in the Brain Trauma Research Program, the Fetal Diagnosis and Treatment Center, the Vascular Anomalies Center and the Brachial Plexus Program. A landmark study, the MOMS (Management of Myelomeningocele Study) trial, was published in the New England Journal of Medicine in February 2011, revealing exciting improvements in the outcomes of children with spina bifida who underwent fetal surgery when compared to those who underwent traditional open surgery shortly after birth. In conjunction with a team of specialists at Magee-Womens Hospital, Dr. Greene has established a program to treat babies with myelomeningocele, or spina bifida, with in utero surgery here in Pittsburgh. Babies who are not candidates for in utero surgery undergo conventional closure of the defect within several days of birth. These children are seen throughout childhood by a multidisciplinary team of medical professionals in the Spina Bifida Clinic at Children’s Hospital of Pittsburgh, one of the largest such clinics in the country. Expectant mothers are counseled in the pediatric neurosurgery clinic if prenatal imaging reveals a potential neurosurgical abnormality.

The Brachial Plexus Birth Injury Clinic—run through the division of pediatric plastic surgery—manages infants with birth injuries to the brachial plexus in a collaborative fashion with specialists from neurosurgery, plastic surgery, orthopedic surgery, and physical and occupational therapy. Dr. Greene and Lorelei J. Grunwaldt, MD of plastic surgery perform the necessary operations on infants together, bringing their different expertise to bear on the problem in a collaborative fashion. Children’s Hospital of Pittsburgh is one of a handful of centers in the country that have a dedicated multidisciplinary clinic for these patients. Patients with peripheral nerve tumors or injuries are seen by Dr. Greene outside of the Brachial Plexus Program.
Dr. Tamber has worked to include Children’s Hospital of Pittsburgh of UPMC in several large multi-center clinical networks that are dedicated to the study of common pediatric disorders. CHP is a member of the Hydrocephalus Clinical Research Network, a group of seven premier pediatric neurosurgical departments in North America that are dedicated to designing and undertaking field-changing prospective research into pediatric hydrocephalus. In addition, CHP has been selected as a member institution in the Park-Reeves Syringomyelia Research Consortium, a group dedicated to solving important clinical problems within the realm of Chiari malformation and syringomyelia. Dr. Tamber is the institutional Principal Investigator for both of these endeavors.

Patients with vascular anomalies such as aneurysms, arteriovenous malformations, cavernous malformations, and moyamoya syndrome are managed by Dr. Greene. Select patients undergo further evaluation at the department’s Center for Image-Guided Neurosurgery with L. Dade Lunsford, MD, for possible radiosurgical treatment, angiography by Brian Janowitz, MD, for further definition of anomalies and possible embolization of feeding vessels to reduce blood flow to a malformation, and assessment by a vascular neurologist for management of seizures, dystonia, and coagulopathies that may be identified during the course of the evaluation process. Such comprehensive evaluation best identifies those patients who would benefit from surgical intervention. Patients with vascular problems involving more than one organ system, or those with syndromes such as Sturge-Weber or PHACES, are seen in the multidisciplinary Vascular Anomalies Clinic, one of the largest of its kind in the country.

**Brain and Spine Injury Program**

The Brain and Spine Injury Program consists of a number of programs developed to better understand and treat the problems associated with traumatic injury to the central nervous system, brain and spinal cord, in both adults and children.

The department’s adult clinical neurotrauma division, led by David Okonkwo, MD, PhD, remains a world leader in the treatment of and research into traumatic brain injury. The neurotrauma service works closely with integral colleagues from the Trauma Division, Critical Care Medicine, Neurophysiology, Neuroradiology, and Physical Medicine and Rehabilitation to provide the most sophisticated treatments available to persons suffering from traumatic brain injury.

The spine trauma program continues to evolve. The department collaborates with investigators worldwide through the international Spine Trauma Study Group to advance the evaluation, treatment and outcomes of patients suffering traumatic injuries of the spinal column and spinal cord. The Neurotrauma Clinical Trials Office provides the infrastructure necessary to carry out the large number of active research protocols ongoing within the program.

Clinical efforts in traumatic brain injury are conducted in collaboration with research carried out through the Brain Trauma Research Center (BTRC) under the direction of C. Edward Dixon, PhD. The BTRC is a multidisciplinary, multidisciplinary research program aimed at improving outcome following severe traumatic brain injury. Research conducted both at the center and at other brain injury research programs clearly demonstrates the potential for improving outcome using therapies designed to treat biochemical derangements that occur following impact to the brain. The BTRC has pioneered efforts using temperature manipulation and cerebral blood flow monitoring in the treatment of severe head injury and has conducted landmark investigations into the mechanisms of induction and recovery of head trauma and secondary injury.

The Pediatric Neurotrauma Center (PNTC), under the leadership of Michael J. Bell, MD (Critical Care Medicine) and Mandeep Tamber, MD, PhD, has both basic science and clini-
Department Overview

cal research programs aimed at understanding the pediatric response to neural injury, as well as the unique elements of recovery that are specific to traumatic central nervous system injuries in children. This section coordinates services for injured children at Children’s Hospital of Pittsburgh of UPMC, which operates the region’s only Level I pediatric trauma center. The goal of the center is to provide optimal care between the time of injury and discharge. Sub-specialists in all pediatric medical and surgical disciplines are readily available to provide definitive care. As one of the most established and comprehensive programs in the country, the PNTC has been at the forefront of pediatric neurotrauma research not only locally but also nationally and internationally, serving as an important resource for collaborative programs such as multi-institutional clinical trials designed to improve outcomes, as well as efforts aimed at developing consensus clinical guidelines for the care of children with traumatic neurological injury. Research is progressing at a vigorous pace, with the implementation of several new phase I/II clinical trials, the start of a comparative effectiveness study to discern barriers to implementation of evidenced-based guidelines and the continuing support of a T32-training grant in pediatric neurocritical care.

• Brain Stimulation and Epilepsy Surgery Program
The Brain Stimulation and Epilepsy Surgery Program at the University of Pittsburgh, directed by Mark Richardson, MD, PhD, encompasses the treatment of movement disorders, obsessive-compulsive disorder and epilepsy. These brain diseases are similar in that successful neurosurgical treatment requires an expert understanding of the involved brain networks and their potential for modulation by functional neurosurgical procedures, as well as multidisciplinary teams that deliver surgical care to these special groups of patients.

Our department is the only one in Pennsylvania that offers both awake, frame-based deep brain stimulation (DBS) and asleep, interventional-MRI based DBS to treat Parkinson’s disease, essential tremor, Dystonia (including Meige syndrome), and pediatric movement disorders.

UPMC Presbyterian houses the region’s foremost center for the comprehensive neurosurgical treatment of all types of adult epilepsy, including epilepsy caused by lesions visible on MRI (sclerosis, dysplasia, brain tumors, cavernous malformations) and epilepsy where the seizure onset location is not obvious and must be discovered by intracranial monitoring. Part of the University of Pittsburgh Comprehensive Epilepsy Center, the surgery program offers the latest treatments for patients suffering from multiple types of epilepsy, in coordination with colleagues in the Epilepsy Division of the Department of Neurology.

• Center for Clinical Neurophysiology
The Center for Clinical Neurophysiology (CCN) at UPMC was organized in 1981 to serve as an interdepartmental resource serving then-Presbyterian University Hospital, Montefiore Hospital and Children’s Hospital of Pittsburgh. At that time, CCN was composed of just a few clinicians providing diagnostic testing and intraoperative monitoring (IOM) services for only very specific surgeries in the neurosurgical and orthopedic disciplines.

The service has now grown to providing more than 7,000 IOM cases per year at all UPMC pavilions, as well as supporting UPP surgeons at non-UPMC hospitals. The use of IOM at UPMC reaches across many surgical disciplines and has proven to be an invaluable adjunct not only in adult and pediatric neurosurgical procedures but also in orthopedic, ENT, vascular, cardiothoracic and interventional neurological procedures.

The Center for Clinical Neurophysiology and its highly trained and nationally renowned faculty and technical staff’s primary goal is to provide high quality service in a cost-efficient manner.
Department Overview

manner to the UPMC patient population. The center focuses on interdisciplinary research to improve the understanding and the value of IOM to predict and prevent nerve injury. In addition, faculty teach undergraduates, medical students, residents and fellows the value of IOM during surgical procedures.

The CCN is the largest and busiest academic IOM program in the country, providing services at 12 UPMC hospitals including UPMC Hamot. In addition, the CCN provides professional and technical coverage at Mon Valley and Jameson Hospitals. Center faculty is able to achieve this service expansion to community hospitals through the use of telemedicine technology. Patients in community hospitals, more than 100 miles away, can receive the same quality care without having to travel to Pittsburgh.

Intraoperative multimodality monitoring at UPMC includes expertise in somatosensory evoked potentials (SSEP), brainstem auditory evoked potentials (BAEP), motor evoked potentials (MEP) and electromyography (EMG).

Direct peripheral nerve recordings also are performed, as well as single unit micro-electrode recordings performed during placement of DBS electrodes in various subcortical structures. EEG is also used to monitor cerebral function and ischemic risk during cerebral and peripheral vascular procedures, including cerebral aneurysm treatment, carotid endarterectomy and a variety of cardiothoracic procedures.

EEG recorded directly from the pial surface of the brain, or Electrocorticography (ECoG), is used to help determine resection margins in epilepsy surgery, and to monitor for seizures during direct electrical stimulation of the brain surface carried out while mapping eloquent cortex in awake patients. In addition to providing IOM services, the CCN also performs diagnostic evoked potential testing, and transcranial Doppler studies.

The center’s greatest source of pride is that it is able to provide a high quality service at a significantly lower cost to all the patients. It is able to achieve this high quality service by constantly evaluating and improving the service through quality improvement programs. With support from Procirca, the center is able to constantly look for cost efficient ways to provide care to its patients.

The center’s cutting-edge research efforts and publications have shown the application of multimodality intraoperative neurophysiological monitoring during various peripheral and central nervous system operative procedures. It will continue to provide an additional element of high quality care for patients, ultimately reducing morbidity and, thereby, establishing cost savings for the health system.

• Community Neurosurgery
The University of Pittsburgh Department of Neurological Surgery Community Division provides state-of-the-art neurosurgical care in community hospitals in the greater Pittsburgh area, offering excellent care in an environment close to family and friends. Community neurosurgeons see patients and provide advanced clinical care in an area stretching from Ohio to Indiana, PA, and from West Virginia to Erie. These physicians offer a wide range of subspecialty skills, including minimally invasive neurosurgery, general and complex spine surgery, peripheral nerve surgery, and brain and vascular neurosurgery. This local initiative is offered to help provide convenience for the community and to promote an atmosphere of reassurance and comfort for the patient.
Accomplishments of Note in Fiscal Year 2013-14

July 2013
- The University of Pittsburgh Department of Neurological Surgery was ranked among the top 10 best neurosurgery programs in the country in a poll published in *U.S. News & World Report* magazine. The rankings appear as part of the magazine’s annual America’s Best Hospitals article analyzing more than 200 top medical centers in 17 specialties.
- Peter Gerszten, MD, MPH, was interviewed for the online journal *eCancerTV*, July 30, regarding spine radiosurgery.
- Daniel Wecht, MD, was named chief of neurosurgery at UPMC Shadyside.

September 2013
- Joseph Maroon, MD, was featured in a *Pittsburgh Post-Gazette* article that discussed how antibiotics can relieve back pain caused by bacterial infections.
- Parthasarathy D. Thirumala, MD, coordinated a visit to UPMC Presbyterian by U.S. Rep. Keith J. Rothfus (R-Pa) to help the congressman learn more about the health system’s advanced neurological services including cognitive care, neurology, neurological surgery and telemedicine service lines.
- R. Mark Richardson, MD, PhD, and Donald Crammond, MD, were featured on *Al Jazeera’s* medical show *The Cure* in a segment that focused on deep brain stimulation.
- The Neuromag—the state-of-the-art neuromagnetic recording system available at the UPMC Brain Mapping Center—co-directed by Ajay Niranjan, MD, and Avniel Ghuman, PhD, was featured in a PBS neuroscience documentary.

October 2013
- The high definition fiber tracking lab work of Juan Carlos Fernandez-Miranda, MD, was featured on the October 2013 cover of *Cerebral Cortex* magazine.
- David Okonkwo, MD, PhD, was one of a number of investigators from 20 institutions across the country receiving funding in a major $18.8 million, five-year National Institutes of Health (NIH) study on traumatic brain injury.
- Parthasarathy D. Thirumala, MD, was elected president of the Pennsylvania Neurological Society.
- Joseph Maroon, MD, completed his fifth Hawaiian Ironman World Championship Triathlon in Kona Hawaii, with a time of 16 hours, 3 minutes and 48 seconds. Dr. Maroon was also featured in a *Muscle & Body* feature article, and a Steelers.com article that examined how he prepared for the Ironman. He was also a guest on the KDKA Radio *Morning News Show* talking about his preparation for the race.
- Robert Friedlander, MD, received a $100,000 grant from The Pittsburgh Foundation and from LiveLikeLou.org to fund research into amyotrophic lateral sclerosis, the neurodegenerative disease also known as ALS or Lou Gehrig’s disease.

November 2013
- Peter C. Gerszten, MD, MPH, co-edited the book, *Controversies in Stereotactic Radiosurgery: Best Evidence Recommendations*, a 277-page look into an evidence-based approach to stereotactic radiosurgery for the brain and spine. Published by Thieme, the book was also co-edited by Jason Sheehan, MD, co-director of the Gamma Knife Center at the University of Virginia. Other contributors to the book included L. Dade Lunsford, MD, Ajay Niranjan, MD, and Edward A. Monaco III, MD, PhD.
Department Overview

- Jackie Smith a physician assistant at CHP was featured in a *Pittsburgh Tribune Review* article spotlighting her efforts to help raise awareness of esophageal cancer.

**December 2013**
- Desiree Playso-Doyle, division administrator, received the American College of Healthcare Executives Senior Level Healthcare Executive’s Regent Award. The award recognizes ACHE members who have made significant contributions to the advancement of healthcare management excellence.

**January 2014**
- Jonet Vacsulka, RN, Gamma Knife® nurse coordinator, received UPMC’s 2013 Dignity and Respect Champion Award for her efforts in building and sustaining a work environment in which everyone feels included, valued, and appreciated. The award recognizes and honors UPMC staff for their commitment to the UPMC core value of dignity and respect, creating the best experience for patients, families and employees.
- Robert M. Friedlander, MD, was quoted in a Hubbard (Ohio) *Soaring Eagle* article that detailed the brain tumor surgery of one his patients.
- Andrew Ducruet, MD, was a recipient of the NINDS Neurosurgeon Research Career Development Award for 2014-16.

**February 2014**
- Parthasarathy D. Thirumala, MD, was promoted to clinical associate professor of neurological surgery and neurology.
- Adam S. Kanter, MD, was promoted to associate professor of neurological surgery.
- Joseph Maroon, MD, reached the summit of Mt. Kilimanjaro, in the first ever climb of Africa’s tallest mountain by 10 amputees, serving as the expedition’s medical advisor.
- Robert Friedlander, MD, was among several University of Pittsburgh researchers to receive a major $3.5 million grant award from the DSF Charitable Foundation. Part of the award will help fund a project looking for drugs that can affect the function of mitochondria, the so-called powerhouses of cells.

**March 2014**
- David Okonkwo, MD, PhD, was noted in a NBC.com article that discussed a promising new drug, progesterone, utilized in traumatic brain injury research.
- Stephanie Greene, MD, was quoted in a *Pittsburgh Tribune Review* article commenting on arteriovenous malformation (AVM) surgery in a 14-year-old patient.

**April 2014**
- Adnan Abla, MD, Daniel M. Bursick, MD, Matt El-Kadi, MD, PhD, Johnathan Engh, MD, Juan C. Fernandez-Miranda, MD, Robert M. Friedlander, MD, Paul A. Gardner, MD, Adam S. Kanter, MD, L. Dade Lunsford, MD, Joseph C. Maroon, MD, John J. Moossey, MD, David O. Okonkwo, MD, PhD, Ian Pollack, MD, Raymond Sekula, MD, and Elizabeth Tyler-Kabara, MD, PhD, were named among this area’s top doctors in their field in a national survey published locally in *Pittsburgh Magazine*.
- PGY-3 resident Georgios Zenonos, MD, received the Robert J. Dempsey, MD, Cerebrovascular Award from the AANS/CNS Section on Cerebrovascular Surgery for his research study “Evaluation of Plasma miRNAs as Early Clinical Biomarkers of Carotid Plaque Vulnerability.”
Robert M. Friedlander, MD, was an honored guest of Serbia’s Crown Prince Alexander, Crown Princess Katherine and Michael D. Kirby, the United States Ambassador to Serbia, April 29, in Belgrade, Serbia, as a tribute for his work in developing collaborative medical partnerships with the eastern European country.

Robert M. Friedlander, MD, completed his tenure as chair of the AANS/CNS Joint Section of Cerebrovascular Surgery.

May 2014

Researchers at the University of Pittsburgh, led by Robert M. Friedlander, MD, released a study identifying for the first time a key molecular mechanism by which the abnormal protein found in Huntington’s disease can cause brain cell death. The results of these studies, published in *Nature Neuroscience*, could one day lead to ways to prevent the progressive neurological deterioration that characterizes the condition.

R. Mark Richardson, MD, PhD, was a guest on the KDKA Radio *Morning News Show* talking about the use of deep brain stimulation in treating the symptoms of Parkinson’s disease and other movement disorders. He was also featured in numerous media outlets across the country discussing DBS.
Future Initiatives

**Jeffrey Balzer, PhD**  
Associate Professor of Neurological Surgery, Neuroscience & Acute and Tertiary Care Nursing  
Associate Director for Clinical Services  
Director of Cerebral Blood Flow Laboratory

In addition to continuing the basic and clinical research outlined in his research summary (see page 205), Dr. Balzer and collaborators have submitted a grant that will be a follow-up to the genetic biomarker work where they will attempt to categorize SAH patients according to whether or not they have cerebrovascular reserve and then correlating positive and negative reserve to the genetic marker library that has already been developed. Further, Dr. Balzer will investigate differential post SAH treatment arms based on vascular compliance and genetic predisposition. This data may lead to potential interventions based on genetic profiling as well as patient categorization based on reserve and not just on Hunt and Hess and Fisher grade.

**Diane L. Carlisle, PhD**  
Assistant Professor of Neurological Surgery

The future goals of the developmental studies includes teasing out the molecular signaling pathways responsible for nicotine-caused changes in development, and the future goals of the drug studies are to continue to advance the use of patient-derived neurons for drug discovery in ALS, and to expand the study to Huntington’s Disease.

**C. Edward Dixon, PhD**  
Professor of Neurological Surgery, Anesthesiology, Neurobiology & Physical Medicine and Rehabilitation  
The Neurotrauma Chair in Neurosurgery  
Vice Chairman, Research  
Director, Brain Trauma Research Center  
Research Health Scientist at the Geriatric Research, Education and Clinical Center in the Veteran’s Affairs Pittsburgh Health Care System

Dr. Dixon’s future studies will evaluate the role of proteins involved with SNARE (soluble N-ethylmaleimide-sensitive factor attachment protein receptor) protein assembly after traumatic brain injury. These include cysteine string protein alpha and native alpha-synuclein. He will also continue work with Operation Brain Trauma Therapy to screen addition drug on his CCI (Controlled Cortical Impact) model. He will also work closely with R. Mark Richardson, MD, PhD, and Samuel Shin, MD, to evaluate deep brain stimulation protocols in experimental TBI.

**Matt El-Kadi, MD, PhD**  
Clinical Professor of Neurological Surgery  
Vice Chairman  
Chief of Neurosurgery, UPMC Passavant

Over the next year, Dr. El-Kadi plans to continue to expand his clinical database to include multilevel cervical and lumbar spine surgeries. These large, blind databases allow for the potential to find significant patterns. Future study goals include evaluating risk factors for hardware failure in the cervical spine, the effect of obesity and body mass index for cervical and lumbar spine surgery, evaluating the effect of ASA class on hospital stay and complications, and continuing to evaluate factors to attempt to reduce overall hospital stay.
Johnathan Engh, MD
Associate Professor of Neurological Surgery
Director, Neuroendoport Surgery Program
Director, Adult Neurosurgical Oncology

Through the Center for Medical Innovation at the University of Pittsburgh, Johnathan Engh, MD, has partnered with Anne Robertson, PhD, of the Swanson School of Engineering. Their team has built the first prototypes of a dilatable endoscopic port for brain surgery, and tissue phantom testing is currently being performed. Plans are in place to apply for NIH funding at the end of the year.

In addition, the Walter L. Copeland Fund of the Pittsburgh Foundation has supported further research into steerable needles in a porcine model, which will commence in the summer of 2014.

Avniel Singh Ghuman, PhD
Assistant Professor of Neurological Surgery
Director, MEG Research

Dr. Ghuman recently demonstrated important aspects of the dynamics of face and word processing in the human temporal lobes (see research activities). His future work will extend these findings in two important ways. First, these regions do not act in isolation in service of face and word recognition and instead recognizing faces and words requires a network of brain regions working together. Determining the dynamics of these network-level processes is a key future initiative of Dr. Ghuman’s lab. Second, now that these dynamics have been described, an important question is how are they disturbed in individuals with face and word pathologies. Over the next year, Dr. Ghuman will use MEG to examine the dynamics face and word recognition in individuals with autism spectrum disorders.

Now that we have a working set of atomic-based MEG sensors, we are planning a number of proof-of-principle studies to demonstrate their utility in measuring a number of different biological signals, including sensory-related brain activity, infant neural and cardiac activity, and, ultimately, fetal neural and cardiac activity.

In addition, Dr. Ghuman is involved in a number of ongoing and future projects with members of the Pittsburgh neuroscience community in his role as director of MEG research.

L. Dade Lunsford, MD
Lars Leksell Professor and Distinguished Professor
Director, Center for Image-Guided Neurosurgery
Director, Residency Training Program

Dr. Lunsford will collaborate with the development of the Leksell Gamma Knife Registry as well as a joint venture between ASTRO and the AANS, which is organizing a long-term data-based registry for stereotactic radiosurgery.

A major project currently underway is the conversion of our current database to a sequel type registry. The registry will be populated with data to facilitate larger scale reviews in association with other national and international programs. In collaboration with UPMC, the Gamma Knife registry will appear as an application that in time may be used by researchers and patients alike.
Ajay Niranjan, MD, MBA
Associate Professor of Neurological Surgery
Director, UPMC-Brain Mapping Center (MEG)
Associate Director, Center for Image-Guided Neurosurgery
Director of Radiosurgery Research

Dr. Niranjan plans to conduct a multicenter phase II study of “Minocycline Therapy for Management of Adverse Radiation Effects (ARE) after Brain Metastases Radiosurgery.” The proposed study would be a single arm clinical trial to evaluate effectiveness of minocycline in improving ARE. Brain metastases patients with documented AREs after radiosurgery will be evaluated for eligibility to participate in this study. All subjects (N=40) will be treated with minocycline (100mg twice a day) for three months in addition to the standard treatment. We anticipate recruiting a total of 40 patients over two years. In this study the investigators will study whether administration of minocycline can reduce the total volume of T2 signal change (as seen on MR at the time of ARE diagnosis) and post contrast enhancement of lesion within six weeks following treatment. The hypothesis is that minocycline will significantly reduce the brain edema burden associated with ARE as well as the mass effect.

Daniel R. Premkumar, PhD
Research Assistant Professor of Neurological Surgery

Dr. Premkumar’s ongoing studies have focused on counteracting aberrant signaling as a therapeutic strategy for gliomas. Protein synthesis and degradation is a tightly regulated process that is essential for cellular homeostasis. Most intracellular proteins are degraded by the proteasome. Many proteasome target proteins, such as cyclins, tumor suppressor protein p53, pro-apoptotic protein Bax, the cyclin-dependent kinase inhibitor (CKI) p27, and the inhibitor of NF-κB, IκB-α, are involved in important processes of carcinogenesis and cancer survival. Proteasome inhibition in cancer cells leads to accumulation of pro-apoptotic target proteins and induction of cell death. The clinical efficacy of bortezomib in solid tumors and other hematologic malignancies lends credence to the concept that targeting the proteasome is a promising strategy for cancer treatment.

Shengjun Ren, PhD
Assistant Professor of Neurological Surgery

Dr. Ren is going to further investigate the role of cyclin C-regulated cell cycle reentry in the initiation of neuronal death. Another main focus is studying the potential role of cyclin-dependent kinase (CDK) inhibitors in the blockade of neuronal death initiation. He is also working on developing a system to correct different diseases and different patient gene mutations using CRISPR/Cas9-directed genome editing.

Raymond F. Sekula Jr, MD
Assistant Professor of Neurological Surgery
Director, Cranial Nerve Disorders Program

Not all patients with trigeminal neuralgia symptoms have pain caused by vascular compression of the trigeminal nerve and, unfortunately, this class of patients is difficult to treat. Dr. Sekula has partnered with Michael Gold, PhD of the University of Pittsburgh Department of Anesthesiology and has begun a project aimed at helping to understand the mechanism of pain in trigeminal neuralgia patients without vascular compression. Dr. Gold, an international authority on pain and nerve “chanellopathies,” and Dr. Sekula have developed a project aimed at understanding mechanisms responsible for trigeminal neuralgia. They are
investigating the role of sodium channels in the trigeminal nerves of those with all types of trigeminal neuralgia. This project was planned in 2013 and begun 2014. The center has recruited a senior scientist, with particular expertise in this area, to help move the project along.

**Mingui Sun, PhD**  
*Professor of Neurological Surgery, Bioengineering and Electrical Engineering*

The development and evaluation of a novel wireless EEG Monitoring Sensor—which has been approved for funding by the Center for Medical Innovation (CMI) at the University of Pittsburgh—aims to develop a wireless EEG system to provide critical point-of-care information about brain electrical activity. A novel dry electrode, which can be installed rapidly, is used to acquire EEG from the scalp. A wireless data link between the electrode and a data port (i.e., a smartphone) is established based on Bluetooth technology. A prototype of this system has been implemented and its performance in acquiring EEG has been evaluated. Dr. Sun's current interest is to further improve the performance of this system while minimizing its physical dimension.

**Parthasarathy D. Thirumala, MD**  
*Clinical Associate Professor of Neurological Surgery & Neurology  
Co-Director, Center of Clinical Neurophysiology*

Carotid endarterectomy (CEA) is the gold-standard treatment for individuals with symptomatic carotid stenosis. There appears to be a clear benefit for CEA in symptomatic patients (usually with carotid stenosis ≥ 70%) when compared to medical management alone. At the five-year mark, 85-90% of patients treated with CEA are stroke free in comparison to medical treatment, which holds a rate of 75-80%. However, studies have shown 2-3% of CEA cases result in an ischemic event. These are mainly thought to be a result of thromboembolic events from the operative and/or distal site as a result of atherosclerotic plaque disruption or from cerebral hypoperfusion due to cross clamping of the internal carotid artery in conjunction with inadequate collateral circulation.

Intraoperative intraluminal shunting has been used during CEA in order to prevent cerebral hypoperfusion and impending ischemia during the cross clamping of the carotid artery. In conjunction, intraoperative monitoring, with somatosensory evoked potential (SSEP), has been shown to be a valuable technique for determining the need for selective intraoperative shunting in place of routine shunting in all patients. SSEP monitoring allows for adequate assessment of collateral circulation and the need for insertion of a shunt.

A shunt is generally inserted if there is a "significant change in response of the SSEP waveform," which is a greater than 50% decrease in the amplitude of the cortical N20-P25 complex and/or 10% increase in latency of cortical wave after cross clamping of the carotid artery. Unfortunately, strokes still occur despite these preventive measures. Moreover, the predictive value of neurologic outcome of SSEP changes which persist after the placement of a shunt remains unclear. Such information could offer a very helpful avenue for surgeons during the CEA procedure to detect shunt malfunction as well other events of hypoperfusion which can lead to post-operative stroke. Furthermore, the predictive values of SSEP changes can help effectively test newer mechanical and pharmacological neuroprotection.

Researchers plan to do a systematic review the scientific literature in order to evaluate whether changes in SSEPs during CEA are diagnostic for post-operative outcomes (neurological deficits). The goal of this review is to ascertain the sensitivity, specificity, diagnostic odds
ratio, and area under receiver operating characteristic (ROC) curves of the intraoperative SSEP changes in relation to neurological outcome in patients undergoing CEA for symptomatic carotid stenosis.

- Sensitivity and specificity of neurophysiological changes to detect iatrogenic neurological injury in laboratory animals

Currently, patients undergo decompressive cervical and thoracic spine surgery to alleviate symptoms including paresthesia, numbness, and mild weakness. However, one of the major risks of decompressive cervical and thoracic spinal cord surgery is the potential for iatrogenic spinal cord injury (SCI), which may result in post-operative neurologic deficits. The morbidity related to the injuries leads to increased lengths of stay in the hospital as well contribute to significant mental stress in patients. Additionally, they result in financial strain on both the patient and the healthcare system. Intraoperative neurophysiological monitoring can prevent intraoperative SCI through the use of both somatosensory evoked potentials (SSEPs) and motor evoked potentials (MEPs), which have been shown to reduce the incidence of neurological deficits. Significant changes in SSEPs and MEPs are used to warn the surgeon of impending neurological injury, and allow the surgical team to respond early to any potential damage. Additionally, SSEPs and MEPs are utilized to monitor CNS integrity during intracranial surgery and have significant potential to reduce the iatrogenic injuries in those applications as well. Though intraoperative monitoring of the spinal cord can serve as a proxy for impending injury in many types of surgical procedures, it is limited by the surgical team’s response in the event that an injury is indeed detected. Currently, there is no evidence to support the efficacy of any one treatment in the event of an intraoperative SCI or brain injury.

The study researchers are proposing the following:

1) They will establish an animal model that suitably mimics the conditions observed in human iatrogenic SCI, and,

2) They will use the animal model to evaluate the efficacy of various therapeutic interventions in improving the neurologic deficits that ordinarily result from SCI. Researchers believe that this represents a critical milestone in the detection and treatment of intraoperative traumatic spinal cord injury. Additionally, it lays the groundwork for similar studies to investigate the efficacy of various treatments for intraoperative brain injuries.
Educational Programs
Educational Programs

The Department of Neurological Surgery provides medical education in a wide variety of forums at the University of Pittsburgh. The faculty contributes to undergraduate and graduate-level education at the university and to the continuing education of their professional colleagues.

Undergraduate Level
Selected faculty of the Department of Neurological Surgery participate in several undergraduate courses at the University of Pittsburgh. In addition, undergraduate students are offered shadowing opportunities with various faculty members while they evaluate and operate on patients at UPMC. To qualify undergraduate students obtain faculty permission and complete on line training courses related to patient confidentiality.

Medical Students
Faculty participate in teaching clinical neuroscience and neuroanatomy to first- and second-year University of Pittsburgh medical students. These students spend elective time doing clinical research with faculty members from various centers in the department. During their surgery core clerkship, third-year medical students may elect to take a two-week introductory subspecialty experience in neurosurgery.

Selective fourth-year medical students at the University of Pittsburgh, as well as visiting medical students from other schools, may elect to take a four-week clinical subinternship on the neurosurgery service, during which they participate in all phases of the training program, as well as in supervised patient care services. One-month clerkships offered to senior medical students from other medical schools attract five to 10 students each year. In their senior year, selective students may participate in ongoing research projects in the Department of Neurological Surgery under the supervision of an advisor. This experience trains students in basic neurosurgical research techniques and procedures and offers in-depth education in basic neurosciences. Other medical students seek a more formal and longitudinal exposure to neurosurgical investigation, and complete an approved scholarly project. Pitt medical students often use this educational opportunity as the base for their required graduation scholarly project.

The course Introduction to Clinical Neurophysiology exposes students to the Neurophysiology Laboratory, where they learn to use electrodiagnostic tools to study clinical neurological disorders in humans. Instruction also is provided in intraoperative and ICU monitoring. Students participate in patient testing and analysis of results, and they also can take part in research projects in electrophysiology and computational data analysis.

Graduate Students
The Department of Neurological Surgery offers a graduate-level experience in the use of advanced computer techniques in biological research. A course in bioengineering systems, offered to University of Pittsburgh first-year graduate students in electrical engineering, is also taught by department faculty. Various faculty participate in the training of masters-level physician assistants from Chatham University.

Residency Program
The Department of Neurological Surgery offers a seven-year (PGY 1-7) residency program that is internationally renowned as a training ground for exceptional neurosurgeons. Accredited by the UPMC Graduate Medical Education Council, as well as the Accreditation Council on Graduate Medical Education (ACGME), the program is currently approved to train 25 residents. The goal of the program is to provide exceptional clinical and scientific education to top-notch graduates of medical schools who wish to be future leaders in the field of neu-
Educational Programs

rological surgery in the United States. The program focuses on training to maximize medical knowledge, build patient care skills, and provide for practice based and systems based learning. The department stress professionalism and interpersonal and communication skills, and rely heavily on both inpatient and outpatient use of informatics.

The University of Pittsburgh Department of Neurological Surgery was founded more than 75 years ago with a strong commitment to patient care, education and research. Today, the department is the largest neurosurgical academic provider in the United States, performing nearly 8,000 procedures annually at UPMC academic hospitals and nearly 11,000 system wide.

A recent study published in the Journal of Neurosurgery showed that our department ranked first in academic output in top-tier specialty journals among all departments of neurosurgery across the United States and Canada. Another Journal of Neurosurgery article showed that our department ranked as the most productive residency program in the nation in terms of graduates remaining and contributing in academic neurosurgery. Still another article, published in informaHealthcare, showed that our stereotactic research effort was the most productive in the world.

Seventy-five years at the forefront of neurosurgical care have demonstrated that we are a proven international leader in patient care, research and training.

• PGY-1:
Residency training at the department begins with the first year experience. PGY-1 residents who enter the field as novices in neurosurgery will spend a total of six months on the clinical neurosurgical service, as well as three months on the clinical neurology service. First-year residents also will gain clinical experience on various surgical sub-specialties, such as otolaryngology, surgical subspecialties, critical care medicine and the emergency room.

• PGY-2:
The PGY-2 year represents an in depth introductory year to clinical neurosurgery and emphasizes basic operative techniques and initial clinical decision making. The department emphasizes the importance of the flow of information and communication between residents, senior residents and responsible faculty. PGY-2 residents routinely spend a block of three months on the cranial service, three months on the spine service, three months on the pediatric service and three months on the trauma service.

Most junior residents participate in more than 250 neurosurgical procedures during their first year. PGY-2 residents will complete basic training in many procedures, such as lumbar puncture, external ventricular drain placement, intracranial pressure monitor insertions and placement of cerebral blood flow technologies such as Licox monitors. Initial case experience includes the selection and identification of patients who will undergo craniotomy, routine spinal procedures and trauma cases.

In addition to nine months at UPMC Presbyterian, each PGY-2 resident will spend a period of three months on the pediatric neurosurgical service at Children’s Hospital of Pittsburgh of UPMC. Clinical judgment is enhanced by spending an average of one day per week in the physician outpatient office. Numerous midlevel providers, including physician assistants and nurse practitioners, provide support both on the hospital floors and in the outpatient clinics.
Educational Programs

• **PGY-3:**
The PGY-3 year emphasizes clinical experience in vascular neurosurgery (an initial introduction to endovascular and exovascular techniques), neuropathology and image-guided surgery (including radiosurgery, functional neurosurgery and neuro-oncology). Residents will also spend three months on the neuro-oncology service at UPMC Shadyside.

During the PGY-3 year, residents have a greater opportunity to consolidate their knowledge and to maximize supplemental reading and clinical reviews in preparation for a practice run of the written board examination (American Board of Neurological Surgery). This test is taken for practice in March of the PGY-3 year. Attendance at a training course in stereotactic radiosurgery, as well as initial experience in movement disorder, pain surgery and neuro-oncological surgery are obtained during this year. All residents also attend the annual Research Update in Neuroscience for Neurosurgeons (RUNN) course at Woods Hole, Mass. This course provides an annual exciting update on the future of neuroscience and is intended to catalyze residents to pursue neuroscience basic or clinical research.

• **PGY-4:**
In the PGY-4 years, senior residents in neurological surgery will gain additional experience in multiple cranial and spinal cases in order to reach the next set of milestones in their education. Consolidation of medical knowledge, enhanced patient care skills and intense practice-based learning will occur in this year. PGY-4 residents spend a significant portion of their time in the neurosurgical operating room. Increasingly difficult procedures are assigned to senior residents and include complex spinal procedures with instrumentation, craniotomies for intra-axial tumors, meningiomas and posterior fossa surgery. Residents spend eight to nine months on the adult service and three to four months as senior resident on the pediatric service. Typically a senior resident does between 400 and 500 cases per year.

• **PGY-5/6:**
The PGY-5 and PGY-6 blocks provides a total of 18-24 months of focused career development opportunities for senior residents. During this time, residents will spend between three and four months as the chief resident at the VA Pittsburgh Healthcare System where they will gain additional surgical and service management skills.

The remaining block of time is designed for residents to actively pursue research-focused subspecialty training, along with clinical investigation on topics that will eventually foster their subsequent career and provide benefit to the future course of neurosurgery. There are two paths for trainees in the PGY-5 and PGY-6 years: the Clinical Investigator Path and the Surgeon Scientist Investigator Path:

**Clinical Investigator Path:**

The clinical investigator path includes an 18-month period of time during the PGY-5 and PGY-6 year for focused subspecialty training. Residents must identify a primary mentor during the PGY-4 year. The resident in this path must have identified a clinical subspecialty focus that will supplement career development and submit an internal funding grant request (Copeland Grant) on a clinical topic. The resident must complete and submit six publications in peer-reviewed journals during this interval of time. Residents also will participate in the Clinical and Translational Science Institute (CTSI) Seminar Series. Residents are expected to present at the AANS (American Association of Neurological Surgeons), CNS (Congress of Neurological Surgeons) or subsection meetings relative to their clinical or scientific work.
Educational Programs

Surgeon Scientist Investigator Path:

During this interval of time, residents have between 18-20 months to further develop an academic research career, working in a functional and dedicated laboratory. Residents must identify a primary mentor during their PGY-4 year. They are expected to submit a Copeland Grant during their PGY-4 year on their research topic of choice. Residents in this path are able to submit for a national grant using existing mechanisms from the AANS, CNS, foundations or industry. Residents are expected to submit four to six peer-reviewed journal articles during this time. Residents also will have the opportunity to gain a master of science degree but must begin this process one year in advance. Selected residents who wish to obtain a PhD will be fully evaluated for this opportunity but must dedicate additional blocks of training time to complete such an advanced degree. All residents are expected to present their work at one or more national scientific meetings. During their PGY-6 year, residents are freed from responsibility from both outpatient and operating room coverage, except for elective and approved moonlighting performed on the UPMC Presbyterian neurological surgery service.

The University of Pittsburgh provides a wide spectrum of faculty mentors and opportunities for research in neurosurgery, neurology, neuroscience, psychiatry, physical medicine and rehabilitation, neuro-imaging, neuropathology, bioengineering, public health, and regenerative medicine (McGowan Institute of Regenerative Medicine). Research may be funded from numerous sources, including the Walter Copeland Fund of the department (which is administered by The Pittsburgh Foundation). Residents in the department’s program have competed successfully for AANS, CNS and American College of Surgeons grants. All residents are expected to write scientific papers and to supplement this with additional book chapters. Residents are expected to learn the principals of investigation under the supervision of faculty mentors.

Residents at all levels are expected to attend the departmental teaching conferences, which are mandatory. Neurosurgical knowledge is gauged by performance on written boards, as well as by semi-annual written evaluations and meetings. Each year a promotion to the next level of training is determined by the departmental competency review committee.

• PGY-7:
PGY-7 residents return to the service as chief residents on the clinical service at UPMC Presbyterian. Coverage responsibilities include chief of the cranial service, the spinal service and the trauma service. On average, chief residents perform 400-500 major cases during PGY-7, such as clipping of aneurysms, skull-based tumors, complex spine surgery, and posterior fossa surgery. As future practitioners of neurosurgery, they also learn responsibilities of clinical oversight of the service that they are leading. They serve as primary instructors to the younger residents. By the time of their completion of the chief year, residents often have performed more than 1,200 neurosurgical procedures as monitored by the ACGME online Accreditation Data System (ADS) database.

• General:
Residents in this program have a particularly unique experience in microneurosurgery, pediatric, endoscopic, and image-guided neurosurgery including radiosurgery. In addition to daily teaching rounds, led by individual members of the department faculty, the department holds a series of weekly resident conferences and review lectures to discuss specific neurosurgical concepts, techniques, problems and solutions. Both faculty and residents are regular participants in these programs, many of which include formal didactic presentations. The training program includes the following faculty/resident conference:
Educational Programs

Multidisciplinary Brain Tumor Board (weekly)
Chairman’s Conference (twice monthly)
Faculty Teaching Conference (weekly)
Image-Guided/Radiosurgery Conference (weekly)
Written Boards Preparation Conference
Patient Care Conference (weekly)
Pediatric Neurosurgical Conference (twice weekly)
Pituitary Conference (quarterly)
Residents’ Conference (weekly)
Visiting Professor Series (four to six per year)

The chief residents present the weekly patient care conference. Each resident also presents one or more annual 30-minute lectures on basic neurosurgical topics or recent research. To teach the skills required for the oral boards, several conferences use a board-simulated approach to presented cases. At least four times per year, an internationally known neurosurgeon serves as a lecturer and visiting professor. The visiting professor also reviews interesting cases with the residents and attends a journal club.

Trainees have been extremely productive during their clinical and non-clinical years. They commonly have five to 10 publications in refereed journals and multiple presentations at national meetings by the completion of their residency.

Since 1980, residents in the department have been awarded three Congress of Neurological Surgeons Preuss Awards for brain tumor research, two CNS clinical fellowships, American College of Surgeons research scholarships, the CNS Margot Anderson Foundation Fellowship in Brain Restoration Research, and two CNS Wilder Penfield Clinical Investigation Fellowships. Four residents have received the Van Wagenen Fellowship, a prestigious award given annually by the American Association of Neurological Surgeons to a North American neurosurgical resident who is graduating that year.

Given the extensive experience in microneurosurgery, skull base surgery, endovascular surgery, endoscopic surgery, and image-guided neurosurgery, many residents no longer require post residency fellowships and entered directly into academic or private practice. Residents who want to have a career focus in pediatric neurosurgery obtain prestigious fellowships at other institutions prior to beginning their neurosurgical careers.

Although the program’s focus is on training academic neurosurgeons interested in clinical and basic science research, it has produced many outstanding private practice neurosurgeons as well. Half of the department’s graduates in the last 25 years serve as full-time academic faculty members, and 25 percent have clinical affiliations with academic institutions.

• Neurosurgery Residency Special Features:
The Department of Neurological Surgery at the University of Pittsburgh has created a unique environment where centers of excellence flourish. The goals are to provide outstanding neurosurgical patient care, to promote education, and to perform clinical and basic science research. This group of dedicated individuals, including faculty, residents, and staff, is one of the most productive departments in the world.

These accomplishments in both patient care and research have resulted in numerous publications. Each year, more than 200 refereed articles, abstracts, proceedings, book chapters, and books are published by this department. Special features include:
Educational Programs

Clinical and Laboratory Program for the Surgery of Cranial Nerve Disorders
Comprehensive Spine Surgery Center
Endoscopic Endonasal and Skull Base Surgery
Frameless Stereotactic Equipment (multiple technologies)
Magnetic Resonance Spectroscopy
Microsurgical Laboratory
Microelectrode Recording System
Laboratory for the Development and Evaluation of New Surgical Techniques
Two Gamma Knife Radiosurgical Suites
Spinal Radiosurgery (CyberKnife or TrueBeam)
State-of-the-Art Neuroimaging:
  - CT and MRI angiography
  - High Definition Fiber Tractography
  - Functional MRI, MRS
  - Magnetoencephalography
  - PET
  - MR Research Center
  - Intraoperative CT Imaging (Dedicated OR Suite)

• Neurosurgery Residency Research Opportunities:
  Comprehensive programs in basic science and clinical research are conducted by department faculty along with investigators throughout the university community. Current research projects include:

  - Animal Models of Epilepsy
  - Clinical and Basic Science Head Injury Program
  - Computer-Image Integration into Surgical Planning
  - Brain Tumor Research
  - Intracranial Blood Flow and Saccular Aneurysm Formation
  - Radiobiology of Radiosurgery
  - Research in Spinal Tumors and Spine Biomechanics
  - Spasticity
  - Stem Cells
  - Studies on Cranial Nerve Disorders
  - Teleradiography
  - Viral Vectors in Tumor Management

Basic science and clinical research projects are an integral part of department faculty and trainee activities. Most residents spend 18-24 months working on such projects. Local, regional and national peer-reviewed funding resources continue to grow and support productive basic and clinical research. Internal funding from the Walter Copeland Fund provides seed money for many unique and fascinating projects undertaken by residents and faculty. In many cases these projects subsequently receive extramural research funding.

The coordinator of the department’s medical education program is Melissa Lukehart. L. Dade Lunsford, MD, is the program’s residency director.

Each academic year ends with a gala farewell celebration. (See photos on page 192.)
Educational Programs

Teaching Awards
Annual departmental teaching awards are given to the best faculty teacher (selected by the residents) and to the best resident teacher (selected by the staff). The 2013-14 faculty award was awarded to Paul Gardner, MD, co-director of the Center for Skull Base Surgery. The resident honoree was chief resident Ramesh Grandhi, MD.

Continuing Medical Education
Department faculty take an active role in national and regional continuing education programs. Course presentations are given every year at the annual meetings of both the Congress of Neurological Surgeons and the American Association of Neurological Surgeons. In addition, physicians of several department centers provide institutional training to other physicians throughout the world.

Professional Courses
Principles and Practice of Gamma Knife Surgery, detailing the practical aspects of stereotactic radiosurgery using the Leksell Gamma Knife, is co-directed by Drs. L. Dade Lunsford, John C. Flickinger and Ajay Niranjan. Principles of medical physics and radiobiology as they apply to single-session, focused, small-volume irradiation are covered. Patient selection techniques, didactic course presentations, and hands on computer skills are provided. More than 1700 professionals from around the world have trained in this course, in more than 105 sessions during the past 20 years. Course graduates are able to create radiosurgery dose plans for brain tumors, vascular malformations and trigeminal neuralgia. The week-long course is offered six times per year.

The Center for Image-Guided Neurosurgery faculty and staff presents Gamma Knife Radiosurgery Training for Nurses, a basic training course geared for nurses and other allied health personnel. The course covers device management, patient preparation, patient education, neuroimaging and post-radiosurgery care related to the Gamma Knife.

Minimally Invasive Endoscopic Surgery of the Cranial Base and Pituitary Fossa Course, co-directed by Paul Gardner, MD, and Carl Snyderman, MD, MBA, teaches endoscopic surgery of the cranial base and pituitary fossa. Experts present technical aspects of those operations, along with risks, benefits and outcomes. Live cases and hands-on lab work are included in the course schedule. This course is designed for neurosurgeons, minimally invasive surgeons and other allied health professionals. The week-long course is presented three times a year.

Innovations in Endoscopic Intracranial Surgery, co-directed by Paul Gardner, MD, Juan Fernandez-Miranda, MD, and Johnathan Engh, is a comprehensive overview of the basic concepts of cranial endoscopy as well as multiple endoscopic and minimally invasive corridors of approach to all areas of the brain and skull base. The course combines 3D anatomical and didactic lectures with hands-on anatomical dissection, prosection and live interactive surgical cases.

Online Courses
The department currently sponsors two online course through the University of Pittsburgh Department of Continuing Education for CME credit:

- Gamma Knife Radiosurgery for Acoustic Neuromas: Treatment Options
- Gamma Knife Radiosurgery for Brain Metastases
The following CME courses also are offered through UPMC Physician Services

- Endoscopic Endonasal Approach in the Pediatric Population
- Endoscopic Endonasal Pituitary Surgery
- Immunotherapy for Brain Tumors
- Radiosurgery and Cranial Base Surgery
- Radiosurgery for Pituitary Surgery (Part 2): Stereotactic Radiosurgery for Endocrine Active Pituitary Tumors
- Vertebral Body Compression Fractures: Interventional Management Strategies

**Speakers Bureau**

The department has a speakers bureau service available for organizations interested in keeping abreast with the latest advances and techniques in the field of neurological surgery. This service is promoted through the University of Pittsburgh’s Center for Continuing Education and UPMC’s Office of Physician Relations, as well as through the department website. The ultimate goal of the speakers bureau is to enhance education of current management of neurosurgical disorders at area hospitals and to help area physicians—and the community in general—become more aware of the services and advanced care available at the University of Pittsburgh Department of Neurological Surgery. Some of the speakers available for this service include Drs. Robert Friedlander, Peter Gerszten, Adam Kanter, L. Dade Lunsford, Joseph Maroon, David Okonkwo, Ian Pollack, Elizabeth Tyler-Kabara, Mark Richardson, Ray Sekula and others. Speakers cover a wide variety of subjects from brain and spine surgical techniques to cancer research.

**Stuart Rowe Society Lectureship and Research Day**

On December 18, 2013, the department hosted the 9th annual Stuart Rowe Society Lectureship and Research Day. The event is intended to showcase research activities in the field of neurological surgery and provide a forum for discussion. *(See photos on next page.)*

During this day, a series of talks are presented by department residents, each spotlighting a topical research issue relevant in the field. These talks are followed by discussion, moderated by a special honored visiting professor prominent in the field of neurosurgery. The 2013 honored guest was Chris Shaffrey, MD, the Harrison Distinguished Teaching Professor of Neurological and Orthopaedic Surgery at the University of Virginia School of Medicine and director of the UVA spine division.

The visiting professor is also charged with selecting a “best presentation” award at a dinner and reception. For 2013, PGY-6 resident Kimberly Foster, MD, received the best presentation award for her talk, “ABT-737 Synergizes with Vorinostat to Induce Apoptosis, Mediated by Noxa Upregulation, Bax Activation and Mitochondrial Dysfunction in PTEN-Intact Malignant Human Glioma Cell Lines.” It was the third year in a row that Foster received an award at the event. In 2012, she received a runner-up award and in 2011, she shared the co-winner award with Matthew Tormenti, MD. PGY-3 resident David Panczykowski, MD, received the runner-up award for 2013 for his presentation, “Glial Fibrillary Acidic Protein Breakdown Products for the Diagnosis of Intracranial Injury.”

![Kimberly Foster](image)

![David Panczykowski](image)
Department residents and faculty listen to Christopher Shaffrey’s lecture on “Evaluation and Management of Cervical Deformity.”

Dr. Shaffrey answers questions after his evening talk on “Decision Making in Adult Spinal Deformity” at Duquesne Club.

Department chairman Robert Friedlander presents Dr. Shaffrey with a plaque honoring him as the 2013 Stuart Rowe Lecturer.

Kimberly Foster accepts best presentation award from Dr. Shaffrey. It was the third year in a row that Dr. Foster received an award for her talk.

David Panczykowski receives runner-up presentation award from Dr. Shaffrey.

Dr. Shaffrey with residents and faculty after evening reception and lecture at the Duquesne Club.
Educational Programs

This spotlight on research was a principle first emphasized by Stuart Niles Rowe, MD, the first formally-trained neurosurgeon to practice in Pittsburgh. Rowe is widely considered the founding figure of neurosurgery training in the city, establishing the base of what would later become the University of Pittsburgh Department of Neurological Surgery.

Rowe believed that neurosurgery training should not only teach exceptional technique, but also the critical clinical decision-making skills necessary to succeed. He preached the underlying need for thorough literature review and independent research as a means for broadening clinical knowledge.

Other Postgraduate Education
The Department of Neurological Surgery participates in the education of house staff of other departments, including surgery, neurology, medicine (endocrinology) and emergency medicine. Educational endeavors include neuroscience conferences, general lectures on neurosurgical topics, and grand rounds. In addition, faculty takes part in the Department of Surgery’s Vascular Surgery Conference and provides speakers for the Critical Care Medicine Lecture Series.

Finally, faculty members present lectures to the UPMC nursing staff and to the medical staff of other regional hospitals.

Neurocirugía en UPMC
The Department of Neurological Surgery maintains a Spanish-language website at upmc.com/Services/neurosurgery/spanish/Pages/default.aspx to serve, educate and provide important information for Spanish-speaking visitors.
Adnan Abla, MD, completed his neurosurgical residency training at the Medical College of Pennsylvania and at the University of Oklahoma. To obtain cross-training in spinal instrumentation, he completed a year in the orthopedic residency program at the University of Oklahoma. He also completed a clinical fellowship at Allegheny General Hospital. He is certified by the American Board of Neurological Surgery and the American College of Surgeons. Dr. Abla served as an associate professor of neurosurgery at Allegheny University of the Health Sciences in Pittsburgh, PA, as well as the director of spine services for Allegheny General Hospital. He is a clinical professor of neurosurgery at the University of Pittsburgh School of Medicine. Dr. Abla specializes in the treatment of complex spine disorders including spinal instrumentation and tumors. He has co-authored 12 book chapters, and has published 40 articles. He is an active participant in multiple professional and scientific societies.

**Specialized Areas of Interest**
Microdiscectomy; laminectomy; anterior cervical discectomy; spinal instrumentation and fusion; spinal tumors.

**Board Certifications**
American Board of Neurological Surgery  
American College of Surgeons

**Hospital Privileges**
Sewickley Valley Hospital  
Sharon Regional Health System  
UPMC Horizon  
UPMC Passavant  
UPMC Presbyterian  
UPMC St. Margaret  
UPMC Shadyside  
Washington Hospital

**Professional Organization Membership**
Allegheny County Medical Society  
American Association for Advance of Science  
American Association of Neurological Surgeons  
American Medical Association  
Congress of Neurological Surgeons  
Joint Committee on Spine and Peripheral Nerves - AANS/CNS  
Oklahoma State Medical Association  
Pennsylvania Medical Society  
Pennsylvania Neurosurgical Society  
World Association of Lebanese Neurosurgeons

**Editorial Service**
- **Editorial Board:**  
  *Spinal Cord*
- **Ad Hoc Reviewer:**  
PAM Spinal Implant Steering Committee  
Spine Team
Eric M. Altschuler, MD  
*Clinical Assistant Professor of Neurological Surgery*

Eric M. Altschuler, MD, specializes in hydrocephalus treatments, spinal neurosurgery, neurosurgical trauma and intracranial neurosurgery. He received his medical degree from the University of Arizona in Tucson and completed his neurosurgical residency training at the University of Pittsburgh Medical Center. He is a member of the American Medical Association and the American Association of Neurological Surgeons, Congress of Neurological Surgeons as well as an American College of Surgeons fellow.

**Specialized Areas of Interest**
Spine surgery.

**Board Certifications**
American Board of Neurological Surgeons

**Hospital Privileges**
Monongahela Valley Hospital  
UPMC Mercy

**Professional Organization Membership**
Alpha Omega Alpha Medical Society  
American Association of Neurological Surgeons  
American College of Surgeons  
American Medical Association  
Allegheny County Medical Society  
Congress of Neurological Surgeons  
Pennsylvania Medical Society  
Pennsylvania Neurosurgery Society

Nduka Amankulor, MD  
*Assistant Professor of Neurological Surgery*  
*Associate Director, Adult Neurosurgical Oncology*

Nduka Amankulor, MD, a specialist in the surgical treatment of complex brain and spine tumors, joined the Department of Neurological Surgery in June of 2012. Dr. Amankulor received his medical degree and neurosurgical training from the Yale University School of Medicine. He then completed a clinical fellowship in neurosurgical oncology at Memorial Sloan-Kettering Cancer Center in New York. In addition to his clinical practice, Dr. Amankulor is a cancer biologist who is studying the biological underpinnings of gliomas and metastatic brain tumors.

**Specialized Areas of Interest**
Surgical treatment of complex brain and spine tumors

**Professional Organization Membership**
American Association of Neurological Surgeons  
Congress of Neurological Surgeons  
Society for Neuro-Oncology
Jeffrey Balzer, PhD
Associate Professor of Neurological Surgery, Neuroscience & Acute and Tertiary Care Nursing
Associate Director for Clinical Services
Director of Cerebral Blood Flow Laboratory

Jeffrey Balzer, PhD, is associate director for clinical services and staff clinical neurophysiologist at the Center for Clinical Neurophysiology and director of the Cerebral Blood Flow Laboratory at the University of Pittsburgh Medical Center. His current research interests range from the utilization of genetic biomarkers for the prediction of delayed cerebral ischemia in subarachnoid hemorrhage to the use of blood flow measures in mild head injury and concussion to vagal nerve stimulation to control cardiac arrhythmias. Dr. Balzer received his undergraduate education at the University of Pittsburgh, where he also pursued a graduate education and a PhD in behavioral neuroscience. Dr. Balzer is also the secretary/treasurer of the American Board of Neurophysiological Monitoring. He has published 45 refereed articles and 11 book chapters.

Specialized Areas of Interest
Intraoperative neurophysiological monitoring; concussion, cerebral blood flow.

Board Certifications
American Board of Neurophysiological Monitoring

Hospital Privileges
Children’s Hospital of Pittsburgh of UPMC
Jameson Hospital
Magee-Womens Hospital of UPMC
Monongahela Valley Hospital
Shriners’ Hospital
UPMC Hamot
UPMC Horizon
UPMC McKeensport
UPMC Mercy
UPMC Passavant
Jeffrey Balzer, PhD

UPMC Presbyterian
UPMC St. Margaret’s
UPMC Shadyside

**Professional Organization Membership**
American Association for the Advancement of Science
American Clinical Neurophysiology Society
American Society for Neurophysiological Monitoring (Fellow)
New York Academy of Sciences
Pittsburgh Neuroscience Society

**Editorial Service**
- Ad Hoc Reviewer:
  - *Anesthesia and Analgesia*
  - ASNM Monitor
  - *The Neurodiagnostic Journal*

**Interdepartmental and Medical Center Activities**
- University of Pittsburgh:
  - Foundations of Clinical Neurophysiology, Course Director, Department of Neuroscience
  - Neurosurgical Resident’s Basic Science Course, Co-Director

**Professional Activities**
American Board of Neurophysiologic Monitoring, Current Secretary/Treasurer
American Board of Neurophysiologic Monitoring, Past Chairman
American Society for Neurophysiological Monitoring, Past President

**Publications: 2013-14**
- **Refereed Articles:**


**Invited Papers:**

**Invited Lectures: 2013-14**
- **National:**


- **Webinar:**

- **Local/Regional:**
  Balzer JR. "Role of Intraoperative Monitoring in Cardiac Procedures." Carlow College School of Cardiac Perfusion, UPMC Shadyside, Pittsburgh, Pa., February 13, 2104.

  Balzer JR. "Neuroanesthesia and Intraoperative Monitoring." Nurse Anesthesia Program, University of Pittsburgh School of Nursing, Pittsburgh, Pa., February 17, 2014.


**J. Brad Bellotte, MD**
*Clinical Assistant Professor of Neurological Surgery*
*Chief of Neurosurgery, UPMC Hamot*

J. Brad Bellotte, MD, is chief of neurosurgery at UPMC Hamot in Erie, Pa. He joined the University of Pittsburgh Department of Neurosurgery as a clinical assistant professor in July of 2011. Dr. Bellotte is a leading expert in complex spine surgery, including minimally invasive surgeries. He earned his medical degree from West Virginia University School of Medicine, and completed an internship in general surgery and a residency in neurosurgery at Allegheny General Hospital in Pittsburgh.

**Specialized Areas of Interest**
Complex spine surgery; brain surgery.

**Board Certifications**
American Board of Neurological Surgery
Faculty Biographies

J. Brad Bellofie, MD

Hospital Privileges
UMPC Hamot

Professional Organization Membership
American Association of Neurological Surgeons
Congress of Neurological Surgeons
North American Spine Society
Pennsylvania State Neurosurgical Society

Professional Activities
Former Vice Chair, Young Neurosurgeon’s Committee of AANS
Former AANS/CNS Washington Committee Liaison
Councilor at Large, Pennsylvania State Neurosurgical Society
Pennsylvania representative to Council of State Neurosurgical Societies 2012-13
Reference committee member, Council of State Neurosurgical Societies, 2012
Physician Advisory Council, UPMC Hamot
Infection Control Committee UPMC Hamot
ICU Steering Committee UPMC Hamot
Electronic Medical Records Physician Advisory group member, UPMC Hamot
Medical Director of 8S (neuro floor), UPMC Hamot

Honors and Awards
Orthopedic Teaching Award, UPMC Hamot, 2011-12

David J. Bissonette, PA-C, MBA
Assistant Professor of Neurological Surgery
Executive Administrator, Department of Neurological Surgery

David J. Bissonette joined the Department of Neurological Surgery at the University of Pittsburgh in 1975. He holds an MBA degree from the Katz Graduate School of Business at the University of Pittsburgh. He also received a BA degree in zoology from the University of Wisconsin in Madison in 1973 and a BS in community and allied health resources (physician assistant) from the University of Alabama in Birmingham in 1975. Bissonette has published 44 articles in refereed journals, and seven book chapters. He currently serves as executive administrator of the Department of Neurological Surgery.

Specialized Areas of Interest
Physician practice management.

Board Certifications
National Commission on Certification of Physician Assistants

Hospital Privileges
UMPC Presbyterian

Professional Organization Membership
American Academy of Physician Assistants
American Association of Neurological Surgeons
Medical Group Management Association
Pennsylvania Society of Physician Assistants
Interdepartmental and Medical Center Activities

• UPMC Presbyterian:
  Credentials Committee

• UPMC/University of Pittsburgh:
  Department Incentive Plan Committee
  Department Risk Management Committee
  UPMC ICD-10 Work Group
  UPSOM Planning & Budget Committee
  PSD Advanced Practice Providers Committee
  PSD Authorization/Referral Group
  PSD OAPP Career Ladder Governing Council
  PSD Physician/APP Alignment Destiny Committee

J. William Bookwalter III, MD
Clinical Assistant Professor of Neurological Surgery

J.W. Bookwalter III, MD, is a clinical assistant professor of neurological surgery at the University of Pittsburgh School of Medicine. Dr. Bookwalter completed his degree at Loyola University, Stritch School of Medicine.

Specialized Areas of Interest
Minimally invasive surgery for the neck and back; artificial disc replacement; ulnar, and median nerve problems; peripheral and sacral tumors.

Board Certifications
American Board of Neurological Surgery

Hospital Privileges
Magee-Womens Hospital of UPMC
UPMC Passavant
UPMC St. Margaret
UPMC Shadyside

Professional Organization Membership
Allegheny County Medical Society
American Association of Neurological Surgeons
American College of Surgeons
American Medical Association
Congress of Neurological Surgeons
North American Spine Society
Pennsylvania Medical Society
Pennsylvania Neurosurgical Society

Jeffrey Bost, PAC
Clinical Instructor

Jeffrey Bost, PAC, graduated with a BS in 1983 from Allegheny College and attended Community College of Allegheny County for his physician assistant degree. After working with a cardiology practice from 1985 to 1987, he joined Joseph Maroon, MD, and his Tri-State Neurosurgical Associates group at Allegheny General Hospital in June of 1987. In 1999, he and Tri-State moved to UPMC. He has 28 invited lectures, 26 national posters and oral
Jeffrey Bost, PAC

presentations, 29 coordinated research projects, five workshops presentations, 25 refereed articles and six book chapter. He also co-wrote one book. Bost is also clinical assistant professor for Chatham College. He is currently the webmaster for www.josephmaroon.com.

Board Certifications
National Commission on Certification of Physician Assistants
Medical Assistant License, State of Pennsylvania
Medical Assistant License, State of Ohio

Hospital Privileges
Heritage Sewickley Valley Hospital
UPMC Passavant
UPMC Presbyterian

Professional Organization Membership
American Academy of Physician Assistants
American Association of Neurological Surgeons

Publications: 2013-14
• Refereed Articles:

• Professional Magazine Contributions:


Daniel M. Bursick, MD
Clinical Assistant Professor of Neurological Surgery
Chief, Division of Neurosurgery, UPMC Mercy

Daniel M. Bursick, MD, is clinical professor of neurosurgery at UPMC Mercy. His clinical interests include neurosurgical trauma, brain stem injuries, spinal neurosurgery, and the surgical treatment of pain. He received his medical degree from the M.S. Hershey School of Medicine at Pennsylvania State University in Hershey, PA, completed his neurosurgical residency at the University of Pittsburgh Medical Center and received postgraduate fellowship training in neurosurgery at the National Hospital for Nervous Diseases in London. He is a fellow of the American College of Surgeons and a member of the American Association of Neurological Surgeons and the Congress of Neurological Surgeons.

Specialized Areas of Interest
Spine surgery and neurosurgical trauma.

Board Certifications
American Board of Neurological Surgeons

Hospital Privileges
Monongahela Valley Hospital
UPMC Mercy
Diane L. Carlisle, PhD
Assistant Professor of Neurological Surgery

Diane Carlisle, PhD, joined the Department of Neurological Surgery in October 2010. She received her undergraduate degree in molecular biology from Washington and Jefferson College and her graduate degree in molecular and cellular oncology from George Washington University where she identified new signaling pathways involved in occupational causes of lung cancer. Dr. Carlisle came to the University of Pittsburgh after a postdoctoral fellowship at Johns Hopkins University under the mentorship of Robert Casero Jr., PhD, in drug development for lung cancer. She then developed an independent research program using stem cells to investigate adult disease. Her two major research areas include investigating the effects of prenatal exposures on child development and using induced pluripotent cells from Huntington’s Disease and ALS patients for drug development. In addition, she serves as faculty and course coordinator of the NIH-funded stem cell course, *Frontiers in Stem Cells and Regeneration*, which is held annually at the Marine Biological Laboratories in Woods Hole, Mass.

**Specialized Areas of Interest**
Use of stem cells for disease modeling and drug discovery. Specific interests in the mechanisms by which chemical exposures during pregnancy lead to childhood and adult disease and the use of induced pluripotent cells from patients for the development of novel drugs.

**Professional Organization Membership**
American Society for Cell Biology
American Association for Cancer Research
International Society for Stem Cell Research
Women in Cancer Research

**Editorial Service**
- Ad Hoc Reviewer:
  - *Experimental Lung Research*
  - *Molecular Pharmacology*
  - *PLoS One*
  - *Stem Cells*
Yue-Fang Chang, PhD  
*Research Assistant Professor of Neurological Surgery*

Yue-Fang Chang, PhD, joined the Department of Neurological Surgery as a research associate in June of 2000. She received her doctoral degree in statistics from the University of Illinois and master degree in epidemiology from the University of Pittsburgh. Dr. Chang has worked in a variety of areas, such as brain tumor, traumatic brain injury, health outcome, image study, women’s health and diabetes epidemiology. She serves as the lead statistician in several epidemiological studies including Cardiovascular Health Study, Women’s Health Initiative and Study of Women’s Health Across the Nation. In the past ten years she has been involved in numerous grant preparations, providing statistical expertise in design, analysis and power/sample size calculations.

**Specialized Areas of Interest**
Longitudinal data analysis; survival analysis; statistical computing; research methodology; injury epidemiology.

**Publications: 2013-14**

- **Refereed Articles:**
Yue-Fang Chang, PhD

Donna J. Crammond, PhD
Assistant Professor of Neurological Surgery
Associate Director, Movement Disorder Surgery

Donald Crammond, PhD, joined the Center for Clinical Neurophysiology as a staff neurophysiologist in November 1998. Dr. Crammond received his undergraduate education in physiology at the University of Glasgow in Scotland and his graduate education in neurophysiology at the University of Toronto. After postdoctoral studies at the University of Wisconsin and later at the Université de Montréal, he was appointed Visiting Associate Scientist at the National Institute of Mental Health in Bethesda, MD. Dr. Crammond specializes in behavioral and systems-level neurophysiology, examining the neuronal substrates of visuomotor and higher cognitive processes in the cerebral cortex and the mechanisms underlying motor learning and movement disorders. Dr. Crammond is the associate director for microelectrode recording for the Movement Disorder Surgery Program at UPMC.

Specialized Areas of Interest
The application of neurophysiological methods in the surgical treatment of movement disorders, functional localization in cerebral cortex; motor system physiology and peripheral nerve regeneration.

Board Certifications
American Board of Neurophysiological Monitoring

Hospital Privileges
Children’s Hospital of Pittsburgh of UPMC
Magee-Womens Hospital of UPMC
UPMC East
UPMC Horizon
UPMC McKeesport
UPMC Mercy
UPMC Passavant Cranberry
UPMC Presbyterian
UPMC St. Margaret
UPMC Shadyside

Professional Organization Membership
American Clinical Neurophysiology Society
Movement Disorder Society
Society for the Neural Control of Movement
Society for Neuroscience

Editorial Service
• Editorial Board:
  Clinical Neurophysiology

• Ad Hoc Reviewer:
  Journal of Clinical Neurophysiology
Donald J. Crammond, PhD

Faculty Biographies

Journal of Neurology, Neurosurgery, and Psychiatry
Journal of Neurosurgery

Interdepartmental and Medical Center Activities

• UPMC Presbyterian:
  Supervisor for visiting Center for Clinical Neurophysiology fellow, Sébastien Fournier, MD, from Quebec, Canada.

• University of Pittsburgh:
  Mentor for MS4 medical student Zoya Voronovich working on movement disorder/deep brain stimulation (DBS)-related research.
  Neuroscience 1026, Foundations of Clinical Neurophysiology.

• Department of Neurological Surgery:
  Chair, Large Animal Research Protocol Review Committee.

Professional Activities

American Board of Neurophysiologic Monitoring, elected board member
American Board of Neurophysiologic Monitoring, elected board chairman

Media Appearances: 2013-14


Publications: 2013-14

• Refereed Articles:


• Presentations:

C. Edward Dixon, PhD

Professor of Neurological Surgery, Anesthesiology, Neurobiology & Physical Medicine and Rehabilitation
The Neurotrauma Chair in Neurosurgery
Vice Chairman, Research
Director, Brain Trauma Research Center
Research Health Scientist at the Geriatric Research, Education and Clinical Center in the Veteran’s Affairs Pittsburgh Health Care System

C. Edward Dixon, PhD, received his PhD degree in physiological psychology from the Virginia Commonwealth University in 1985. That year, he was awarded a National Research Service Award for Postdoctoral Fellows by the National Institutes of Health and joined the Division of Neurological Surgery at the Medical College of Virginia. In 1986, he became a postdoctoral fellow in the Biomedical Science Department of the General Motors Technical Center in Warren, Mich. Dr. Dixon was named assistant professor in the Division of Neurosurgery at the Medical College of Virginia in 1987 and became an assistant professor in the Department of Neurological Surgery at the University of Texas Health Science Center in Houston in 1991. In 1995, he joined the Brain Trauma Research Center in the Department of Neurological Surgery at the University of Pittsburgh as associate professor. He became the director of the center in October 2002. Dr. Dixon received his adjunct faculty positions with the Department of Anesthesiology in 1995; the Department of Neurobiology in 2000 and the Department of Physical Medicine/Rehabilitation in 2003. In 2001, he became a co-director of the Safar Center for Resuscitative Research. In May of 2004, Dr. Dixon was named full professor of neurological surgery at the University of Pittsburgh and was later appointed vice chairman of research in the Department of Neurological Surgery in 2008. In 2011, Dr. Dixon was honored with one of the highest honors the university can present a faculty member when he was awarded The Neurotrauma Chair in Neurosurgery at the University of Pittsburgh. Dr. Dixon served as president of the National Neurotrauma Society for the 2002-2003 term and continued as councilor of the society for terms 2004-2007 and 2009-2012. He also has continued as a study section participant of several public and private grant review panels. His research has dealt primarily with mechanisms of post-traumatic memory deficits, rodent models of traumatic brain injury, and functional outcomes. Dr. Dixon has published 173 papers in refereed journals, one book (co-editor), 28 book chapters, and two editorials.

Specialized Areas of Interest
Mechanisms of induction and recovery of functional deficits following traumatic brain injury; neurotransmitter agonist therapies for recovery of post traumatic functional deficits; models of traumatic brain injury; clinical studies of pharmacotherapy in TBI patients.

Professional Organization Membership
American Association for the Advancement of Science
Congress of Neurological Surgeons
International Behavioral Neuroscience Society
International Neurotrauma Society
National Neurotrauma Society (Charter Member)
Pittsburgh Chapter of Society for Neuroscience
Society for Neuroscience
C. Edward Dixon, PhD

Editorial Service

• Editorial Board:
  Eye and Brain
  Frontiers in Neurotrauma, Review Editor
  Journal of Neurotrauma
  Metabolic Brain Disease
  Neural Regeneration Research
  Neurosurgery

• Ad Hoc Reviewer:
  Brain Research
  Journal of Neurochemistry
  Journal of Neuroscience
  Journal of Neurotrauma
  Learning Memory
  Neuroscience
  PLOS One
  Stroke
  Translational Stroke Research

Interdepartmental and Medical Center Activities

• University of Pittsburgh:
  Faculty Promotions Committee, Department of Neurosurgery
  Co-Chair, Research Executive Committee, Department of Neurosurgery
  Director, Walter L. Copeland Neurosurgery Research Laboratories
  Associate Director, Safar Center for Resuscitation Research, University of Pittsburgh
  Graduate Faculty Member, Center for Neuroscience and Neurobiology Training Program
  Training Faculty Member, NIH-NICHD Training Grant in Neurointensive Care (Patrick Kochanek, principal investigator)
  Training Faculty Member, Center for Neuroscience at the University of Pittsburgh.

Professional Activities

Department of Defense, United States Special Operations Command Online Panel, grant reviewer, July 16, 2013.
National Institutes of Health ZRG1 IFCN-T (02), Member Conflict CSR Special Emphasis Panel, grant reviewer, September 30, 2013.
Veteran’s Affairs, RR&D Small Projects in Rehabilitation Research (SPIRE,) grant reviewer, October 2013.
Kentucky Spinal Cord & Head Injury Study Section, San Diego CA, November 9, 2013.
Basic to Clinical Collaborative Research Pilot Program (BaCCoR), University of Pittsburgh Clinical and Translational Science Institute, grant reviewer, January 30, 2014.
Veteran’s Affairs, RR&D Small Projects in Rehabilitation Research (SPIRE,) grant reviewer, May, 2014.
Faculty Biographies

C. Edward Dixon, PhD


Publications: 2013-14
• Refereed Articles:
• Published Abstracts:


• Presentations:


Invited Lectures: 2013-14

- International:

- National:

- Local/Regional:

Andrew F. Ducruet, MD
Assistant Professor of Neurological Surgery

Andrew Ducruet, MD, joined the Department of Neurological Surgery as an assistant professor on July 8, 2013. Dr. Ducruet's clinical practice focuses on cerebrovascular disease, and he has subspecialized training in the latest endovascular techniques used to treat patients with vascular disease of both the brain and spinal cord. This includes both coil embolization and flow diversion strategies for the treatment of cerebral aneurysms, as well as embolization of arteriovenous malformations, arteriovenous fistulas, and tumors. He also performs arterial and venous stenting procedures, and treats patients with acute ischemic stroke. Dr. Ducruet was born and raised in the Pittsburgh area. He received his undergraduate degree from Princeton University, and his medical degree from Columbia University’s College of Physicians & Surgeons. He completed his surgical internship and residency in neurological surgery at New York Presbyterian Hospital/Columbia University Medical Center. Dr. Ducruet then completed a two-year fellowship in endovascular neurosurgery at the Barrow Neurological Institute in Phoenix, Ariz.
Faculty Biographies

Andrew F. Ducruet, MD

Specialized Areas of Interest
Cerebrovascular disease; subarachnoid hemorrhage, intracranial aneurysms, arteriovenous malformations, arteriovenous fistulas, intracerebral hemorrhage, carotid stenosis, venous sinus stenosis, normal pressure hydrocephalus

Hospital Privileges
Children’s Hospital of Pittsburgh of UPMC
UPMC Mercy
UPMC Presbyterian
UPMC Shadyside

Professional Organization Membership
American Association of Neurological Surgeons
American Heart Association/American Stroke Association
Congress of Neurological Surgeons
Society of Neurointerventional Surgery

Editorial Service
• Editorial Board:
  BioMed Research International
  International Scholarly Research Network Stroke
  Neurosurgery (Science Times Panelist)
  Newsletter of the Joint Section of Cerebrovascular Surgery

• Ad Hoc Reviewer:
  BMC Neurology
  Brain Research
  Brain Research Bulletin
  Cardiology
  Case Reports in Medicine
  Circulation
  Clinical Neuroradiology
  International Journal of Immunogenetics
  International Journal of Molecular Sciences
  Journal of Cerebral Blood Flow & Metabolism
  Journal of Immunology
  Journal of Neurochemistry
  Journal of Neuroscience Research
  Journal of Neurointerventional Surgery
  Journal of Pediatric Neurology
  Journal of Pediatric Neuroradiology
  The Lancet
  Neurological Research
  Neurology Research International
  Neurosciences
  Neurosurgery
  Neurosurgical Review
  PLoS One
  Stroke
  Translational Stroke Research
  World Neurosurgery
Andrew F. Ducruet, MD

Faculty Biographies

**Professional Activities**
Executive Committee, AANS/CNS Section on Cerebrovascular Surgery

**Honors and Awards**
NINDS Neurosurgery Research Career Development Program Award (2014-2016)

**Publications: 2013-14**

- **Refereed Articles:**

- **Invited Papers:**

- **Letters to the Editor:**

**Invited Lectures: 2013-14**

- **Local/Regional:**
  - Ducruet AF. "Subarachnoid and Intracranial Hemorrhage: Care Update." UPMC Stroke Update, Pittsburgh, Pa., October 11, 2013.
Faculty Biographies

Matt El-Kadi, MD, PhD
Clinical Professor of Neurological Surgery
Vice Chairman
Chief of Neurosurgery, UPMC Passavant

Matt El-Kadi, MD, PhD, FACS joined the Department of Neurological Surgery as a clinical assistant professor in September of 1999. He became clinical associate professor in January 2003 and clinical professor in June 2006. He became vice chairman of the Department of Neurological Surgery in 2010 and has been chief of neurosurgery at UPMC Passavant since 2005. He is a member of the Tri-State Neurosurgical Associates. Dr. El-Kadi board-certified in neurological surgery and has been nominated as one of Pittsburgh’s best doctors in the region for 2012, 2013 and 2014. Dr. El-Kadi specializes in the treatment of complex spine disorders, including spinal fusion and instrumentation, and minimally invasive spinal surgery for both the cervical and lumbar spine, with a special interest in the removal of primary and secondary spinal tumors. He has authored seven books and book chapters, and has over 100 publications in circulation. He is an active participant in professional societies. Before joining UPMC, Dr. El-Kadi received training in complex spinal surgery at Allegheny General Hospital in Pittsburgh. He completed his neurosurgery residency training at West Virginia University and a one-year clinical fellowship in neurosurgery at Hartford Hospital, University of Connecticut. Dr. El-Kadi began his surgical career doing brain surgery. The minimally invasive and microscopic techniques used then on the brain have served him well as a spine surgeon for minimally invasive approaches and has been reflected in his patients’ shorter hospital stays and good outcome.

Specialized Areas of Interest
Minimally invasive spine surgery; complex spine disorders; spinal stabilization; spinal tumors.

Board Certifications
American Board of Neurological Surgeons

Hospital Privileges
Grove City Medical Center
UPMC Horizon
UPMC Mercy
UPMC Passavant
UPMC Presbyterian

Professional Organization Membership
Allegheny County Medical Society
American Academy of Anti-Aging Medicine
American Association of Neurological Surgeons
American Medical Association
Congress of Neurological Surgeons
International Spinal Injections Society
North American Spine Society
Ohio County Medical Society
Pennsylvania Medical Society
Pennsylvania Neurosurgical Society
Matt El-Kadi, MD, PhD

Interdepartmental and Medical Center Activities

- UPMC Passavant:
  Board of Directors, Passavant Hospital Foundation
  Chief of Neurosurgery
  Credentialing Committee
  Critical Care Committee
  Medical Executive Committee
  Operating Room Block Committee
  Operating Room Committee, Chairman
  Quality Patient Care Committee

Honors and Awards
Best Doctors in America, 2009-2013.

Publications: 2013-14

- Refereed Articles:

- Presentations:


Johnathan Engh, MD
Associate Professor of Neurological Surgery
Director, Neuroendoscope Surgery Program
Director, Adult Neurosurgical Oncology

Johnathan Engh, MD, joined the faculty at the University of Pittsburgh Department of Neurological Surgery in 2008 after completing the department’s seven-year residency program. Originally from northern Virginia, Dr. Engh is a graduate of Duke University and the University of Virginia Medical School. Dr. Engh’s clinical focus is on neurosurgical oncology, especially minimally invasive operations for central nervous system tumors and intraventricular lesions. He is the director of the adult neurosurgical oncology program at the University of Pittsburgh. From a research perspective, his major interests are the development of minimally invasive tools for cranial surgery and percutaneous intracerebral navigation.

Specialized Areas of Interest
CNS tumors, minimally invasive surgery, neurosurgical technology and innovation.

Board Certifications
American Board of Neurological Surgery
Hospital Privileges
Children’s Hospital of Pittsburgh of UPMC
Magee-Womens Hospital of UPMC
UPMC Passavant
UPMC Presbyterian
UPMC Shadyside

Professional Organization Membership
Allegheny County Medical Society
Alpha Omega Alpha
American Association of Neurological Surgeons
Congress of Neurological Surgeons
PA Medical Society
Society of Neuro-Oncology
University of Pittsburgh Cancer Institute

Editorial Service
• Editorial Board:
  Frontiers in Radiation Oncology
  Journal of Neurology and Neurosurgery
  Neurosurgery Science Times

• Ad Hoc Reviewer:
  European Journal of Cancer
  Journal of Neurology, Neurosurgery and Psychiatry
  Journal of Medical Case Reports
  Neurosurgery

Interdepartmental and Medical Center Activities
• UPMC:
  University of Pittsburgh, Pittsburgh, Pa., October 9-11, 2013.
  Course Director, Neurosurgery Residents Board Prep Course, University of Pittsburgh.
  Instructor, Multidisciplinary Application of Radiosurgery into a Neurosurgical Practice and Mock Tumor Board. SABRE/Varian Training, Pittsburgh, Pa., July 17-19 and September 11-13, 2013
  Instructor, Multidisciplinary Application of Radiosurgery into a Neurosurgical Practice and Mock Tumor Board, SABRE/Varian Training, Pittsburgh, Pa., November 6-8, 2013; January 15-17 and May 14-16, 2014.

• University of Pittsburgh:
  Institutional Review Board member

Honors and Awards
America’s Best Doctors, 2011-14
Pittsburgh’s Best Doctors, 2012-2014
Faculty Biographies

Johnathan Engh, MD

Publications: 2013-14
• Refereed Articles:


• Invited Papers:


• Presentations:

Invited Lectures: 2013-14
• National:

• Local/Regional:


  Engh J. "Tumor Talk-What is the Most Useful Technology in Brain Tumor Surgery?" Pennsylvania Neurosurgical Society, 100th Scientific Meeting, Hershey, Pa., July 12, 2013.

David J. Engle, MD
Clinical Assistant Professor of Neurological Surgery

David J. Engle, MD, specializes in spine surgery, neurosurgical trauma, neuro-oncology. He earned his medical degree and completed an internship in general surgery and a residency in neurosurgery at the University of Pittsburgh. Dr. Engle also has received fellowship training in stereotactic neurosurgery and Gamma Knife radiosurgery. He is a fellow of the American College of Surgeons and a member of the American Association of Neurological Surgeons and the Congress of Neurological Surgeons.

Specialized Areas of Interest
Spine surgery, neurosurgical trauma and neuro-oncology.

Board Certifications
American Board of Neurological Surgeons

Hospital Privileges
Monongahela Valley Hospital
UPMC Mercy

Professional Organization Membership
American College of Surgeons
American Association of Neurological Surgeons
Congress of Neurological Surgeons
Pennsylvania Neurosurgical Society
Faculty Biographies

Wendy Fellows-Mayle, PhD
Research Assistant Professor of Neurological Surgery
Coordinator, The Walter Copeland Laboratory

Wendy Fellows-Mayle, PhD, joined the faculty of the Department of Neurological Surgery at the University of Pittsburgh in July of 1999. She received her bachelor degree at the University of Pittsburgh in 1994 and her doctoral degree at the University of Pittsburgh in 2004. Dr. Fellows-Mayle is the director of the histology core laboratory for the Department of Neurological Surgery and the coordinator for the Walter Copeland Laboratory for Neurological Research.

Specialized Areas of Interest
Immunotherapy of brain tumors; gene therapy of brain tumors; epilepsy; intracranial pressure; crainiosynostosis; traumatic brain injury.

Interdepartmental and Medical Center Activities
• University of Pittsburgh: Oversight of Anatomical Specimens Committee

Publications: 2013-14
• Refereed Articles:

Juan C. Fernandez-Miranda, MD
Assistant Professor of Neurological Surgery
Associate Director, Center for Cranial Base Surgery
Director, Surgical Neuroanatomy Lab
Director, Fiber Tractography Lab

Juan Carlos Fernandez-Miranda, MD, is assistant professor of neurological surgery, associate director of the Center for Cranial Base Surgery, and director of the Surgical Neuroanatomy Lab and Fiber Tractography Lab at the University of Pittsburgh School of Medicine. He joined the faculty at the University of Pittsburgh Department of Neurological Surgery on July 1, 2008 to complete a two-year clinical fellowship in open and minimally invasive skull base, pituitary, and brain surgery with Amin Kassam, MD, Paul Gardner, MD, and Daniel Prevedello, MD. Prior to joining the faculty at University of Pittsburgh, Dr. Fernandez-Miranda completed a clinical fellowship in cerebrovascular surgery at the University of Virginia—under the direction of Neal F. Kassell, MD—and a two-year research fellowship in microsurgical neuroanatomy at the University of Florida—under the mentoring of Albert L. Rhoton, Jr., MD. Dr. Fernandez-Miranda, a native from Madrid, Spain, received his medical degree from the Complutense University of Madrid and completed his neurological surgery residency at “La Paz” University Hospital of Madrid. Upon completion of his residency, he was awarded the Sanitas Prize 2006 to the best medical postgraduate trainee in Spain. Dr. Fernandez-Miranda’s clinical focus is endoscopic endonasal skull base and pituitary surgery, open skull base surgery, and complex brain surgery. His research interests lie in the study of surgical neuroanatomy and brain connectivity, and the application of innovative techniques into the operating room. He has published near 100 scientific peer-review papers, and he has lectured extensively at national and international scientific meetings and professional courses. The Surgical Neuroanatomy Lab that he directs has a dual educational and research role aiming to improve surgical techniques and outcomes by mastering knowledge of rel-
evant surgical neuroanatomy. Many national and international physicians have conducted training and research at the Surgical Neuroanatomy Lab. The lab has three main research areas: microsurgical neuroanatomy, endoscopic skull base anatomy, and white matter anatomy. Dr. Fernandez-Miranda has major publications and awards on each of these areas, and his research work has contributed significantly to the development and expansion of endoscopic skull base surgery. The Fiber Tractography Lab is focused on the application of advanced fiber mapping techniques—High-Definition Fiber Tractography (HDFT)—for presurgical planning and intraoperative navigation to facilitate brain function preservation and improve resection rates in patients with complex brain lesions. Dr. Fernandez-Miranda’s work is also centered on studying the structure and connectivity of the fiber tracts forming the “normal” human brain, and their structural alteration in patients with brain tumors, vascular lesions, stroke, and neurodegenerative diseases. In addition to his clinical and research activities, Dr. Fernandez-Miranda is greatly devoted to teaching and education of 3D surgical neuroanatomy and techniques at local, national, and international venues.

**Specialized Areas of Interest**
Endoscopic pituitary surgery; minimally invasive endoscopic skull base and brain surgery; open skull base surgery; brain tumors. Research focuses on surgical neuroanatomy (microsurgical neuroanatomy, endoscopic skull base anatomy, and white matter anatomy), advanced brain imaging techniques, and brain connectivity

**Board Certifications**
Spanish Society of Neurosurgery, Spanish Ministry of Science and Education
European Association of Neurosurgical Societies, European Board of Neurosurgery

**Hospital Privileges**
Children’s Hospital of Pittsburgh of UPMC
UPMC Presbyterian

**Professional Organization Membership**
American Association of Neurological Surgeon
Cajal Club
Congress of Neurological Surgeons
European Association of Neurosurgical Societies
German Skull Base Society
International Head and Neck Scientific Group
Joint Section on Tumors – AANS & CNS
North American Skull Base Society
Spanish Society of Neurosurgery

**Editorial Service**
- **Editorial Board:** Neurocirugia
- **Ad Hoc Reviewer:**
  - The Anatomical Record
  - BMC Medical Imaging
  - Brain Structure and Function
  - Cerebral Cortex
  - Clinical Neurology and Neurosurgery
  - Head and Neck
  - Journal of Anatomy
Juan C. Fernandez-Miranda, MD

Faculty Biographies

Journal of Neurosurgery
Laryngoscope
Neurosurgery

Interdepartmental and Medical Center Activities
• University of Pittsburgh:
  MRRC (Magnetic Resonance Research Center)

Professional Activities
International Outreach Committee, American Association of Neurological Surgeons
North American Skull Base Society Awards Committee
NASBS Education and Training Committee

Honors and Awards
Pedro Mata Award of the Neurosurgical Society of Madrid to the Best Neurosurgical Research for the work "Three-Dimensional Microsurgical Anatomy and Tractography of the White Matter of the Human Brain."
Sanitas Prize 2006 to the Best Medical Postgraduate Trainee in Spain.
Recipient of the Synthes CMF (Cranio-Maxillofacial) Anatomical Fellowship.
Aesculap EANS (European Association of Neurosurgical Societies) Research Prize for the work "Three-Dimensional Structure of the White Matter of the Human Brain."
European Skull Base Fellowship Award, 2009.
Best Video Presentation Award, Spanish-Portuguese Neurosurgery Annual Meeting, 2010

Publications: 2013-14
• Refereed Articles:


**Book Chapters:**


**Published Abstracts:**


Juan C. Fernandez-Miranda, MD

Faculty Biographies

- Presentations:

Invited Lectures: 2013-14
- International:


- National:


• Local/Regional:


• Visiting Professorships:
Robert Friedlander, MD, MA  
*Chairman, Department of Neurological Surgery*  
*Walter E. Dandy Professor of Neurosurgery and Neurobiology*  
*Head of Cerebrovascular Neurosurgery*

On June 1, 2010, Robert Friedlander, MD, MA, became the fourth chair in the department’s history. Prior to joining the department, Dr. Friedlander was professor of neurosurgery at Harvard Medical School and vice-chairman of neurosurgery and associate director of cerebrovascular surgery at Brigham and Women’s Hospital in Boston. As a sign of his prominence as a clinician and scientist, Dr. Friedlander is one of a very select group of authors to have been invited by the *New England Journal of Medicine* to write both a basic science review (mechanisms of neuronal cell death), as well as a clinical review (management of AVMs). Clinically, Dr. Friedlander focuses on the operative management of complex cerebrovascular disorders and brain tumors. Dr. Friedlander’s major research interests lie in the study of the mechanistic pathways of the caspase apoptosis gene family. As co-director of Brigham and Women’s Neuroscience Research Center, his work includes the evaluation of treatment strategies for neurodegenerative diseases (Huntington’s and ALS), stroke, brain trauma, and spinal cord injury through the modulation of the caspase-family apoptotic pathways. Dr. Friedlander’s research has received significant media attention including major work published in *Nature, Science,* and *Nature Medicine.* His work has also been recognized through many academic awards, including the Neurosurgery Resident Award from the Congress of Neurological Surgeons, the Bayer Cerebrovascular Award from the Joint Section of Cerebrovascular Surgery, the International Charcot Prize for Motor Neuron Diseases, and the Award from the Academy of Neurological Surgeons. In 2006, he was elected as a member of the prestigious American Society for Clinical Investigation. Dr. Friedlander is only one of two neurosurgeons elected as a member of the American Association of Physicians.

**Specialized Areas of Interest**

Aneurysms, vascular malformations, brain tumors, carotid disease, cerebrovascular disease, Chiari malformation, spinal cord tumors. Research focuses on mechanisms of apoptosis, Huntington’s disease, ALS, and stroke.

**Board Certifications**

American Board of Neurological Surgeons

**Hospital Privileges**

Children’s Hospital of Pittsburgh of UPMC  
UPMC Mercy  
UPMC Passavant  
UPMC Presbyterian  
UPMC Shadyside

**Professional Organization Memberships**

The American Academy of Neurological Surgeons  
American Association for the Advancement of Science  
American Association of Neurological Surgeons  
American Association of Physicians  
American Society for Clinical Investigation  
Congress of Neurological Surgeons  
Joint Section of Cerebrovascular Surgery  
Pennsylvania Neurological Society  
Society for Clinical Investigation Sociedad Venezolana de Neurocirugia
Faculty Biographies

Robert Friedlander, MD, MA

Society for Neurological Surgeons
Society for Neuroscience

Editorial Service
- Editorial Board:
  Neurosurgery

- Ad Hoc Reviewer:
  Annals of Neurology
  Cell Death and Differentiation
  EMBO
  Experimental Neurology
  Human Molecular Genetics
  Journal of Biological Chemistry
  Journal of Neurochemistry
  Journal of Neuroscience
  Letters in Drug Design and Discovery
  Nature
  Nature Biotechnology
  Nature Cell Biology
  Nature Genetics
  Nature Medicine
  Nature Neuroscience
  Nature Reviews Molecular Biology
  Neuron
  Neuropharmacology
  Neuroscience Letters
  Neurosurgery
  New England Journal of Medicine
  Proceedings of the National Academy of Sciences
  Science
  Trends in Neuroscience

Interdepartmental and Medical Center Activities
- UPMC Presbyterian:
  Global Care Steering Committee
  Medical Executive Committee
  MEG Oversight Committee
  Surgical Services Oversight Committee

- University of Pittsburgh:
  School of Medicine Executive Committee

- University of Pittsburgh Cancer Institute:
  Comprehensive Stereotactic Radiosurgery Program Meetings

Professional Activities
Society of Neurological Surgeons:
  Director, Research Update of Neurosciences for Neurosurgeons (RUNN Course)
  Research Committee
NINDS National Advisory Council:
  Clinical Trials Subcommittee
Robert Friedlander, MD, MA

Faculty Biographies

Fellowships and Training Subcommittee
Basic Science Subcommittee
American Academy of Neurological Surgeons
Annual Meeting Committee
Research Committee
The American Academy of Neurological Surgery
    Scientific Program Committee Chair
    AANS/CNS Joint Cerebrovascular Surgery Section Chair

Honors and Awards
Best Doctors in America, 2012-2013
America’s Top Surgeons, 2013
H. Richard Winn Prize for Neurosurgical Research
Castle Connolly Top Doctor in the field of Neurological Surgery, 2013
Honored Guest, US Ambassador, Belgrade, Serbia, 2013
Honored Guest, HRH Crown Prince Alexander and HRH Crown Princess Katherine
    Belgrade, Serbia, 2014

Media Appearances: 2013-2014
“Living Like Lou: Pittsburgh’s Story of Hope in the Face of Lou Gehrig's Disease,” WTAE
“Former college football player, city firefighter sues NCAA over concussions,” Pittsburgh
    Tribune-Review, December 17, 2013.
“Foundations give Pitt $100,000 for ALS research,” Pittsburgh Post-Gazette, October 7, 2013.

Publications: 2013-14
• Refereed Articles:
Zusman EE, Heary RF, Stroink AR, Berger MS, Popp AJ, Friedlander RM, Martin NA, Lonser
    RR, Asthagiri AR. Philanthropy funding for neurosurgery research and program development. Neurosurgery
Friedlander RM, Wang, Xin. Therapeutic neuroprotective agents for amyotrophic lateral
Agarwalla PK, Walcott BP, Dunn IF, Thiex R, Frerichs K, Narang S, Friedlander RM. Fusiform
Modo M, Ambrosio E, Friedlander RM, Badylak SF, Wechsler LR. Bioengeneering solutions
Tempel ZJ, Johnson SA, Richard PS, Friedlander RM, Rothfus WE, Hamilton RL. Parasellar
    arachnoid cyst presenting with a nonpupil sparing third nerve palsy mimicking a posterior
    Siriani AC, Sarkar S, Kristal BS, Friedlander RM, Wang X. N-acetyl-serotonin offers neuro-
    protection through inhibiting mitochondrial death pathways and autophagic activation in


**Letters to the Editor:**

**Invited Lectures: 2013-2014**

- **International:**

  Friedlander RM. “Use of high definition fiber tractography as a tool for resection of lesions in eloquent cortex.” Southeast European Neurosurgical Society, Belgrade, Serbia, October 31-November 1, 2013.

- **National:**


  Friedlander RM. “Novel Therapeutic Approaches.” CHDI’s Annual Huntington’s Disease Therapeutics Conference, Palm Springs, Calif., February 24-27, 2014.


Robert Friedlander, MD, MA

- Local/Regional:


  Mitochondrial Function and Dysfunction in Huntington’s Disease.” United Mitochondrial Disease Foundation, Pittsburgh, Pa., June 5, 2014.


Paul A. Gardner, MD
Associate Professor of Neurological Surgery
Executive Vice Chairman, Surgical Services
Co-Director, Center for Skull Base Surgery

Paul A. Gardner, MD, joined the faculty at the University of Pittsburgh Department of Neurological Surgery in 2008 after completing his residency and fellowship training at the University of Pittsburgh. He completed his undergraduate studies at Florida State University, majoring in biochemistry, and received his medical degree from the University of Pittsburgh School of Medicine. Dr. Gardner completed a two-year fellowship in endoscopic endonasal pituitary and endoscopic and open skull base surgery. His research has focused on evaluating patient outcomes following these surgeries and more recently on genomic analysis of rare tumors. In April of 2008, Dr. Gardner was named neurosurgical director of the Center for Minimally Invasive Cranial Base Surgery at the University of Pittsburgh Medical Center.

Specialized Areas of Interest
Endoscopic endonasal and open skull base surgery; pituitary tumors; vascular surgery; cranial nerve disorders; minimally invasive surgery; peripheral nerve surgery.

Hospital Privileges
Children’s Hospital of Pittsburgh of UPMC
UPMC Mercy
UPMC Presbyterian
Veterans Affairs Pittsburgh Healthcare System

Professional Organization Membership
American Association of Neurological Surgeons
American Medical Association
Congress of Neurological Surgeons
North American Skull Base Society
Pennsylvania Neurological Society
Pituitary Network Association

Editorial Service
- Editorial Board:
  Journal of Neuroscience and Rehabilitation
Paul A. Gardner, MD

Faculty Biographies

• Ad Hoc Reviewer:
  Journal of Neurosurgery
  Neurosurgery
  Skull Base

Interdepartmental and Medical Center Activities
• UPMC Presbyterian:
  Surgical Services Oversight Committee Representative

Professional Activities
Course Co-Director, Endoscopic Endonasal Surgery of the Cranial Base and Pituitary Fossa
  Course. University of Pittsburgh. (three courses per year).
  University of Pittsburgh

Honors and Awards
Best Doctors 2012-2014

Publications: 2013-14
• Refereed Articles:
  Gardner PA, Tormenti MJ, Pant H, Fernandez-Miranda JC, Snyderman CH, Horowitz MB.


Faculty Biographies


**Book Chapters:**


**Published Abstracts:**

Faculty Biographies


**Presentations:**


Faculty Biographies


Invited Lectures: 2013-14

• Telementoring Surgery:


• International:
Gardner PA. "Surgical anatomy of the sellar, parasellar and suprasellar region." Endoscopic Skull Base Course, National University Hospital, Singapore, February 24, 2014.

Gardner PA. "Sagittal modules 1: pituitary, transplanum and transcribriform." Endoscopic Skull Base Course, National University Hospital, Singapore, February 25, 2014.


Gardner PA. "Transpterygoid approach – Meckel’s cave, posterior cranial fossa." Endoscopic Skull Base Course, National University Hospital, Singapore, February 26, 2014.
Gardner PA. “Prevention and management of complications.” Endoscopic Skull Base Course, National University Hospital, Singapore, February 26, 2014.


Gardner PA. "Validation of Chicken Wing Training Model for Endoscopic Microsurgical Dissection as shown by cadaver procedure." European Skull Base Society Meeting, June 28, 2014.

- National:

- Local/Regional:

**Peter C. Gerszten, MD, MPH, FACS**

*Peter E. Sheptak Professor of Neurological Surgery*

*Vice Chairman, Quality Improvement*

*Director, Percutaneous Spine Service*

Peter C. Gerszten, MD, MPH, is the Peter E. Sheptak Professor of Neurosurgery at the University of Pittsburgh. Dr. Gerszten joined the Department of Neurological Surgery and the UPMC Spine Services Division in 1999. He received his undergraduate degree from the University of Virginia and completed his medical degree at the Johns Hopkins School of Medicine. He completed his residency in neurological surgery at the University of Pittsburgh Medical Center. Dr. Gerszten obtained a master of public health degree from the University of Pittsburgh Graduate School of Public Health. He completed a fellowship in spinal surgery at the University of Pittsburgh Medical Center. Dr. Gerszten specializes in disorders of the spine, focusing on spinal neoplasms. His clinical interests include minimally invasive
approaches to the treatment of spinal disorders and spinal tumors. Dr. Gerszten’s area of clinical research is the application of outcomes research to spinal surgical interventions. He is a pioneer in the field of spine radiosurgery and oversees the instruction of this developing area of neurosurgery for both the American Association of Neurological Surgery as well as the Congress of Neurological Surgeons. Dr. Gerszten is co-editor of the newly released book Controversies in Stereotactic Radiosurgery: Best Evidence Recommendations, a 277-page look into an evidence-based approach to stereotactic radiosurgery for the brain and spine. He was also co-editor of the 2008 book Spine Radiosurgery, an authoritative textbook -- and the first of its kind -- on all aspects of spine radiosurgery. Dr. Gerszten currently serves on the editorial boards of Neurosurgery, The Spine Journal and The Journal of Radiosurgery and SBRT.

Specialized Areas of Interest
Outcomes research applied to spinal surgical interventions; failed back syndrome; epidural fibrosis; stereotactic radiosurgery of spinal lesions; minimally invasive spine surgical techniques; spinal motion preservation techniques.

Board Certifications
American Board of Neurological Surgeons

Hospital Privileges
Magee-Womens Hospital of UPMC
UPMC Presbyterian
UPMC Shadyside
Veterans Affairs Pittsburgh Healthcare System

Professional Organization Membership
Allegheny County Medical Society
American Association of Neurological Surgeons
American College of Surgeons
American Medical Association
Cervical Spine Research Society
Congress of Neurological Surgeons
Delta Omega Public Health National Honor Society
International Stereotactic Radiosurgery Society
Joint Section on Disorders of the Spine and Peripheral Nerves
North American Spine Society
Paleopathology Society
Pennsylvania Neurosurgical Society
Pennsylvania State Medical Society

Editorial Service
• Editorial Board:
Frontiers in Radiation Oncology
The Journal of Radiosurgery and SBRT
Neurosurgery
The Spine Journal

• Ad Hoc Reviewer:
Cancer Control
Cureus
European Spine Journal
International Journal of Radiation Oncology Biology Physics
Peter C. Gerszten, MD, MPH, FACS

Faculty Biographies

The Journal of Radiosurgery and SBRT Oncology
Neurosurgery
Radiotherapy and Oncology
The Spine Journal
Technology in Cancer Research and Treatment

Interdepartmental and Medical Center Activities
• UPMC Presbyterian:
  Total Quality Council

• University of Pittsburgh Medical Center:
  Director of Percutaneous Spine Surgery
  Director of Spine Radiosurgery

• University of Pittsburgh:
  Chair, Data Safety Monitoring Board, “A Sensorimotor Microelectrode Brain—Machine Interface for Individuals with Tetraplegia,” 2013-present

Professional Activities
Monitor for the “Spine Patient Outcomes Research Trial” (SPORT). Funded by the National Institute of Arthritis and Musculoskeletal and Skin Diseases, National Institute of Health International Spine Radiosurgery Consortium Member
Self Assessment in Neurological Surgery, American Board of Neurological Surgery
Editor, University of Pittsburgh Neurosurgery News quarterly newsletter

Community Activities
Peter C. Gerszten Endowed Fund for Research in Anthropology, University of Virginia
Gerszten Family Lectureship in Spanish Literature, University of Virginia

Media Appearances: 2013-14
“Experto dice que la Radiocirugía evita la cirugía en el tratamiento de metástasis que afectan a la columna vertebral,” europapress.es, November 6, 2013.

Publications: 2013-14
• Refereed Articles:
Faculty Biographies

Peter C. Gerszten, MD, MPH, FACS


• Books:

• Book Chapters:


• Published Abstracts:


• Presentations:


**Invited Lectures: 2013-14**

* International:

Gerszten PC. “Metastasis del Sistema Nervioso Extracranial.” Jornanda Sobre Manejo de Metastasis Cerebrales, Hospital Clinico San Carlos, Madrid, Spain, October 24, 2013.

Gerszten PC. “Stereotactic radiosurgery, vertebroplasty/kyphoplasty in treating metastatic tumor patients.” Annual Meeting of the European Society of Neurosurgical Surgery, Tel Aviv, Israel, November 13, 2013.

* National:


• Local/Regional:

• Visiting Professorships:

Avniel Singh Ghuman, PhD
Assistant Professor of Neurological Surgery
Director, MEG Research

Avniel Singh Ghuman, PhD, joined the Department of Neurological Surgery in September of 2011. Dr. Ghuman received his undergraduate education in math and physics at The Johns Hopkins University. He completed his doctoral education in biophysics at Harvard University. He completed his postdoctoral training at the National Institute of Mental Health prior to joining the faculty at the University of Pittsburgh. As director of MEG (Magnetoencephalography) Research, one of Dr. Ghuman’s primary roles is to facilitate, develop, and advance clinical and basic neuroscience research using MEG. To this end, he is helping to develop new research applications for MEG in collaboration with researchers throughout the community. MEG is the most powerful functional neuroimaging technique for noninvasively recording magnetic fields generated by electrophysiological brain activity, providing millisecond temporal resolution and adequate spatial resolution of neural events. In addition, Dr. Ghuman’s research interest focuses on using MEG to understand the dynamics of how brain regions interact with an eye towards determining the biological and biophysical underpinnings of these dynamics. He also examines how abnormalities in these dynamics are manifested in autism spectrum disorders and Parkinson’s disease and how they might relate to the cognitive impairments in these disorders.

Specialized Areas of Interest
The dynamics of brain interactions; autism; visual cognition; magnetoencephalography (MEG).

Professional Organization Membership
Society for Neuroscience
Cognitive Neuroscience Society
Organization for Human Brain Mapping
Vision Sciences Society

Editorial Service
• Editorial Board:
  Frontiers in Brain Imaging Methods

• Ad Hoc Reviewer:
  American Journal of Psychiatry
  Brain
Paola Grandi, PhD
Assistant Professor of Neurological Surgery/Molecular Genetics and Biochemistry

Paola Grandi, PhD, joined the Department of Neurological Surgery as an assistant professor in April of 2005. She has a joint appointment in the Department of Microbiology and Molecular Genetics. Dr. Grandi received a bachelor degree in biology from University of Ferrara in 1996 and her master’s degree in genetics in 1997. She earned a PhD in biochemistry from the University of Ferrara in 2001. In 2001 Dr. Grandi received a fellowship for U.S. study from University of Ferrara and was a post-doctoral fellow from 2001-2005 in the Molecular Neurogenetics Department at the Massachusetts General Hospital. She is a member of the American Society of Gene Therapy and American Association Cancer Research and is the assistant editor of the journal Gene Therapy. Dr. Grandi’s research interests include studies to understand the development and progression of brain tumors emphasizing the role of miRNAs in cancer genetics. She has a long standing interest in the molecular biology of herpes simplex virus, mechanisms of virus replication and neuropathogenesis and virus host cells interactions that result in innate immune responses to infection. Much of her recent work has centered on the creation of herpes viral vectors for treatment of glioblastoma. This research has recently been funded by R01 in 2013.
**Paola Grandi, PhD**

**Specialized Areas of Interest**
Gene therapy for brain tumors using HSV-based vectors; molecular targeting to tumor cells; molecular mechanisms of tumor cell migration and the role of miRNAs in cancer progression; extra-cellular Matrix (ECM).

**Professional Organization Membership**
- American Association of Cancer Research
- American Society of Gene and Cell Therapy
- International Society for Stem Cell Research
- Society for Neuroimmunology

**Editorial Service**
- **Editorial Board:**
  - *Molecular Therapy Oncolytics*
- **Ad Hoc Reviewer:**
  - *Gene Therapy*
  - *Journal of Virology*
  - *Molecular Therapy*

**Professional Activities**
- American Society of Gene and Cell Therapy web taskforce
- American Society of Gene and Cell Therapy cancer gene & cell therapy committee

**Invited Lectures: 2013-14**
- **International:**

**Stephanie Greene, MD**

**Assistant Professor of Neurological Surgery/Molecular Genetics and Biochemistry**

Stephanie Greene, MD, joined the faculty of the Department of Neurological Surgery in the pediatric neurosurgery division at Children’s Hospital of Pittsburgh in 2009. Dr. Greene graduated from Dartmouth College in 1993 with a degree in biology and psychology, and a concentration in neuroscience. She earned her medical degree from Albany Medical College, and completed her neurosurgical residency at Harvard University in the Brigham & Women's and Children's Hospital of Boston program. Her fellowship in pediatric neurosurgery was completed through the University of Washington program at Seattle Children's Hospital in 2005. She was the director of pediatric neurosurgery at Hasbro Children's Hospital, affiliated with Brown University, prior to accepting her position at Children's Hospital of Pittsburgh.

**Specialized Areas of Interest**
Brain tumors; vascular malformations; MoyaMoya syndrome; Chiari malformation; spinal dysraphism; peripheral nerve disorders; fetal surgery.
Stephanie Greene, MD

Faculty Biographies

**Board Certifications**
American Board of Neurological Surgeons  
American Board of Pediatric Neurological Surgeons

**Hospital Privileges**
Children’s Hospital of Pittsburgh of UPMC  
Magee-Womens Hospital of UPMC

**Professional Organization Membership**
American Association of Neurological Surgeons  
American Society of Pediatric Neurosurgeons  
AANS/CNS Joint Section on Pediatric Neurosurgery  
AANS/CNS Joint Section on Tumors  
Congress of Neurological Surgeons  
Pediatric Craniocervical Society  
Pennsylvania Neurosurgical Society  
Sigma Xi  
Women in Neurosurgery  
World Federation of Neurosurgical Societies

**Editorial Service**
• Ad Hoc Reviewer:  
  Anesthesia & Analgesia  
  Neurosurgery

**Interdepartmental and Medical Center Activities**
• Children’s Hospital of Pittsburgh:  
  Brachial Plexus Birth Trauma Committee  
  Fetal Diagnosis and Treatment Committee  
  Pediatric Neuro-oncology Board  
  Vascular Anomalies Committee

**Honors and Awards**
Patients’ Choice Award, 2008-2014  
America’s Most Compassionate Doctors 2011-2014

**Media Appearances: 2013-14**

**Publications: 2013-14**
• Refereed Articles:  


• Book Chapters:  

- Presentations:
  Sivak WN, Gander BH, MD, Foster KA, MD, MacIsaac ZM, Greene S, Kumar AR, Grunwaldt LJ. "Management of Pediatric Brachial Plexus Palsy: the Role of Nerve Transfer Combined with Neurolysis or Nerve Grafting of the Upper Trunk." Annual Meeting of the American Society for Peripheral Nerve, Kauai, HI, January 10-12, 2014.


- Web-Based Presentation:

Miguel E. Habeych, MD, MPH
Assistant Professor of Neurological Surgery
Director, Center for Clinical Neurophysiology

Miguel E. Habeych, MD, MPH, joined the Department of Neurological Surgery in September of 2005 as associate director of the Center for Clinical Neurophysiology. He was appointed director of the center in March of 2008. Dr. Habeych attended medical school and did his internship at the Universidad Industrial de Santander (Colombia), obtaining his medical degree in 1989. He completed training in clinical neurology at the National University of Colombia, graduating in 1995. After practicing general neurology and electroencephalography for three years, he pursued a master of public health degree at the Graduate School of Public Health of the University of Pittsburgh, graduating in 2000. He did a postdoctoral fellow research with the Center for Education and Drug Abuse Research (CEDAR) of the University of Pittsburgh's School of Pharmacy, and worked there as a research associate from 2001 to 2004. Dr. Habeych completed a fellowship in clinical neurophysiology/intraoperative neurophysiological monitoring at the Center for Clinical Neurophysiology in July of 2005. He was elected fellow of the American Clinical Neurophysiology Society (ACNS) in 2013.

Specialized Areas of Interest
Intraoperative and critical care neurophysiological monitoring; neurophysiology and epidemiology of neuropsychiatric conditions.

Board Certifications
American Board of Clinical Neurophysiology (ABCN)
Advanced Central Clinical Neurophysiology
Intraoperative Monitoring

Hospital Privileges
Children’s Hospital of Pittsburgh of UPMC
Magee-Womens Hospital of UPMC
UPMC Lee
UPMC McKeesport
UPMC Mercy
Miguel E. Habeych, MD, MPH

UPMC Mercy South Side
UPMC Passavant
UPMC Presbyterian
UPMC St. Margaret
UPMC Shadyside
Veterans Affairs Pittsburgh Health Care System, Oakland
Western Psychiatric Institute and Clinic

Professional Organization Membership
American Clinical Neurophysiology Society
American Medical Association
American Society of Neurophysiological Monitoring
Charles E. Reynolds Medical History Society
Colombian Association of Neurology
Colombian College of Neuropharmacology

Editorial Service
• Ad Hoc Reviewer:
  Addictive Behaviors
  Biological Psychiatry
  Brain
  Clinical Neurophysiology
  Drug and Alcohol Dependence
  International Journal of Psychiatry in Medicine
  Journal of Neurological Sciences
  Journal of Nervous and Mental Diseases
  Neurological Research
  Psychophysiology

Publications: 2013-14
• Refereed Articles:


- **Book Chapters:**

- **Invited Lectures: 2013-14**
  - **International:**


**Esther Jane, PhD**  
*Research Assistant Professor of Neurological Surgery*

Esther Jane, PhD, graduated from Madurai Kamaraj University in India. She did her post doctoral training in Case Western Reserve University in Cleveland, Ohio, on the molecular mechanisms underlying regulation of homeotic gene expression during drosophila development. Before joining the University of Pittsburgh Department of Neurological Surgery, she worked in the Pittsburgh Development Center studying the cell biology of human embryonic stem cells before and after differentiation towards neuronal lineage. Dr. Jane is currently working on the project examining compounds that inhibit the function of individual kinases using diverse panel of malignant glioma cell lines.
Esther Jane, PhD

Faculty Biographies

Specialized Areas of Interest
Mode of action of multi-target tyrosine kinase inhibitors in glioma cells.

Professional Organization Membership
American Association For Cancer Research

Editorial Service
• Ad Hoc Reviewer:
  Cancer Letters

Publications: 2013-14
• Refereed Articles:


• Presentations:
  Jane EP, Premkumar DR, Morales A, Foster KA, Pollack IF. “Inhibition of Phosphatidylinositol 3-Kinase/AKT Signaling by NVP-BKM120 Promotes ABT-737-induced toxicity in a caspase-dependent manner through mitochondrial dysfunction and DNA damage response in established and primary cultured glioblastoma cells.” American Association for Cancer Research Annual Meeting, San Diego, Calif., April 5-9, 2014.


Brian Jankowitz, MD
Assistant Professor of Neurological Surgery
Co-Director, Endovascular Therapy
Director, Neuroendovascular Fellowship Program

Brian Jankowitz, MD, joined the Department of Neurological Surgery faculty as an assistant professor on July 1, 2010 after completing the department’s seven-year residency program and cerebrovascular fellowship. He is the only neurosurgeon in Pittsburgh who performs both open and endovascular cerebrovascular surgery. This unique skill set allows unbiased treatment options ranging from carotid stenting versus carotid endarterectomy, aneurysm coiling versus clipping, and AVM embolization versus resection. Dr. Jankowitz has a keen interest in treating ischemic cerebrovascular disease including carotid revascularization, acute stroke interventions, and EC-IC bypass. He believes a combination of open and endovascular means, working synergistically, holds the key to improving outcomes. He works closely with Tudor Jovin, MD, director of the UPMC Stroke Institute, to evaluate and treat hemorrhagic and ischemic disease in a multidisciplinary cerebrovascular clinic at UPMC Mercy. Originally from Montgomery County, Maryland, Dr. Jankowitz received his
Faculty Biographies

John Jankowitz, MD

Medical training at Temple University in Philadelphia and received his undergraduate degree from the University of Notre Dame.

Specialized Areas of Interest
Vascular neurosurgery

Hospital Privileges
Children’s Hospital of Pittsburgh of UPMC
UPMC Mercy
UPMC Passavant
UPMC Presbyterian
UPMC St. Margaret
UPMC Shadyside

Professional Organization Membership
American Association of Neurological Surgeons
Congress of Neurological Surgeons

Larry W. Jenkins, PhD
Professor of Neurological Surgery and Radiology

Larry Jenkins, PhD, joined the Brain Trauma Research Center within the Department of Neurological Surgery at the University of Pittsburgh in September 1998 and has been an adjunct faculty member in the Department of Neurobiology since 2000. He was promoted to professor in December of 2006. Dr. Jenkins received his PhD in anatomy at the Medical College of Virginia where he also had postdoctoral training in cerebral blood flow physiology. From 1980 to 1993, he was a faculty member in the Division of Neurosurgery at the Medical College of Virginia and the Department of Anesthesiology at UTMB Galveston from 1993 to 1998. He was the secretary/treasurer of the National Neurotrauma Society for 2003 and is an associate director of the Safar Center for Resuscitation Research. Dr. Jenkins has published 93 articles in refereed journals and 20 book chapters. Dr. Jenkins retired from the department in October of 2013.

Wenyan Jia, PhD
Research Assistant Professor of Neurological Surgery

Wenyan Jia, PhD, received her PhD in biomedical engineering from Tsinghua University, China, in 2005 before joining the University of Pittsburgh as a postdoctoral scholar. In 2009, she was promoted to research assistant professor in the Department of Neurological Surgery.

Specialized Areas of Interest
Biomedical signal and image processing; wearable electronic device; mobile health.

Editorial Service
• Ad Hoc Reviewer:
  IEEE Transactions on Biomedical Engineering

Professional Activities
NSF Proposal Reviewer and Panelist, 2013/2014
Program Committee Member, ACM SenseCam and Pervasive Imaging Conference, San Diego, CA, 2013
Faculty Biographies

Wenyan Jia, PhD

Publications: 2013-14

• Refereed Articles:


• Presentations:


Hideyuki Kano, MD, PhD
Research Associate Professor of Neurological Surgery
Director of Clinical Research at the Center for Image-Guided Neurosurgery

Hideyuki Kano, MD, PhD, joined the faculty in the Department of Neurological Surgery Center for Image-Guided Neurosurgery in 2008 as a visiting research assistant professor and is now a research associate professor in the department. He was named clinical research director at the center in 2014. Dr. Kano received his medical training from the Shiga University
Hideyuki Kano, MD, PhD

of Medical Science in Otsu, Japan, earning his medical degree in 1997. He subsequently received his residency training at the Kyoto University School of Medicine, Kyoto, Japan and Osaka Saiseikai Izuo Hospital, Osaka, Japan in 2000. From 2000 to 2004, he received his residency training and then fellowship program of stereotactic radiosurgery and received a certificate of board of neurological surgery in Japan in 2004. In 2006, Dr. Kano received his PhD from the Graduate School of Medicine Kyoto University, Kyoto, Japan. From 2004 to 2007, Dr. Kano worked as a neurosurgeon-in-chief at Kishiwada City Hospital in Japan. He completed his fellowship program of image-guided neurosurgery at the University of Pittsburgh in 2008. In 2009, Dr. Kano received the National Brain Tumor Society Mahaley Clinical Research Award from the Joint Section on Tumors of the AANS/CNS. In 2012, Dr. Kano received the Integra Foundation Award from the Joint Section on Tumors of the AANS/CNS. In 2013, Dr. Kano received the Leksell Radiosurgery Award from the AANS and the Synthes Skull Base Surgery Award from the CNS. Dr. Kano is currently working on a clinical study about stereotactic radiosurgery for benign and malignant brain tumors, arteriovenous malformation and functional disease. He has published more than 100 articles in refereed journals, 29 book chapters and/or invited publications, and has edited one book.

Board Certifications
Japanese Board of Neurological Surgery

Professional Organization Membership
AANS/CNS Joint Section on Tumors
Congress of Neurological Surgeons
International Stereotactic Radiosurgery Society, active member
Japanese Society of Neurosurgery
Japanese Society of Stereotactic Radiosurgery
The Japan Society of Neuro-Oncology

Editorial Service
• Editorial Board:
  BMC Neurology
  World Science

• Ad Hoc Reviewer:
  American Journal of Case Reports
  American Journal of Neuroradiology
  Cancer Research
  CNS Oncology
  Expert Review of Anticancer Therapy
  Expert Review of Medical Devices
  Journal of Clinical Oncology
  Journal of Neurosurgery
  International Journal of Case Reports in Medicine
  International Journal of Molecular Sciences
  International Journal of Radiation Oncology, Biology, Physics
  Journal of Clinical Medicine and Research
  Journal of Pediatric Neuroradiology
  Journal of Pregnancy
  Journal of Zhejiang University SCIENCE B - Biomedicine & Biotechnology
  Medical Imaging and Radiology
  New England Journal of Medicine
  Pain Management
Honors and Awards
Integra Foundation Award, AANS/CNS Joint Section on Tumors, 2012
Leksell Radiosurgery Award, AANS, 2013
National Brain Tumor Society Mahaley Clinical Research Award, 2009
Osaka Medical Research Foundation for Incurable Diseases Grant Award, 2007-09, 2011-12
Synthes Skull Base Surgery Award, AANS/CNS Joint Section on Tumors, 2013

Publications: 2013-14
• Refereed Articles:


- **Invited Papers:**

- **Letters to the Editor:**

- **Book Chapters:**


- **Published Abstracts:**


Faculty Biographies


• Presentations:


**Invited Lectures: 2013-14**

• International:
  Kano H. “What has stereotactic radiosurgery accomplished with management of brain tumors?” Key Note Lecture, Annual Meeting of the Japanese Congress for Brain Tumor Surgery, Otsu, Japan, September 20, 2013.

• Visiting Professorships:

  Osaka City General Hospital, Department of Neurosurgery, Osaka, Japan. “Gamma Knife, A Standard Treatment Modality in The Field of Neurosurgery.” September 26, 2013.

  Hokkaido University, Department of Neurosurgery, Sapporo, Japan “Gamma Knife, A Standard Treatment Modality in The Field of Neurosurgery.” September 30, 2013.

  Kurashiki Central Hospital, Department of Neurosurgery, Kurashiki, Japan “Gamma Knife, A Standard Treatment Modality in The Field of Neurosurgery.” October 1, 2013.
Adam S. Kanter, MD
Associate Professor of Neurological Surgery
Chief, Division of Spine Surgery
Director, Minimally Invasive Spine Program
Director, Spine Fellowship Program

Adam S. Kanter, MD, joined the faculty of the Department of Neurosurgery in January of 2008 as director of the department’s minimally invasive spine program. Dr. Kanter performed his undergraduate work at the University of Massachutes in Amherst, graduating with Cum Laude honors. He obtained his masters degree from Boston University and his medical degree from the University of Vermont in 2001. Dr. Kanter then completed his neurosurgical residency at the University of Virginia in 2007. He completed subspecialty fellowship training in minimally invasive spine surgery at the University of California in San Francisco and Auckland City Hospital in Auckland, New Zealand. Dr. Kanter is board certified in neurological surgery and was promoted to associate professor in 2013. He was named chief of spine services in 2014 and continues to push the surgical envelope in minimally invasive spine procedures utilizing many of the innovative portals that he has helped to develop. Dr. Kanter is principal investigator in several research studies evaluating the use of stem cell derived biologics to induce spinal fusion. His research focuses on patient derived clinical outcome measures, specifically appraising the utility of minimally invasive versus open surgical corridors. Dr. Kanter has published numerous papers in refereed journals and authored several book chapters. He provides editorial service to several peer reviewed journals and is a member of the societies of minimally invasive spine surgery and lateral access surgery.

Specialized Areas of Interest
Minimally invasive spine surgery; endosurgical complex spine surgery; artificial disc technology; spinal tumors; experimental therapies for spinal cord regeneration.

Board Certifications
American Board of Neurological Surgery

Hospital Privileges
Magee-Womens Hospital of UPMC
UMPC Passavant
UPMC Presbyterian
UPMC St. Margaret
UPMC Shadyside

Professional Organization Membership
AANS/CNS Joint Section on Spine & Peripheral Nerves
American Association of Neurological Surgeons
Congress of Neurological Surgeons
Society of Lateral Access Surgeons
Society of Minimally Invasive Spine Surgeons
North American Spine Society

Editorial Service
• Editorial Board:
The Physician & Sports Medicine
SpineLine
Faculty Biographies

Adam S. Kanter, MD

• Ad Hoc Reviewer:
The Spine Journal
Neurosurgical Focus
Neurosurgery

Interdepartmental and Medical Center Activities
• UPMC Presbyterian:
Medical Executive Committee

Professional Activities
AANS/CNS Joint Section of Spine & Peripheral Nerves:
Executive Committee Member
Fellowship Committee, Chairman
Research & Awards Committee, Past Chair
Scientific Program Committee

Honors and Awards
Best Doctors in America 2009-14
Pittsburgh Best Doctors 2012-14
Brazilian Spine Congress 2012 Honored Guest
Most Compassionate Doctor Award, December 2012
Patients’ Choice Award, October 2012
Fellowships Committee Chair, AANS/CNS Spine Section, March 2014
Research & Awards Committee Chair, 2011-13

Publications: 2013-14
• Refereed Articles:


• **Book Chapters:**


**Invited Lectures: 2013-14**

• **International:**

Faculty Biographies


• National:


David L. Kaufmann, MD

Clinical Assistant Professor of Neurological Surgery
Chief of Neurosurgery, UPMC Mercy

David L. Kaufmann, MD, specializes in spinal and general neurosurgery. His clinical interests include degenerative spinal disorders, spine and brain tumors, and the treatment of spinal and cranial trauma. Dr. Kaufmann received his medical degree from the Albert Einstein College of Medicine in New York City and completed a surgical internship at the John Hopkins Hospital. He performed his neurosurgical residency at Montefiore Medical Center and the Hyman-Newman Institute for Neurology and Neurosurgery at Beth Israel Medical Center in New York City. He is a member of the American Association of Neurological Surgeons, the Congress of Neurological Surgeons and the Pennsylvania Neurological Society.
Faculty Biographies

**Specialized Areas of Interest**
Spinal surgery

**Board Certifications**
American Board of Neurological Surgeons

**Hospital Privileges**
Monongahela Valley Hospital
UPMC Mercy

**Professional Organization Membership**
Allegheny County Medical Society
American Association of Neurological Surgeons
Congress of Neurological Surgeons
Pennsylvania Neurosurgical Society

**L. Dade Lunsford, MD**
*Lars Leksell Professor and Distinguished Professor*
*Director, Center for Image-Guided Neurosurgery*
*Director, Residency Training Program*

L. Dade Lunsford, MD is the Lars Leksell Professor and Distinguished Professor at the Department of Neurological Surgery at the University of Pittsburgh. He is also director of the Center for Image-Guided Neurosurgery at the University of Pittsburgh Medical Center and an internationally recognized authority on stereotactic surgery, radiosurgery, and minimally invasive surgery. In 1987, Dr. Lunsford was responsible for bringing the Gamma Knife to the University of Pittsburgh Medical Center, the first center in the United States to offer this state-of-the-art, minimally invasive form of brain surgery. Dr. Lunsford received his medical degree in 1974 from the Columbia University College of Physicians and Surgeons. He completed his internship in surgery at the University of Virginia Hospital and his residency in neurological surgery at the University of Pittsburgh. Following a one-year fellowship in stereotactic and functional neurosurgery at the Karolinska Institute in Stockholm, Sweden—studying with professors Lars Leksell and Erik-Olof Backlund—he joined the Department of Neurological Surgery faculty in 1981. He is an active staff member of several UPMC hospitals and was president of the medical staff at UPMC Presbyterian from 1999-2001 and past president of the Council of Clinical Chairs for the University of Pittsburgh School of Medicine in 2001-2003. Dr. Lunsford chairs the UPMC Health System Technology and Innovative Practice committee and co-chairs the UPMC Brain Mapping (MEG) Center. Dr. Lunsford has been board-certified by the American Board of Neurological Surgery since 1983. He is the author of 554 published articles and 258 book chapters as well as the editor or co-editor of twelve books. Dr. Lunsford also served as department chairman for ten years, stepping down in July of 2006 to devote more time to his clinical work, clinical investigation, and resident and fellow training.

**Specialized Areas of Interest**
Brain tumor management; Gamma Knife stereotactic radiosurgery; movement disorders and trigeminal neuralgia; vascular malformations; concussion and sports medicine.

**Board Certifications**
American Board of Neurological Surgery
Faculty Biographies

L. Dade Lunsford, MD

Hospital Privileges
Children's Hospital of Pittsburgh of UPMC
UPMC Presbyterian
UPMC Shadyside
UPMC St. Margaret's

Professional Organization Membership
AANS/CNS Joint Section for Stereotactic and Functional Neurosurgery (chairman, 1995-97)
Allegheny County Medical Society
American Academy of Neurological Surgery
American Association of Neurological Surgeons, Fellow
American College of Surgeons, Fellow
American Medical Association
American Pain Society
American Society for Stereotactic and Functional Neurosurgery (president, 1995-97)
Congress of Neurological Surgeons
Elekta Scientific Advisory Board
Florida Medical Association
International Association for the Study of Pain
International Radiosurgery Association, Chairman, Medical Advisory Board
International Stereotactic Radiosurgery Society, Co-Founder and President, 1991-1993
Japan Neurosurgical Society, Guest Member
Mid-Atlantic Neurosurgical Society
North American Gamma Knife Consortium, Chairman
North American Skull Base Society
Pennsylvania Medical Society
Pennsylvania Neurosurgical Society
Phi Sigma Biological Society
Pittsburgh Neuroscience Society
Research Advisory Committee of the Focused Ultrasound Surgery Foundation
Society for Neuro-Oncology
Society of Neurological Surgeons
University of Virginia Alumni Association, Regional Selection Committee, Jefferson Scholars Program
World Society for Stereotactic and Functional Neurosurgery

Editorial Service
• Editorial Board:
  Empowered Medical Media
  Neurologia Medico-Chirurgica, (commentator, advisory board)
  Neurosurgery Operative Technologies
  Progress in Neurological Surgery, (editor)
  Stereotactic and Functional Neurosurgery
  Surgical Neurology

• Ad Hoc Reviewer:
  Acta Neurologica Scandinavica
  American Journal of Otology
  British Journal of Neurosurgery
  Cancer
  Environmental Research
  International Journal of Endocrinology
Faculty Biographies

L. Dade Lunsford, MD

International Journal of Radiation Biology
International Journal of Radiation Oncology, Biology and Physics
JAMA
Journal of Image-Guided Neurosurgery
Journal of Microsurgery
Journal of Neurosurgery
The Lancet Oncology
Nature Reviews Endocrinology
Nature Clinical Practice Neurology
Neurology
Neuroradiology
Neurosurgery
Neurotherapeutics
New England Journal of Medicine
Oncology
Otology and Neurotology
Radiation Oncology
Radiotherapy and Oncology
Scholarly Research Exchange
Technology in Cancer Research and Treatment
World Journal of Surgical Oncology

Interdepartmental and Medical Center Activities

• UPMC:
  UPMC Presbyterian Medical Staff President 1999-2001
  Director, Residency Program, Neurological Surgery 1994-Chairman, Neurological Surgery, 1997-2006
  Council of Clinical Chairmen, Chair 2001-2003
  Value Analysis Executive Steering Team
  Technology and Innovative Practice Assessment Committee, Chair
  Chairman, Board of Directors, UPMC Rehabilitation Hospital, 1998-2005
  Board of Directors, Tri Century Medical Insurance, 2004-2007
  Co-Chair, UPMC Brain Mapping (MEG) Center, 2009-present
  Moderator, Residents and Fellows, Radiosurgery Conference
  Director, Center for Image-Guided Neurosurgery

• University of Pittsburgh:
  Executive Committee, School of Medicine, 1997-2006
  Co-Director, Image-Guided Neurosurgery Fellowship Program
  Senate Council
  Faculty Assembly

• University of Pittsburgh Physicians:
  Board of Directors, 1997-2006
  Finance Committee, 1997-2006

Professional Activities
Course Co-Director, Principles and Practices of Gamma Knife® Radiosurgery, Pittsburgh, PA, (six courses per year)
Faculty Biographies

L. Dade Lunsford, MD

Honors and Awards
BA with High Honors - University of Virginia (1970)
Phi Beta Kappa - University of Virginia (1970)
William P. Van Wagener Fellowship, AANS (1980)
Good Housekeeping Best Doctors (1996)
International Stereotactic Radiosurgery Jacob Fabrikant Award (1997)
William S. McEllroy Award, University of Pittsburgh School of Medicine (1997)
The Best Doctors, 1997 - 2002
Faculty Teaching Award, Department of Neurosurgery (1997, 1999, 2000, 2010)
Lars Leksell Provost Lecture (2000)
"America's Top Doctors," Castle Connolly Medical, Ltd. 2000-2008
AANS Young Neurosurgeon Award (2005)
Academic Keys Who's Who in Medical Sciences Education (2005)
Best Doctors in America (2005-2014)
Guide to America’s Top Surgeons (2006-2009)
Distinguished Professor, University of Pittsburgh (2007)
Congress of Neurological Surgeons Honored Guest (2007)
Allegheny County Medical Society Ralph C. Wilde Award (2008)
Castle Connolly Medical Ltd. National Physician of the Year Award (2008)
Pioneers in Radiosurgery Award, 2010, Leksell Gamma Knife Society (2010)
Leading Health Professionals of the World (2010)
America’s Top Doctors for Cancer Award, Castle Connolly (2010-2014)
Best Doctors in America database (2010-2014)

Publications: 2013-14
• Refereed Articles:


Faculty Biographies


• Books:

• Book Chapters:


- Published Abstracts:

- Presentations:

Invited Lectures: 2013-14
- National:


  Lunsford LD. “Controversies in management: surgery with whole brain radiation therapy vs. surgery followed by radiosurgery to the surgical cavity.” Annual Brain Tumor Update and Annual International Symposium on Long-Term Control of Metastases to the Brain and Spine, Cleveland Clinic, Las Vegas, Nev., November 9-10, 2013.


  Lunsford LD. “Rationale and Results of Radiosurgery for AVMs.” Shelley A. Chou Lecturer in Neurosurgery. The Department of Neurosurgery, University of Minnesota, Minneapolis, Minn., May 2, 2014.


  Lunsford LD. “Defining a Role for Cavernous Malformation Radiosurgery.” Neurological Surgery Grand Rounds, Stanford University, Stanford, Calif., June 20, 2014.
Joseph C. Maroon, MD

Heindl Scholar in Neuroscience
Clinical Professor of Neurological Surgery
Director, Tri-State Neurosurgical Associates
Team Neurosurgeon, Pittsburgh Steelers

Joseph C. Maroon, MD, is a board-certified clinical professor of neurological surgery at the University of Pittsburgh Medical Center, and the Heindl Scholar in Neuroscience. He obtained his medical and neurosurgical training at Indiana University, Georgetown University, Oxford University in England and the University of Vermont. His clinical and research interests have been in the areas of the development of minimally invasive surgical procedures to the brain and spine, the prevention and treatment of traumatic injuries to the central nervous system, innovative approaches to pituitary and other brain tumors and more recently complimentary approaches to inflammatory diseases associated with aging. Working with neuropsychologist, Mark Lovell, PhD, he co-developed ImPACT® (Immediate Post-Concussion Assessment and Cognitive Testing). This is the first computerized system to determine concussion severity and the timing for return to contact sports. It is now the standard of care for concussion management in the National Football League, National Hockey League, Major League Baseball, NASCAR and is used in over 12,000 colleges and high schools in the United States. For over 20 years he has served as the neurosurgical consultant to professional and college athletes in football, baseball, golf, hockey and soccer and has been the team neurosurgeon to the Pittsburgh Steelers for 20 years. He has been honored by the neurosurgical societies of Japan, Korea, Thailand, Egypt, Brazil, Lebanon and China for his neurosurgical contributions. He was honored by his peers when he was elected president of the Congress of Neurological Surgeons, the largest society of neurosurgeons in North America. Other outside activities include a member of the board of directors and chairman of the scientific and technology committee of Mylan Laboratories, the third largest generic drug manufacturer in the world; chairman of the scientific advisory board to General Nutrition Corporation (GNC); and, chairman of the medical and scientific advisory board to Stemedica. He also serves on the NFL Head, Neck and Spine Committee and, in 2008, he became medical director of the World Wrestling Entertainment Corporation (WWE). Also in 2008, he was named senior vice president of the American Academy of Anti-Aging Medicine (A4M). Honored as one of America’s best neurosurgeons for 12 consecutive years, he has published four books, has written over 250 papers and 40 book chapters. His two most recent books include, Fish Oil: The Natural Anti-Inflammatory, published in 2006 and The Longevity Factor: How Resveratrol and Red Wine Activate Genes for Longer and Healthier Life, released by Simon and Schuster in January of 2009. In his early years, his athletic abilities earned him a football scholarship to the University of Indiana in Bloomington. There he was selected as Scholastic All-American in football. Despite his busy professional schedule, Dr. Maroon remains an avid athlete and has competed in over 70 triathlon events. These include eight Ironman distant triathlons (2.4 mile swim, 112 mile bike and 26.2 run) in Hawaii (1993, 2003, 2008, 2010 and 2013), Canada (1995), New Zealand (1997) and Europe (2000). He placed sixth in the Senior U.S. Olympics Triathlon in 2005. In 1999 he, along with Joe Montana and Kareem Abdul Jabaar, was inducted into the Lou Holtz Upper Ohio Valley Hall of Fame for his athletic accomplishments and contributions to sports medicine. On May 2, 2009 he was inducted into the Western Pennsylvania Sports Hall of Fame and on March 14, 2010 he was inducted into the National Fitness Hall of Fame in Chicago. As medical director of the Live Free African Freedom Tour, on February 26, 2014, Dr. Maroon and his daughter, Isabella—along with a group of amputees—summitted Mt. Kilimanjaro in Africa, the highest free standing mountain in the world.
Specialized Areas of Interest
Microdiscectomy; lumbar laminectomy; anterior cervical discectomy; Arnold-Chiari Malformation; pituitary tumors; orbital tumors; acoustic tumors; brain tumors; concussion; sports medicine.

Board Certifications
American Board of Neurological Surgery

Hospital Privileges
UPMC Passavant
UPMC Presbyterian
UPMC St. Margaret
Sewickley Valley Hospital
Wheeling Hospital

Professional Organization Membership
Allegheny County Medical Society
American Academy of Anti-Aging Medicine
American Association of Neurological Surgeons
American College of Sports Medicine
American College of Surgeons
American Medical Association
Congress of Neurological Surgeons
Mid-Atlantic Neurosurgical Society
National Association for Disabled Athletes
National Football League Physicians Society
Neurosurgical Society of America
Pennsylvania Medical Society
Pennsylvania Neurosurgical Society
Research Society of Neurological Surgeons
Society of Neuroscience

Editorial Service
• Editorial Board:
  Anti-Aging News Journal
  Neurological Research
  The Physician and Sportsmedicine
  Surgical Neurology International

• Ad Hoc Reviewer:
  Annals of Otolaryngology
  Chinese Journal of Neural Regeneration Research
  European Journal of Pain
  Journal of Cranial Base Surgery
  Journal of Neurotrauma
  Journal of the American College of Surgeons
  Neurology India
  Neurosurgery
  Stroke
  Surgical Neurology
Faculty Biographies

Joseph C. Maroon, MD

Professional Activities
Team Neurosurgeon, Pittsburgh Steelers
Scientific Advisory Board, General Nutrition Corporation
Board of Directors, Mylan Laboratories
Medical Director, WWE
Senior Vice President, American Academy of Anti-Aging Medicine (A4M)
Senior Advisor, NFL Head, Neck and Spine Committee
World Advisory Board of the International Sports Hall of Fame
Board of Directors, Phipps Conservatory
Chairman, Science and Technology Committee of Mylan Labs
Chairman, Medical and Scientific Advisory Board, Stemedica

Honors and Awards
Lou Holtz/Upper Ohio Valley Hall of Fame inductee, for excellence in athletics and medicine, June 1999.
Western Pennsylvania Chapter of the Sports Hall of Fame, May 2, 2009.
Distinguished Alumni Service Award, Indiana University, Bloomington, Ind., November 4, 2011.
Pioneer Award. 25th Anniversary UPMC Center for Cranial Base Surgery, Pittsburgh, Pa., November 17, 2012.

Media Appearances: 2013-14
“Doctor says Kilimanjaro trek was an inspirational high,” Pittsburgh Tribune-Review, March 11, 2014.
“Ain’t no mountain high enough for Steelers doc,” steellers.com, February 27, 2014.
“Pittsburgh Doctors Head WWE Medical Team,” KDKA.com, February 19, 2014.
“Jermichael Finley, agent optimistic TE will be cleared; Packers future uncertain,” Milwaukee-Wisconsin Journal Sentinel, February 12, 2014.
Faculty Biographies

“Pro athletes can resume careers after cervical spine fusion surgery, reports Neurosurgery,” Science Codex, July 18, 2013.

Publications: 2013-14
• Refereed Articles:

Invited Lectures: 2013-14
• National:

• Local/Regional:

• Visiting Professorships:
Vincent J. Miele, MD  
*Clinical Assistant Professor of Neurological Surgery*

Vincent J. Miele, MD, joined the University of Pittsburgh Department of Neurosurgery as a clinical assistant professor on January 1, 2014. He is the former director of the neurosurgical spine service at West Virginia University. Dr. Miele received his undergraduate degree at Northeastern University in Boston where he graduated summa cum laude and was inducted into the Rho Chi Academic Pharmacy Honor Society as well as the Phi Kappa Phi Honor Society. He was also awarded the Northeastern University Alumni of the Year President’s Award in 2001. Dr. Miele completed medical school and his neurosurgical residency at West Virginia University where he was elected to the medical honor society Alpha Omega Alpha and won the Gandee-Massey Award based on academic achievement. He is fellowship trained in complex spine surgery from Cleveland Clinic Foundation, where he remains adjunct faculty in the Spine Research Laboratory. His research has encompassed such areas as spinal biomechanics, concussion management and return to play, as well as accelerometer and MEMs technology translation into clinical applications. He has published more than 30 papers in refereed journals, authored 20 book chapters, and has presented scientific lectures both nationally and internationally. His research has lead to invited written editorials in prominent media such as the New York Times. He has been actively involved in the Congress of Neurological Surgeons, American Association of Neurological Surgery, and North American Spine Society and is an ad hoc reviewer for various journals. Dr. Miele’s major clinical interests embrace many aspects of neurosurgery, but are focused on spinal disorders including pathologies associated with degeneration and trauma, complex spinal instrumentation, revision spinal surgery, and spinal tumors. His areas of expertise include minimally invasive spine surgery and the newer motion preservation technologies as well as the larger surgeries required for conditions such as adolescent/adult spinal deformity and the multidisciplinary treatment of spinal tumors. Dr. Miele also has a strong background in cranial neurosurgery and treats peripheral nerve conditions such as carpal tunnel syndrome. Dr. Miele frequently evaluates and manages sports-related head and spine injuries, and works at a national level with athletes on return to play issues. He is involved in the development of devices used to detect and prevent concussion and is frequently invited to speak on this subject nationally. He is licensed to practice in Pennsylvania, Ohio, and West Virginia and has established clinics in Lower Burrell PA, Beaver Falls PA, Greenville PA, Monroeville PA, Wexford PA, and Wheeling WV.

**Specialized Areas of Interest**
Spinal disorders; spine tumors; revision spinal surgery, adult deformity/scoliosis surgery, sports-related head and spine injures; peripheral nerve disorders.

**Board Certifications**
American Board of Neurological Surgery

**Hospital Privileges**
UPMC Mercy  
UPMC Passavant  
UPMC Presbyterian  
UPMC Shadyside

**Professional Organization Membership**
Alpha Omega Alpha Medical Honor Society  
American Association for the Improvement of Boxing  
American Association of Neurological Surgeons
American Association of Professional Ringside Physicians
American College of Sports Medicine
Congress of Neurological Surgeons
International Federation of Sports Medicine
North American Spine Society
Ohio State Medical Society
Pennsylvania State Medical Society
United States Amateur Boxing Ringside Physicians
West Virginia State Medical Society

Publications: 2013-14

• Presentations:
  Miele VJ. “Vertebral Augmentation – Options and Evidence.” Cleveland Clinic Spine Review
  Hands-On 2013, Lutheran Hospital, Cleveland Clinic, Cleveland, Ohio, July 10-16, 2013.
  
  Miele VJ, Bartsch A, Benzel E. “The Use of Accelerometers to Detect Head Injuries in Sports.”
  Neurosurgery Research Retreat, University of Pittsburgh Medical Center, Department of Neu-

Edward A. Monaco III, MD, PhD, PhD
Assistant Professor of Neurological Surgery

Edward A. Monaco III, MD, PhD, joined the Department of Neurological Surgery faculty as
an assistant professor in June of 2013 after completing the University of Pittsburgh’s seven-
year neurosurgery residency program. Prior to coming to the university, Dr. Monaco earned
a PhD in neuroscience and physiology at SUNY Upstate Medical University in Syracuse and
his medical degree from Columbia University College of Physicians and Surgeons in New
York, N.Y. He completed undergraduate degrees in biology and chemistry at LeMoyne Col-
lege in Syracuse, N.Y. Dr. Monaco was born in Charleston, S.C.

Specialized Areas of Interest
Gamma Knife stereotactic radiosurgery.

Hospital Privileges
UPMC Presbyterian

Publications: 2013-14

• Refereed Articles:
  Bowden G, Kano H, Tempel ZJ, Caparosa E, Monaco E 3rd, Niranjan A, Flickinger J, Luketich
  JD, Lunsford LD. Gamma Knife Radiosurgery for Management of Cerebral Metastases from

• Book Chapters:
  Treating Cavernomas with Radiosurgery. In: Controversies in Stereotactic Radiosurgery: Best

• Published Abstracts:
  Zwagerman NT, Hamilton R, Monaco EA, Chen S, Flickinger JC, Gerszten PC. Histopatho-
  logical examination of spine metastases after radiosurgery. Journal of Radiosurgery and SBRT
John J. Moossy, MD

Professor of Neurological Surgery
Director, Surgical Pain Management
Chief of Neurosurgery, VA Pittsburgh Healthcare System

John J. Moossy, MD, joined the faculty of the Department of Neurological Surgery at the University of Pittsburgh in 1986. He is chief of neurosurgery at the Veterans Affairs Pittsburgh Healthcare System. Dr. Moossy attended medical school at Tulane University, earning an MD degree in 1980. He completed a surgical internship and the residency program in neurosurgery at Duke University. Prior to that, he was an undergraduate student at Wake Forest University in Winston Salem, North Carolina, and at the University of Pittsburgh. His clinical practice is one of general neurosurgery with a special interest in the surgical management of medically intractable pain. Dr. Moossy's publications include 30 articles in refereed journals and nine book chapters.

Specialized Areas of Interest
The surgical treatment of intractable pain problems through neuro-augmentative and neuro- ablative procedures.

Board Certifications
American Board of Neurological Surgery

Hospital Privileges
Lanrobe Area Hospital
Magee-Womens Hospital of UPMC
UPMC Presbyterian
UPMC St. Margaret
UPMC Shadyside
Veterans Affairs Pittsburgh Healthcare System

Professional Organization Membership
Allegheny County Medical Association
American Association of Neurological Surgeons (AANS)
American Medical Association
Carroll F. Reynolds History of Medicine Society
Congress of Neurological Surgeons
Pennsylvania Medical Association
Pennsylvania Neurosurgical Society
Section on Disorders of the Spine & Peripheral Nerves of the AANS/CNS
Section on Pain of the AANS/CNS
Section on History of the AANS/CNS

Honors and Awards
Department of Neurological Surgery Resident Teaching Award, 2001-2003
Pittsburgh Magazine Top Doctor Award, 2012-2014
Rudlof Matas Prize in History of Medicine, 1980
Ajay Niranjan, MD, MBA
Associate Professor of Neurological Surgery
Director, UPMC-Brain Mapping Center (MEG)
Associate Director, Center for Image-Guided Neurosurgery
Director of Radiosurgery Research

Ajay Niranjan, MD, is associate professor of neurological surgery at the University of Pittsburgh and the director of UPMC-Brain Mapping Center (MEG). Dr. Niranjan received his medical training at the King George’s Medical College in Lucknow, India from 1980 to 1985, graduating with a bachelor of medicine and bachelor of surgery degree. Dr. Niranjan completed general surgery in 1989 residency and in and neurological surgery residency 1992. Dr. Niranjan joined the University of Pittsburgh as a fellow in image-guided neurosurgery in 1997 and completed his fellowship in 2000. He joined the faculty of neurological surgery in July of 2000. Dr. Niranjan’s major research interest is in the development of presurgical brain mapping using magnetoencephalography (MEG). His other research interests include development of strategies to enhance the effect of radiosurgery on brain tumors, and role of hypothalamic radiosurgery in appetite and body weight modulation. His laboratory has studied the radiobiological effects of radiation on brain-tumor microenvironment and has evaluated the effects of radiation on neural stem cells implantation in the brain. Dr. Niranjan serves as principal investigator on the following two projects: “Multicenter Phase II Study of Border Zone Stereotactic Radiosurgery with Bevacizumab Chemotherapy in Patients with Recurrent or Progressive Glioblastoma Multiforme” and “A Safety and Feasibility Study of Minocycline Therapy for Management of Adverse Radiation Effects after Brain Metastases Radiosurgery.” He has co-authored over 160 articles in refereed journals and over 80 book chapters. He has contributed guidelines for stereotactic radiosurgery for trigeminal neuralgia, pituitary adenomas, arteriovenous malformation, acoustic tumors, and brain metastases. He has edited three books.

Specialized Areas of Interest
Radiosurgery for tumors, vascular malformations and functional brain disorders; Pre-surgical brain mapping using MEG.

Hospital Privileges
UPMC Presbyterian

Professional Organization Membership
American Clinical MEG Society
Congress of Neurological Surgeons
International Stereotactic Radiosurgery Society

Editorial Service
• Editorial Board:
  World Science

• Ad Hoc Reviewer:
  Gene Therapy
  Journal of Neurosurgery
  Neurology India
  Technology In Cancer Research And Treatment (TCRT)
Interdepartmental and Medical Center Activities

- UPMC Presbyterian:
  Member, Radiation Safety Committee
  Director of Operations, UPMC Brain Mapping Center
  Member, Total Quality & Patient Safety Council

Publications: 2013-14

- Refereed Articles:


  Bowden G, Kano H, Tonetti D. Stereotactic radiosurgery for sylvian fissure arteriovenous malformations with emphasis on hemorrhage risks and seizure outcomes. *J Neurosurg* 1-8, 2014


FACULTY BIOGRAPHIES

Hideho Okada, MD, PhD
Professor of Neurological Surgery, Surgery and Immunology

Hideho Okada, MD, PhD, joined the faculty in the Department of Neurological Surgery in 1996 as a visiting research associate. During the past year, Dr. Okada served as professor in the departments of Neurological Surgery, Surgery and Immunology as well as co-leader of the Brain Tumor Program at the University of Pittsburgh Cancer Institute. From 1985 to 1991, Dr. Okada received his medical training at the Nagoya University School of Medicine and graduated in 1991 with a bachelor of medicine degree. In 1992, he completed his internship at Handa Municipal Hospital in Japan and then received neurosurgical residency training at Nagoya University School of Medicine. In 1996, Dr. Okada received his PhD from the Graduate School of Nagoya University School of Medicine in Japan. Dr. Okada received a certificate of board of neurological surgery in Japan in 2003, and a license as a medical physician and surgeon from Commonwealth of Pennsylvania in 2004. In 2010, he was elected to be a member of the American Society for Clinical Investigations (ASCI), an honor society of physician-scientists, those who translate findings in the laboratory to the advancement of clinical practice. In June of 2013, Dr. Okada left the department to take a position at the University of California San Francisco (UCSF).

Specialized Areas of Interest
Immunotherapy for brain tumors; gene therapy for brain tumors; roles of the immune system for prevention of brain tumors; roles of microRNAs in brain tumors and immunity.

Board Certifications
Japanese Board of Neurological Surgery
Medical Physician and Surgeon, PA Department of State

Hospital Privileges
University of Pittsburgh Cancer Institute

Professional Organization Membership
Adult Brain Tumor Consortium
American Association for Cancer Research
American Society for Clinical Investigations (ASCI)
Clinical Immunology Society
Japan Society of Neurosurgery
Society for Immunotherapy of Cancer
Society for Neuro-oncology

Editorial Service
• Editorial Board:
  Cancer Research
  Journal of Clinical Immunology
  Journal of Translational Medicine
  Neuro-Oncology
  OncoImmunology
• Ad Hoc Reviewer:
  Cancer Immunology Immunotherapy
  Clinical Cancer Research
  International Journal of Cancer
  Journal of Clinical Oncology
Faculty Biographies

Hideho Okada, MD, PhD

Journal of Immunology
Journal of Immunotherapy
Journal of Neuro- oncology
Human Gene Therapy
Gene Therapy
Melanoma Research
Molecular Therapy
Molecular Cancer Research
Neoplasia
Neurotherapeutics
New England Journal of Medicine
Vaccine

Interdepartmental and Medical Center Activities

• University of Pittsburgh:  
Numerous interdepartmental collaboration projects with other immunologists and molecular biologists at the University of Pittsburgh

• University of Pittsburgh Cancer Institute:  
Reviewer in Protocol Review Committee (PRC) within the UPCI

Professional Activities
Catered member in the NIH Clinical Oncology (CONC) Study Section

Honors and Awards
Doris Duke Charitable Foundation’s Clinical Scientist Development Award
James S. McDonnell’s Foundation 21st Century Scientist Award
Mayoral Award, City of Erie, PA, “Dedication in Medicine”
Pitt Inventor Award 2008
University of Pittsburgh, Faculty Honoree at the Annual Convocation, 2009
Elected to be a member of the American Society for Clinical Investigations (ASCI), 2010
Team Science Recognition Award by Society for Immunotherapy for Cancer, 2010
University of Pittsburgh, Faculty Honoree at the Annual Convocation, 2011, 2013

Publications: 2013-14

• Refereed Articles:


David O. Okonkwo, MD, PhD
Associate Professor of Neurological Surgery
Executive Vice Chairman, Clinical Operations
Clinical Director, Brain Trauma Research Center
Director, Neurotrauma Program
Director, Scoliosis and Spinal Deformity Program

David O. Okonkwo, MD, PhD, is executive vice chair for clinical operations and is director of neurotrauma, director of scoliosis and spinal deformity at UPMC Presbyterian. He is also associate professor and clinical director of the Brain Trauma Research Center of the University of Pittsburgh. Dr. Okonkwo completed his undergraduate work at the University of Virginia, where he received the University Academic Achievement Award and was named a Howard Hughes Undergraduate Biomedical Research Scholar. He completed his medical and doctoral education through the MD/PhD program of the Medical College of Virginia of Virginia Commonwealth University. He joined the University of Pittsburgh Department of Neurological Surgery in 2006 following completion of neurosurgical residency at the University of Virginia and a fellowship at Auckland Public Hospital, Auckland, New Zealand. He has additional specialized training in scoliosis and other spinal deformities. Dr. Okonkwo's
clinical interests are traumatic injuries to the brain and spine as well as scoliosis and spinal deformity. His research endeavors involve developing novel therapeutic interventions for brain and spinal cord injury. Dr. Okonkwo is the principal investigator of a nationally fund-ed clinical core to study the pathophysiology of traumatic brain injury. He is also principal investigator of several ongoing clinical studies in neurotrauma in Pittsburgh. Dr. Okonkwo has published more than 90 papers in refereed journals, authored numerous book chapters, and garnered several awards for his scientific research. He is a member of the American Association of Neurological Surgeons, the Congress of Neurological Surgeons and the National and International Neurotrauma Societies.

Specialized Areas of Interest
Brain and spine trauma; scoliosis; spinal deformity; minimally invasive spine surgery; experimental therapies for brain and spinal cord injuries

Board Certifications
American Board of Neurological Surgery

Hospital Privileges
Children’s Hospital of Pittsburgh of UPMC
Magee-Womens Hospital of UPMC
UPMC Mercy
UPMC Presbyterian
Veterans Affairs Pittsburgh Healthcare System

Professional Organization Membership
Alpha Omega Alpha Medical Honor Society
American Association of Neurological Surgeons
American College of Surgeons (Associate Member)
American Spinal Injury Association
Congress of Neurological Surgeons
International Neurotrauma Society
National Neurotrauma Society

Editorial Service
• Editorial Board:
  Neurosurgical Focus
  Therapeutic Hypothermia

• Ad Hoc Reviewer:
  Developmental Neuroscience
  Experimental Neurology
  Journal of Neurosurgery
  Journal of Neurotrauma

Interdepartmental and Medical Center Activities
• UPMC:
  Trauma Medical Audit Committee
  Physician Services Division Diversity Committee
  UPMC Presbyterian Medical Executive Committee

• University of Pittsburgh:
  Institutional Review Board Member
Faculty Biographies

David O. Okonkwo, MD, PhD

• DSMB Service:
  ProTECT™ III Clinical Trial Oversight Committee
  Phase II Trial of Pediatric Autologous Bone Marrow Mononuclear Cells for Severe Traumatic Brain Injury

Professional Activities
  AANS Annual Meeting, Abstract Selection Committee
  AANS/CNS Section on Neurotrauma and Critical Care, Executive Committee
  International Neurotrauma Society, Executive Board

Honors and Awards
  America’s Best Doctors 2010-14
  Best Doctors in America, 2012-14
  Pittsburgh’s Best Doctors, Pittsburgh Magazine 2012-14

Publications: 2013-14
• Refereed Articles:


**Invited Lectures: 2013-14**

- **International:**
  - Okonkwo DO. "Imaging for Traumatic Brain Injury." AONEuro Course #1, Beijing, China, February 25, 2014.
  - Okonkwo DO. "New Horizons in Traumatic Brain Injury." AONEuro Course #1, Beijing, China, February 26, 2014.
  - Okonkwo DO. "TBI Case Management." AONEuro Course #2, Beijing, China, March 1, 2014.

- **National:**
David O. Okonkwo, MD, PhD

**Faculty Biographies**


- **Local/Regional:**


Jamie Pardini, PhD
Assistant Professor of Neurological Surgery

Jamie Pardini, PhD, a neuropsychologist, joined the Department of Neurological Surgery in July of 2012, as an assistant professor. Dr. Pardini received her PhD in clinical psychology with a subspecialization in psychology-law from the University of Alabama. She completed a pre-doctoral neuropsychology internship at the VA Pittsburgh Healthcare system. She then completed a post-doctoral neuropsychology fellowship at the UPMC Sports Concussion Program. Prior to joining the faculty of the Department of Neurological Surgery, Dr. Pardini was an assistant professor and neuropsychologist in the UPMC Sports Medicine Concussion Program. Dr. Pardini specializes in evaluation of neuropsychological functioning of patients with neurological disorders, many of whom have undergone, or are scheduled to undergo, neurosurgical intervention. A neuropsychological evaluation can contribute to differential diagnosis, provide the physician with information about how an injury, lesion, or disorder is affecting cognitive function (e.g., memory, concentration), measure progress or treatment effects, and/or assist in treatment planning. Patients must be referred by their neurosurgeon. In addition to her clinical practice, Dr. Pardini has remained active as a researcher, lecturer, and educator in the field of mild traumatic brain injury and sports-related concussion since beginning fellowship in 2003. Recently, Dr. Pardini has joined research teams exploring outcomes of epilepsy surgery, DBS placement, traumatic brain injury, and neurovascular procedures.

Specialized Areas of Interest
Neuropsychology; mild traumatic brain injury; sport concussion.

Hospital Privileges
UPMC Mercy  
UPMC Presbyterian  
UPMC Shadyside

Professional Organization Membership
American Psychological Association  
Greater Pittsburgh Psychological Association  
International Neuropsychological Society  
National Academy of Neuropsychology  
Sports Neuropsychology Society

Interdepartmental and Medical Center Activities
• University of Pittsburgh:
  Externship supervisor for Department of Psychology graduate students.

• Chatham University:
  Externship supervisor for Department of Psychology graduate students.

Professional Activities
Annual Meeting Planning Committee, Sports Neuropsychology Society

Community Activities
Volunteer, Big Brothers Big Sisters
Faculty Biographies

Jamie Pardini, PhD

Publications: 2013-14

- Refereed Articles:

- Book Chapters:

- Presentations:


Ian F. Pollack, MD

A. Leland Albright Professor of Neurological Surgery
Vice Chairman, Academic Affairs
Chief, Pediatric Neurosurgery
Co-Director, Neurosurgical Oncology

Ian Pollack, MD, is co-director of the Brain Tumor Program at the University of Pittsburgh Cancer Institute, chief of Pediatric Neurosurgery at Children’s Hospital of Pittsburgh, and A. Leland Albright Professor of Neurosurgery at the University of Pittsburgh School of Medicine. Prior to joining the faculty of the Department of Neurological Surgery at the University of Pittsburgh in 1992, he was awarded the 1991 Van Wagenen Traveling Fellowship, which afforded him a year of subspecialty training in the Department of Neurosurgery at the Hospital for Sick Children in Toronto, the Neuro-Oncology Laboratory of the University of Lausanne in Switzerland, and the Laboratory of Tumor Biology of the University of Uppsala in Sweden. Dr. Pollack graduated magna cum laude from Emory University in 1980, where he earned a BS degree in chemistry. He received his medical degree from the Johns Hopkins University School of Medicine in 1984, then completed a surgical internship and neurosur-
Faculty Biographies

Ian F. Pollack, MD

gical residency at the University of Pittsburgh School of Medicine. He also was a research fellow in neuropathology and neurobiology during some of that time. Pollack has published more than 290 papers in refereed journals, numerous book chapters and invited papers, and has edited two books on childhood brain tumors. He is co-editor of the recently published book *Principles and Practice of Pediatric Neurosurgery* and an accompanying atlas *Operative Techniques In Pediatric Neurosurgery*. He is currently a principal investigator on numerous NIH grants focusing on novel therapies for brain tumors and evaluating molecular markers of tumor prognosis. Dr. Pollack was named vice chairman of academic affairs for the department in July of 2008. He has co-chaired the National Cancer Institute brain malignancy steering committee since 2010.

**Specialized Areas of Interest**
Pediatric neurosurgery; pediatric neuro-oncology; craniofacial surgery; congenital spinal abnormalities; brain tumor clinical trials.

**Board Certifications**
American Board of Neurological Surgery
American Board of Pediatric Neurosurgery

**Hospital Privileges**
Children’s Hospital of Pittsburgh of UPMC
Magee-Womens Hospital of UPMC
UPMC Presbyterian

**Professional Organization Membership**
Academy of Neurological Surgeons
Alpha Omega Alpha
American Association for the Advancement of Science
American Association for Cancer Research
American Association of Neurological Surgeons (AANS)
American College of Surgeons
Association of American Physicians
American Society of Pediatric Neurosurgeons
American Society for Clinical Investigation
Children’s Oncology Group
Congress of Neurological Surgeons (CNS)
Johns Hopkins Medical and Surgical Society
Joint Section on Tumors (AANS/CNS)
Pennsylvania Neurosurgical Society
Phi Beta Kappa
Society of Neurological Surgeons
Society for Neuro-Oncology
Society of Surgical Oncology

**Editorial Service**
- **Editorial Board:**
  - ASCO PLWC
  - *Journal of Neurosurgery*
  - *Journal of Neurosurgery: Pediatrics* (Chairman)
  - *Pediatric Blood and Cancer*
Faculty Biographies

- **Ad Hoc Reviewer:**
  - *Acta Paediatrica*
  - *Cancer*
  - *Cancer Research*
  - *Clinical Cancer Therapy*
  - *The European Journal of Cancer*
  - *Gene Therapy*
  - *Journal of Clinical Oncology*
  - *Journal of Craniofacial Surgery*
  - *Journal of Neuro-Oncology*
  - *Journal of Pediatric Hematology/Oncology*
  - *Journal of Pediatrics*
  - *Molecular Cancer Therapeutics*
  - *Neurosurgery*
  - *Pediatrics*

**Interdepartmental and Medical Center Activities**

- **University of Pittsburgh:**
  - Director, Pediatric Neuro-Oncology Laboratory
  - Co-Director, Brain Tumor Program, University of Pittsburgh Cancer Institute

- **Children's Hospital of Pittsburgh:**
  - Co-Director, Pediatric Neuro-Oncology Tumor Board
  - Perioperative Executive Committee

**Professional Activities**

Institutional PI, Pediatric Brain Tumor Consortium
Steering Committee, Pediatric Brain Tumor Consortium
Chairman, Drug Delivery Subcommittee, Pediatric Brain Tumor Consortium
NCI Brain Malignancy Steering Committee, Co-Chair
Scientific Program Committee, Society of Neuro-Oncology, 2000-present

**Honors and Awards**

Castle Connolly's America's Top Doctors, 2002-14
Who's Who in America (Marquis), 2005-14
Who's Who in the World (Marquis), 2008-14
Castle Connolly's America's Top Cancer Doctors, 2005-14
National Brain Tumor Society/Congress of Neurological Surgeons Mahaley Clinical Research Award, 2012
Association of American Physicians, 2012
McEllroy Distinguished University of Pittsburgh Resident Alumni Award, 2013

**Publications: 2013-14**

- **Refereed Articles:**

Faculty Biographies


**Book Chapters:**


**Invited Lectures: 2013-14**

- **International:**

- **National:**


Pollack IF. “Vaccine therapy for childhood gliomas,” Marne Rose Brain Tumor Symposium, Key Note Speaker. MD Anderson Cancer Center, Houston, Texas, February 28-March 1, 2014.


Daniel R. Premkumar, PhD
Research Assistant Professor of Neurological Surgery

Prior to joining the faculty of the Department of Neurological Surgery at the University of Pittsburgh in 2008, Daniel R. Premkumar, PhD, was a senior scientist at a biotechnology company. He graduated from Madurai Kamaraj University in India where he earned his masters and PhD degrees. Dr. Premkumar then completed his post-doctoral training at Case Western Reserve University in Cleveland. Dr. Premkumar has published more than 30 papers in refereed journals and has been awarded patents to characterize protein-protein interaction biosensors for cellular systems biology profiling. He is currently examining the efficacy of promising various receptor inhibitors, for inhibiting glioma proliferation in vitro, using genotypically diverse panel of malignant glioma cell lines to identify potential genotype-response associations.

Specialized Areas of Interest
Major research emphasis is directed towards understanding the molecular mechanisms of receptor tyrosine kinase inhibition and signaling in malignant human glioma cell lines.

Professional Organization Membership
American Association for Cancer Research
ASPET (American Society of Pharmacology and Experimental Therapeutics)

Editorial Service
• Editorial Board:
Journal of Neurology and Neurosurgery
Daniel R. Premkumar, PhD

- Ad Hoc Reviewer:
  Carcinogenesis
  Journal of Cellular Physiology

Publications: 2013-14
- Refereed Articles:

- Presentations:
  Jane EP, Premkumar DR, Morales A, Foster KA, Pollack IF. “Inhibition of Phosphatidylinositol 3-Kinase/AKT Signaling by NVP-BKM120 Promotes ABT-737-induced toxicity in a caspase-dependent manner through mitochondrial dysfunction and DNA damage response in established and primary cultured glioblastoma cells.” American Association for Cancer Research Annual Meeting, San Diego, Calif., April 5-9, 2014.

Ava Puccio, RN, PhD
Assistant Professor of Neurological Surgery & Nursing
Co-Director, Neurotrauma Clinical Trials Center

Ava M. Puccio, RN, PhD, received her bachelor of science degree in neuroscience in 1988 and bachelor degree in nursing in 1994, both from the University of Pittsburgh. In 1995, she joined the Department of Neurological Surgery as a nurse coordinator on the National Acute Brain Injury Study: Hypothermia (NABIS:H) study and also the coordinator for the Brain Trauma Research Center. Throughout her years of employment as a nurse coordinator, she pursued part-time advanced schooling to graduate with a master’s degree in nursing from the University of Pittsburgh in 2000 and as a university scholar (top 2% of class) from the University of Pittsburgh School of Nursing with a doctoral degree, emphasis in neuroscience in 2008. Her dissertation, “Effect of short periods of normobaric hyperoxia on local brain tissue oxygenation and cerebrospinal fluid oxidative stress markers in severe traumatic brain injury” was published in the Journal of Neurotrauma in 2009. Dr. Puccio was appointed associate scientist at the Safar Center for Resuscitative Research at the University of Pittsburgh upon completion of her doctorate degree. This was a reflection of her past and continuing collaborations with Patrick Kochanek, MD, C. Edward Dixon, PhD, and Hulya Bayir, MD, as well as multiple critical care medicine fellows. Dr. Puccio was appointed research associate in the Department of Neurological Surgery at the University of Pittsburgh in 2009. She was promoted to assistant professor in 2010 and was granted tenure-track in 2013. Dr. Puccio received her adjunct faculty position with The School of Nursing, Department of Acute/Tertiary Care in 2010 with collaborations with Yvette Conley, PhD and Richard Henker, RN, PhD.
Faculty Biographies

Ava Puccio, RN, PhD

Her research has focused on improving outcomes in traumatic brain injury patients, with clinical venues of controlled normothermia, mechanisms of brain oxygenations and exploring genetic variances and expression on outcome. Dr. Puccio is currently the co-director of the Neurotrauma Clinical Trials Center in collaboration with David O. Okonkwo, MD, PhD. With 19 years of clinical trial design, involvement and management, several traumatic brain and spine injury research studies have been completed and are ongoing. Many cutting-edge biomarker and high definition fiber tracking imaging, observational research studies are also being conducted.

Specialized Areas of Interest
Dr. Puccio’s specialized areas of interest are exploring secondary injury mechanisms following traumatic brain injury to improve neurological outcomes in mild, moderate and severe traumatic brain injury patients. Focused mechanisms include use of controlled normothermia and hypothermia, brain oxygenation, genetic expression and variances and clinical studies of pharmacotherapy in TBI patients.

Board Certifications
RN License: Pennsylvania

Hospital Privileges
UPMC Mercy
UPMC Presbyterian

Professional Organization Membership
Eastern Nursing Research Society
National Neurotrauma Society
Neurocritical Care Society
Sigma Theta Tau International Nursing Honor Society
Society of Critical Care Medicine
Women in Neurotrauma Research (WINTR)

Editorial Service
• Ad Hoc Reviewer:
  Pediatric Critical Care
  Neurocritical Care
  Therapeutic Hypothermia and Temperature Management
  Society of Critical Care Medicine
  State of the Science Congress on Nursing Research

Honors and Awards
Ruth Perkins Kuehn Nursing Research Award, 2011
Cold Spring Harbor Scholarship, 2012

Publications: 2013-14
• Refereed Articles:


**Published Abstracts:**


Faculty Biographies


**Invited Lectures: 2013-14**

- National:

**Shengjun Ren, PhD**  
*Assistant Professor of Neurological Surgery*

Shengjun Ren, PhD, joined the Department of Neurological Surgery in September 2011. Dr. Ren received his PhD from Shanghai Medical University and Shanghai Cancer Institute, China. He had postdoctoral training in the lab of Barrett Rollins, MD & PhD, and was Instructor of Medicine in the Department of Medical Oncology at Dana-Farber Cancer Institute and Harvard Medical School. Dr. Ren’s research interests include elucidation of molecular controls governing cell cycle quiescence regulation, and the employment of this pathway in carcinogenesis and onset of neurodegenerative diseases. Dr. Ren is also interested in the neuronal regeneration using stem cell and genetic approaches.

**Specialized Areas of Interest**

- Cell cycle, G0-to-G1 transition, cell growth control, molecular controls governing neuronal death, onset of neurodegenerative diseases, cellular senescence and carcinogenesis of glioblastoma.

**Professional Organization Membership**

American Cancer Society

**R. Mark Richardson, MD, PhD**  
*Assistant Professor of Neurological Surgery*  
*Director, Adult Epilepsy and Movement Disorders Surgery*  
*Director, Brain Modulation Laboratory*

R. Mark Richardson, MD, PhD, is director of Epilepsy and Movement Disorders Surgery at UPMC Presbyterian. Dr. Richardson received his undergraduate education at the University of Virginia. He completed his medical and doctoral education in the MD/PhD program at the Medical College of Virginia, where his interest in adult neurogenesis led to an NIH National Research Service Award. Prior to joining the faculty at the University of Pittsburgh in 2011, Dr. Richardson completed neurosurgical residency at the University of California San Francisco where he received specialized training in epilepsy neurosurgery, deep brain stimulation, and brain mapping during awake craniotomies. Additionally, he received an NIH National Research Service Award to study gene therapy delivery to the brain. Dr. Richardson’s clinical specialization is comprehensive epilepsy surgery and deep brain stimulation for movement disorders. He started the intervention-MRI DBS program at UPMC, and his additional clinical expertise includes intraoperative mapping to preserve brain function, including language, in patients who are awake during epilepsy and tumor surgery.
Specialized Areas of Interest
Epilepsy surgery, deep brain stimulation for movement and limbic disorders (including interventional-MRI guided DBS surgery), awake surgery in eloquent brain areas.

Hospital Privileges
UPMC Presbyterian
Veterans Affairs Pittsburgh Healthcare System

Professional Organization Membership
American Association of Neurological Surgeons
American Association of Stereotactic and Functional Neurosurgery
American Epilepsy Society
American Society for Neural Transplantation and Repair
Congress of Neurological Surgeons
International Movement Disorders Society

Editorial Service
• Associate Editor:
  NEUROSURGERY Science Times

• Ad Hoc Reviewer:
  PLoS One

Interdepartmental and Medical Center Activities
• UPMC Presbyterian:
  Epilepsy Task Force

• Department of Neurological Surgery:
  Research Executive Committee

Professional Activities
American Society for Stereotactic and Functional Neurosurgery
Psychiatric Neurosurgery Committee

Honors and Awards
Faculty Teaching Award, Department of Neurological Surgery, 2013

Media Appearances: 2013-14

Publications: 2013-14
• Refereed Articles:

Invited Lectures: 2013-14
• National:

• Local/Regional:
Richardson RM. “Stereo-EEG: Multiple depth electrode diagnostic epilepsy surgery.” Joint Grand Rounds, Departments of Neurology and Neurological Surgery, UPMC Presbyterian, Pittsburgh, Pa., January 2014.


Michael J. Rutigliano, MD, MBA
Clinical Associate Professor of Neurological Surgery
Director, Westmoreland County Community Neurosurgery
Chief of Neurosurgery, Latriobe and Westmoreland Hospitals

Michael J. Rutigliano, MD, MBA, was appointed to the University of Pittsburgh faculty in 1996. An active staff member of the University of Pittsburgh Medical Center, Dr. Rutigliano lives in Greensburg, PA, and the primary focus of his clinical practice is in Westmoreland County at the hospitals of the Excela Health System. His clinical interests include a wide range of neurosurgical diseases, focusing mostly in the areas of spinal and peripheral nerve disorders, brain tumors, and concussion and other sports-related injury. Surgical procedures performed include simple spinal surgery such as lumbar and cervical discectomy, laminectomies for spinal stenosis, and more complex spinal reconstructive surgery for spondylolisthesis and scoliosis. Common peripheral nerve surgery includes carpal tunnel release and ulnar neurolysis. Craniotomy for primary and metastatic brain tumors are also performed. He received his medical degree in 1989 from the University of Pittsburgh School of Medicine. Following an internship in general surgery, he completed residency training in neurological surgery at the University of Pittsburgh Medical Center. During this time he also obtained an MBA from the Katz Graduate School of Business. Dr. Rutigliano’s academic expertise is in medical economics and cost-effectiveness analysis. He was awarded the Pittsburgh Academy of Medicine Study Scholarship and was honored by the Stroke Council of the American Heart Association with a scholarship for research in cerebrovascular disease. Dr. Rutigliano has retired from the United States Army Reserve and has served in support of Operation Iraqi Freedom at Walter Reed Medical Center from April to July 2003, and in Blad, Iraq from October 2007 to February 2008.

Specialized Areas of Interest
Spinal disorders; peripheral nerve disorders; brain tumors.

Board Certifications
American Board of Neurological Surgery

Hospital Privileges
Indiana Regional Medical Center
Latriobe Area Hospital
UPMC Presbyterian
Westmoreland Hospital
Raymond F. Sekula Jr, MD
Assistant Professor of Neurological Surgery
Director, Cranial Nerve Disorders Program

Raymond Sekula, Jr., MD, joined the Department of Neurological Surgery on March of 2013 as an assistant professor and director of the department's Cranial Nerve Disorders program. Dr. Sekula is known internationally and nationally for his development of microvascular techniques, which provide patients with improved outcomes, reduced complications, and easier recoveries. He has been recognized with numerous honors, including The American Association of Neurological Surgeons's Young Investigator Award, The Trigeminal Neuralgia Association Fellowship Award, and Pittsburgh Magazine’s "40 Under 40" and "Best Doctor’s" Award. Dr. Sekula has performed more than 1,000 procedures for patients with trigeminal neuralgia, hemifacial spasm, and other cranial neuralgias. He has also developed a novel procedure for Chiari malformation performed through a one-inch incision affording patients a minimal one- or two-day hospital stay after the procedure. Dr. Sekula received his undergraduate degree from the University of Virginia and his medical degree from Georgetown University School of Medicine. Following a surgical internship and residency in neurological surgery, he completed advanced training in minimally invasive neurosurgery and a fellowship with neurosurgical pioneer, and former University of Pittsburgh neurosurgery chairman, Peter Jannetta, MD. Following his training, he became assistant, and then co-director, of the Cranial Nerve Disorders Center with Dr. Jannetta in Pittsburgh. Dr. Sekula is also a renowned teacher of neurological surgery and is a frequent lecturer nationally and internationally. He has authored or co-authored many original journal articles and book chapters.

Specialized Areas of Interest
Trigeminal neuralgia, hemifacial spasm; Chiari malformation; brainstem tumors.

Board Certifications
American Board of Neurological Surgery

Hospital Privileges
Charles Cole Memorial Hospital
UPMC Hamot
UPMC Passavant
Faculty Biographies

Raymond F. Sekula, Jr, MD

UPMC Presbyterian
UPMC Shadyside

Professional Organization Membership
Allegheny County Medical Society
American Association of Neurological Surgeons
Congress of Neurological Surgeons
Facial Pain Association
Medical Advisory Board of TNA
Pennsylvania Neurosurgical Society

Editorial Service
• Editorial Board:
  Austin Journal of Neurological Disorders and Epilepsy

• Ad Hoc Reviewer:
  Acta Neurologica Scandinavica
  International Journal of Infectious Diseases
  Irish Journal of Medical Sciences
  Journal of Pediatric Neurology
  Neuropediatrics
  Neurosurgery

Interdepartmental and Medical Center Activities
• UPMC Presbyterian:
  Executive Resident Selection Committee
  Assistant Director, Neurological Surgery Residency Program

• University of Pittsburgh:
  Member of the UPSOM Interviewing Committee

Honors and Awards

Media Appearances: 2013-14

Publications: 2013-14
• Refereed Articles:


Faculty Biographies

• Presentations:

Invited Lectures: 2013-14
• National:

  Sekula RF. "Categorizing Facial Pain and Making the Right Diagnosis with Special Consideration of Trigeminal Neuralgia." National TNA Conference, TNA The Facial Pain Association, University of California San Diego, Department of Neurosurgery, San Diego, Calif., October 5, 2013.


• Local/Regional:

  Sekula RF. "Understanding Facial Pain and Spasms and an Update on Imaging of the Cranial Nerves." University of Pittsburgh School of Medicine, Combined Grand Rounds of the Departments of Neurology and Neurosurgery, Pittsburgh, Pa., September 11, 2013.


Mingui Sun, PhD
Professor of Neurological Surgery, Bioengineering and Electrical Engineering

Mingui Sun, PhD, received a BS degree in instrumental and industrial automation in 1982 from the Shenyang Chemical Engineering Institute in Shenyang, China, and an MS degree in electrical engineering in 1986 from the University of Pittsburgh, where he also earned a PhD degree in electrical engineering in 1989. He was later appointed to the faculty in the Department of Neurological Surgery. Dr. Sun's research interests include neurophysiological signals and systems, biosensor designs, brain-computer interface, bioelectronics and bioinformatics. He has more than 360 publications.

Specialized Areas of Interest
Biomedical engineering; biomedical instrumentation; biomedical signal processing; computational neurophysiology, image and video processing; computer-assisted neurosurgery and diagnosis.
Mingui Sun, PhD

**Professional Organization Membership**
American Institute for Medical and Biological Engineering  
Institute of Electrical and Electronics Engineers  
IEEE Circuit and Systems Society  
IEEE Engineering in Medicine and Biology Society

**Editorial Service**
- Editorial Board:
  - *International Journal of Information and Communication Engineering*  
  - *International Journal of Medical Implants and Devices*  
  - *Journal of Healthcare Engineering*
- Ad Hoc Reviewer:
  - *China National Science Foundation*  
  - *National Institutes of Health*  
  - *National Science Foundation*  
  - *University Grants Committee (Hong Kong)*

**Professional Activities**
Fellow, American Institute of Biological and Medical Engineers (AIBME)  
Technical Committee Member, Biomedical and Life Science Systems, Circuit and Systems Society, IEEE

**Publications: 2013-14**
- Refereed Articles:
  
  
  
  
  
  
  


**Presentations:**


**Invited Lectures: 2013-14**

**International:**


Sun M. “Tracking lifestyle in real-world settings with the eButton—An American Perspective.” Internal meeting on Food4Growth project and Public Health Nutrition education programs, Aalborg University, Copenhagen, Denmark, October 30, 2013.

**National:**

Mandeep Tamber, MD, PhD
Assistant Professor of Neurological Surgery

Mandeep S. Tamber, MD, PhD, joined the faculty of the University of Pittsburgh Department of Neurological Surgery in the pediatric neurosurgery division at Children’s Hospital of Pittsburgh on August 1, 2009. Dr. Tamber began his medical studies at the University of Alberta, Canada, where he earned a doctor of medicine degree with distinction and honors in research. After graduating from medical school in June 1999, he completed his neurosurgical residency at the University of Toronto, Canada. During residency, Dr. Tamber worked towards obtaining a PhD degree in clinical epidemiology and biostatistics from McMaster University. He completed a postgraduate fellowship in Pediatric Neurological Surgery at the Hospital for Sick Children, Toronto and is board certified by the Royal College of Physicians and Surgeons of Canada and the American Board of Pediatric Neurological Surgery. Dr. Tamber is surgical director of the Pediatric Epilepsy Program at Children’s Hospital of Pittsburgh. In addition to the surgical management of pediatric epilepsy, Dr. Tamber’s practice additionally focuses on general pediatric neurosurgery, including the management of complex hydrocephalus, pediatric neuro-oncology, spinal dysraphism, pediatric neuro-trauma and craniofacial disorders.

Specialized Areas of Interest
Epilepsy surgery; craniofacial surgery.

Board Certifications
American Board of Pediatric Neurological Surgery
Royal College of Physicians and Surgeons of Canada

Hospital Privileges
Children’s Hospital of Pittsburgh of UPMC
Magee-Womens Hospital of UPMC
UPMC Presbyterian

Professional Organization Membership
American Association of Neurological Surgeons (AANS)
American Society of Pediatric Neurosurgeons
CNS/AANS Joint Section of Pediatric Neurosurgery
CNS/AANS Joint Section on Tumors
Congress of Neurological Surgeons (CNS)
Royal College of Physicians and Surgeons of Canada

Interdepartmental and Medical Center Activities
• Children’s Hospital of Pittsburgh of UPMC:
  Medical Advisory Committee—Pediatric Trauma
  Surgical Epilepsy Program
  Pediatric Neuro-oncology Board

Professional Activities
Pediatric Hydrocephalus Evidence Review Taskforce, AANS/CNS Joint Guidelines Committee
Pediatric Plagiocephaly Evidence Review Taskforce, AANS/CNS Joint Guidelines Committee

Media Appearances: 2013-14
“Parents decide on rare surgery for son,” WPXI-TV, September 25, 2013.
Mandeep Tamber, MD, PhD

**Publications: 2013-14**

**• Refereed Articles:**


**• Presentations:**


Parthasarathy D. Thirumala, MD

Clinical Associate Professor of Neurological Surgery & Neurology
Co-Director, Center of Clinical Neurophysiology

Parthasarathy D. Thirumala, MD, joined the Center of Clinical Neurophysiology in June 2008. Dr. Thirumala specializes in intraoperative neurophysiological monitoring to adult and pediatric neurosurgical, orthopedic, ENT, vascular and interventional neuroradiology procedures. Dr. Thirumala completed his neurology residency and clinical neurophysiology fellowship training at the University of Pittsburgh Medical Center. He completed his internship in internal medicine training at Brookdale University Hospital and Medical Center in Brooklyn, NY. Prior to clinical training he completed his masters in biomedical engineering at the University of Illinois at Chicago. Dr. Thirumala completed his medical training in India at Stanley Medical College in Chennai, India. Prior to joining the department, Dr. Thirumala was in private practice providing intraoperative neurophysiological monitoring services. His group was one of the largest physician groups in the country providing intraoperative neurophysiological to approximately 90 hospitals across 12 states in the United States. His clinical and research interests include intraoperative neurophysiological monitoring during expanded endonasal approach, functional cortical mapping during awake craniotomies, ICU EEG. He has published over 20 peer reviewed articles, book chapters, and invited articles in the journals including Neurosurgery, Journal of Neurosurgery, and Journal of Clinical Neurophysiology. He has given lectures both nationally and internationally on the value of intraoperative neurophysiological monitoring.
Parthasarathy D. Thirumala, MD

Specialized Areas of Interest
Intraoperative neurophysiological monitoring; functional cortical mapping during awake craniotomies; neurophysiological monitoring during minimally invasive endonasal approach to skull base surgeries, electroencephalography in the intensive care unit and telemedicine.

Board Certifications
American Board of Clinical Neurophysiology: Intraoperative Monitoring
American Board of Psychiatry and Neurology
American Board of Psychiatry and Neurology: Subspecialty Clinical Neurophysiology
American Board of Neuroimaging
American Board of Neurophysiologic Monitoring

Hospital Privileges
Children’s Hospital of Pittsburgh of UPMC
Jameson Hospital
Magee-Womens Hospital of UPMC
Monongahela Valley Hospital
UPMC Braddock
UPMC Hamot
UPMC Horizon-Greenville
UPMC Mercy
UPMC Passavant
UPMC Presbyterian
UPMC St. Margaret
UPMC Shadyside

Professional Organization Membership
American Academy of Neurology
American Clinical Neurophysiology Society
American Medical Association
American Society of Electroneurodiagnostic Technologists
American Society of Neurophysiological Monitoring
American Telemedicine Association

Editorial Service
• Ad Hoc Reviewer:
  American Journal of Electroneurodiagnostic Technology
  Journal of Clinical Monitoring and Computing
  Neurological Research
  Neurology
  Frontiers in Neuroscience

Interdepartmental and Medical Center Activities
• UPMC Presbyterian:
  Telemedicine Oversight Committee, Center For Connected Medicine
  Regional Ambassador, UPMC Global Care

Professional Activities
Pennsylvania Neurological Society, President
Pennsylvania Medical Society, Specialty Leadership Cabinet
American Clinical Neurophysiology Society, Social Media and Website Committee
Parthasarathy D. Thirumala, MD

**Faculty Biographies**

**Publications: 2013-14**

- **Refereed Articles:**


**Invited Lectures: 2013-14**

- **International:**


- **Local/Regional:**
  - Thirumala PD. "Intraoperative monitoring during cardiac surgery, Pennsylvania State Perfusion Society Conference, Pittsburgh, Pa, April 4-6, 2014.

Elizabeth C. Tyler-Kabara, MD, PhD
Assistant Professor of Neurological Surgery and Bioengineering

Elizabeth C. Tyler-Kabara, MD, PhD completed her bachelor's degree at Duke University, double majoring in biomedical and electrical engineering, in 1989. After leaving Duke, she worked at the National Institutes of Health as a biomedical engineer, developing and testing molecular biology software, developing a strategic plan for implementing computer networking, and recruiting a head for the newly formed Computational Biology Group. She left the NIH to attend Vanderbilt University, earning her MD and PhD in 1997. Her graduate research in the Department of Molecular Physiology and Biophysics investigated the neurophysiology of the corticostriatal synapse. This served as the basis for her interest in neuro-modulation, which has been a key aspect of her subsequent clinical research activities. She completed her internship in general surgery at the University of Pittsburgh in 1998 under the direction of Richard Simmons, MD. Following internship she specialized in neurological surgery during her residency at UPMC and VA hospitals from 1998-2004 under L. Dade Lunsford, MD. She then completed a fellowship in pediatric neurosurgery at the Children's Hospital of Alabama in 2005 under the direction of W. Jerry Oakes, MD. Dr. Tyler-Kabara has served as assistant professor of the Department of Neurological Surgery, University of Pittsburgh, since 2005. She has secondary appointments in the Department of Bioengineering, Swanson School of Engineering, since 2006 and in the Department of Physical Medicine and Rehabilitation since 2007. Dr. Tyler-Kabara has been a faculty member of the McGowan Institute for Regenerative Medicine since 2000. She has been a member of the medical staff of Children’s Hospital of Pittsburgh of UPMC, UPMC Shadyside and UPMC Presbyterian since 2005 and a medical consultant at Magee Women’s Hospital of UPMC since 2007. Dr. Tyler-Kabara directs the Neural Enhancement Laboratory in the Department of Neurological Surgery. The focus of the laboratory is improving function following injury to the central nervous system. Dr. Tyler-Kabara’s research has been supported by the National Institutes of Health, NINDS and NICHD, DARPA, Craig Nielsen and Margot Anderson Foundations, The Copeland Fund and Pedal with Pete. She served as principal investigator for five of those grants. She was the co-principal investigator on the grant that kick-started the brain computer interface human trials at the University of Pittsburgh. She has served as a co-investigator on six grants including the current brain computer interface grants. Current efforts are focused on the use of brain computer interfaces to restore function. The current studies employ electrocorticography and microelectrode techniques in conjunction with brain computer interfaces for control of a prosthetic arm. These studies are conducted in collaboration with the Human Rehabilitation Neural Engineering Laboratory in the Department of Physical Medicine and Rehabilitation combining expertise in engineering, neuroscience, and rehabilitation medicine. Her work was featured on CBS-TV’s 60 Minutes. Additionally, Dr. Tyler-Kabara has been the director of the Spasticity and Movement Disorder Program at Children’s Hospital of Pittsburgh since 2006. This program is one of the few multidiscipline movement disorder programs combining the expertise of neurological surgery, orthopedics, physiatry, occupational and physical therapy and social work. This program is one of the world’s largest pediatric intrathecal baclofen pump experiences with over 500 pump implants. Dr. Tyler-Kabara has also been the director of the Surgical Epilepsy Program at the University of Pittsburgh, since 2009. She serves on the Epilepsy Task Force created in 2012. She has served on the executive committee for the McGowan Institute for Regenerative Medicine since 2008. In her clinical work she has pioneered the use of expanded endonasal surgery of the skull base in extremely young children providing them with a minimally invasive alternative for the treatment of a variety of conditions. Dr. Tyler-Kabara has over 35 publications in peer-reviewed journals. She has over 10 book chapters and 50 published abstracts. She supervises pediatrics, neurology, and physical medicine residents and fellows on the neurological surgery service and in the Spasticity and Movement Disorder clinic. Dr. Tyler-Kabara
Elizabeth C. Tyler-Kabara, MD, PhD

won the Department of Neurological Surgery teaching award in 2009 and is actively engaged in teaching medical students, graduate students, and post-doctoral fellows in laboratory. She has taught numerous medical school courses including the first year Introduction to Being a Physician. She is the ILS course director for the Neurosurgery and Head and Neck Dissection since 2007. Dr. Tyler-Kabara has given 19 local lectures, 17 regional lectures, three national invited lectures and six international invited lectures. Dr. Tyler-Kabara provides lectures each year within the department of Neurological Surgery and the University of Pittsburgh Medical Center.

**Specialized Areas of Interest**
Cerebral palsy; spasticity; dystonia; movement disorders; pediatric spinal disorders.

**Board Certifications**
American Board of Neurological Surgery
American Board of Pediatric Neurosurgery

**Hospital Privileges**
Children’s Hospital of Pittsburgh of UPMC
Magee-Womens Hospital of UPMC
UPMC Presbyterian
UPMC Shadyside

**Professional Organization Membership**
Allegheny County Medical Society
American Association of Neurological Surgeons (AANS)
American Association for the Advancement of Science
American Medical Association
American Medical Student Association
American Medical Women's Association
American Society of Pediatric Neurosurgery
American Society of Stereotactic and Functional Neurosurgery
Congress of Neurological Surgeons (CNS)
Engineering in Medicine and Biology Society
Institute of Electrical and Electronics Engineers (IEEE)
Joint Section on Neurotrauma and Critical Care (AANS/CNS)
Joint Section on Pediatric Neurological Surgery
Joint Section on Tumors (AANS/CNS)
North American Spine Society
Pennsylvania Medical Society
Sigma Xi
Society for Neuroscience
Women in Engineering
Women in Neurosurgery

**Editorial Service**
- Ad Hoc Reviewer:
  *Children’s Nervous System*
  *Journal of Neurological Surgery*

**Interdepartmental and Medical Center Activities**
- UPMC Presbyterian:
  Epilepsy Task Force
Daniel A. Wecht, MD, MSc, FACS

Clinical Professor of Neurological Surgery
Chief of Neurosurgery, UPMC McKeesport
Chief of Neurosurgery, UPMC St. Margaret
Chief of Neurosurgery, UPMC Shadyside

Daniel A. Wecht, MD, joined the Department of Neurological Surgery as a clinical assistant professor in September of 1999. He was promoted to clinical associate professor in 2002 and full clinical professor in 2008. He was born and raised in Pittsburgh, PA. After graduating from Harvard University, Dr. Wecht attended medical school at the University of Pennsylvania. He completed his neurosurgery residency at Baylor College and then completed a two-year neurovascular surgery fellowship at Yale University School of Medicine. He was board-certified with the American Board of Neurological Surgery in 2000 and was re-certified in 2010. Dr. Wecht specializes in the treatment of brain tumors and cerebrovascular diseases such as stroke, aneurysms and vascular malformations. He also has an active spine and general neurosurgery practice. He has co-authored or authored several articles and publications. Dr. Wecht has been a neurosurgical faculty member at Yale University (New Haven, CT), University of New Mexico (Albuquerque, NM) and Allegheny University of the Health Sciences (Pittsburgh, PA). He is an active participant in multiple professional and scientific societies. He is licensed to practice in Pennsylvania and New Mexico.

Specialized Areas of Interest
Vascular neurosurgery (aneurysms and vascular malformations); brain tumors; spinal and peripheral nerve microsurgery; trigeminal neuralgia, chiari malformation and hydrocephalus.
Monte S. Weinberger, MD  
*Clinical Assistant Professor of Neurological Surgery*

Monte S. Weinberger, MD, joined the faculty of the University of Pittsburgh Department of Neurological Surgery in May of 2014. He graduated from the Medical University of South Carolina College of Medicine in 1987.

**Board Certifications**
American Board of Neurological Surgery

**Hospital Privileges**
UPMC Presbyterian  
UPMC Shadyside  
UPMC McKeesport  
UPMC St. Margaret

**Professional Organization Membership**
AANS/CNS Joint Section on Cerebrovascular Surgery  
AANS/CNS Joint Section on Trauma  
Allegheny County Medical Society  
American College of Surgery Associate Fellow  
American Heart Association-Stroke Council  
American Medical Association  
Congress of Neurological Surgeons  
Pennsylvania Medical Society

**Professional Activities**
The Pittsburgh Penguins Hockey Club Team Neurosurgeon, 2013-14

Matthew M. Wetzel, MD  
*Clinical Assistant Professor of Neurological Surgery*

Matthew M. Wetzel, MD, was appointed to the clinical faculty at the University of Pittsburgh in 2006 after completing the university's seven-year neurological surgery residency program. He is a graduate of Penn State University and received his medical degree from the Johns Hopkins University School of Medicine. Dr. Wetzel resides in Greensburg, PA, and practices in Westmoreland and Indiana counties. He is on the active medical staff at Latrobe Area Hospital and Westmoreland Hospital, and is on the courtesy staff at Indiana Regional Medical Center. He sees outpatients at the Westmoreland County Community Neurosurgery Center in Greensburg, and also at satellite offices on the campuses of the Westmoreland Hospital and Indiana Regional Medical Center.

**Specialized Areas of Interest**
Spine surgery
Hong Qu Yan, MD, PhD

Research Assistant Professor of Neurological Surgery

Hong Qu Yan, MD, is a licensed acupuncturist of Pennsylvania and New York states. Dr. Yan received his medical degree in 1982 from Shanghai College of Traditional Chinese Medicine, China and completed his residency program at the Shanghai First Pulmonary Hospital, in China. He then pursued his master’s and PhD degree in medical and pharmaceutical research at Free University of Brussels (VUB), Belgium. In 1992, he became a postdoctoral fellow in the University of Texas Health Science Center at Houston TX. In 1996, he joined the Department of Neurological Surgery at the University of Pittsburgh as a postdoctoral fellow.

Specialized Areas of Interest

Acupuncture research and treatment in neurological diseases such as traumatic brain injury, spinal cord injury, stroke, Alzheimer disease and Parkinson’s disease, etc.; mechanisms of induction and recovery of functional and pathological deficits following TBI; pharmaceutical therapies for recovery of post traumatic functional deficits; acupuncture and traditional Chinese medicine research and treatment in the other diseases such as cancer.

Board Certifications

Licensed Acupuncturist of New York and Pennsylvania

Professional Organization Membership

National Neurotrauma Society
Society for Neuroscience

Publications: 2013-14

• Refereed Articles:


*Presentations:*


**Yu Zhang, PhD**  
*Assistant Professor of Neurological Surgery*

Yu Zhang, PhD, joined the faculty at the University of Pittsburgh Department of Neurological Surgery in October 2010. Dr. Zhang received her PhD from Shanghai Medical University, China in 2000. She had postdoctoral training in Neuroapoptosis laboratory from 2000-2007 and was instructor of Neurosurgery from 2008-2010 in Department of Neurosurgery at Brigham and Women’s Hospital, Harvard Medical School. Dr. Zhang’s research interests include small RNA-related pathogenesis in neurodegenerative diseases, cellular reprogramming-based disease modeling, genetic correction of causal mutations and development of patient-specific cellular replacement therapies for Huntington’s disease, targeted delivery of therapeutic nucleic acid to the central nervous system.

**Specialized Areas of Interest**  
Pathogenetic mechanism and therapy development for neurodegenerative diseases, Huntington’s disease, stroke, ALS, Kennedy’s disease, microRNA and other small RNAs, cellular reprogramming, mutant allele linked polymorphism, crossing BBB delivery of small RNA.

**Board Certifications**  
National certification commission for acupuncture and oriental medicine (NCCAOM)

**Professional Organization Membership**  
International Society for Stem Cell Research  
Society for Neuroscience

**Editorial Service**  
• Ad Hoc Reviewer:  
  *Clinical Genetics*  
  *International Journal of Molecular Sciences*
David S. Zorub, MS, MD
Clinical Associate Professor of Neurological Surgery

David S. Zorub, MD, joined the faculty of the University of Pittsburgh Department of Neurological Surgery in May of 2014. Dr. Zorub was born in Lebanon and immigrated to the United States at the age of nine. He grew up in Hot Springs, Ark, where he received his primary education. Dr. Zorub received his undergraduate degree from Tulane University College of Arts and Sciences, graduating summa cum laude with a major in history. His subsequent education was at Tulane University School of Medicine where he received his medical degree cum laude and a masters of science in neuroanatomy. Post-graduate education was at Duke University Medical Center where he completed his internship and residency in neurologic surgery. While at Duke he did a special postdoctoral fellowship for the Veteran's Administration and did research at the Institute of Physiology in Pisa, Italy. Upon completion of training at Duke University Medical Center, Dr. Zorub came to the University of Pittsburgh and Presbyterian University Hospital where he served as director of residency education and director of stereotactic surgery. He subsequently relocated to Shadyside Hospital and Foundation in 1980 and has served as director of neurosurgery, and subsequently as chairman of surgery from July 1993 to September 30, 2009. Dr. Zorub also functioned as vice president of clinical affairs for Shadyside Hospital for seven years and his responsibilities included the clinical oversight of the merger agreement with UPMC Presbyterian for the Shadyside Board of Trustees as well as serving as vice president overseeing medical staff services, infection control, informatics and process improvement and quality management. He has also been active in organized medicine, having served as president of the Allegheny County Medical Society, chair of its board of trustees, and chair of the ACMS Foundation Board of Trustees. Dr. Zorub continues to be very active clinically. He has served in numerous positions at UPMC Shadyside, participating in essentially all facets of the institution. His areas of expertise include brain tumors, pituitary microsurgery, cranial nerve disorders like trigeminal neuralgia, hemifacial spasm, treatment for benign and malignant disease and spine surgery. He also specializes in peripheral nerve disorders having trained under Barnes Woodhall, MD.

Specialized Areas of Interest
Brain tumors, pituitary microsurgery, cranial nerve disorders like trigeminal neuralgia, hemifacial spasm, treatment for benign and malignant disease and spine surgery.

Board Certifications
American Board of Neurological Surgery

Hospital Privileges
Jefferson Regional Medical Center
UPMC Cancer Center
UPMC East
UPMC Presbyterian
UPMC Shadyside

Professional Organization Membership
American Association of Neurological Surgeons
American Association for Stereotactic Surgery
American Medical Association
Congress of Neurological Surgeons
Pennsylvania Medical Society
Pennsylvania Neurosurgical Society
Resident Biographies

William J. Ares, MD
PGY-2 Resident

William J. Ares, MD began his residency with the University of Pittsburgh Department of Neurosurgery in July of 2012. He graduated from Johns Hopkins University in 2006 with a degree in psychological and brain sciences and earned his medical degree from the University of Vermont in 2012. During his medical school career he was elected to the Alpha Omega Alpha Medical Honor Society and also received an Alpha Omega Alpha Student research fellowship for his work investigating the molecular mechanisms of cerebral vasospasm following subarachnoid hemorrhage. Dr. Ares was born and raised in Malverne, NY.

Honors and Awards
Alpha Omega Alpha Student Research Fellowship, 2011
Johns Hopkins University Dean’s List, 2005-06

Christopher Bonfield, MD
Chief Resident

Christopher Bonfield, MD, graduated summa cum laude from the University of Pennsylvania while majoring in biological basis of behavior and classical studies. He graduated from the University of Pittsburgh School of Medicine in 2007. After completing the University of Pittsburgh’s seven-year neurosurgery residency program in June of 2014, Dr. Bonfield accepted a pediatric neurosurgery fellowship with the University of British Columbia Children’s Hospital in Vancouver, B.C.

Specialized Areas of Interest
Craniofacial reconstruction; complex spine surgery.

Publications: 2013-14
• Refereed Articles:

Christopher Deibert, MD
PGY-4 Resident

Christopher Deibert, MD, joined the University of Pittsburgh neurosurgical residency program in July of 2010. Son of Paul and Carol Deibert of Pottsville, Pa., Dr. Deibert received his undergraduate degree from Goucher College and his medical degree from the University of Pittsburgh.
Resident Biographies

Christopher Deibert, MD

Specialized Areas of Interest
Neuro-oncology; stereotactic radiosurgery; neuro-trauma.

Professional Organization Membership
American Association of Neurological Surgeons
Congress of Neurological Neurosurgeons
International Stereotactic and Radiosurgery Society
National Brain Tumor Society
Watson Humanism Honor Society

Honors and Awards
American College of Rheumatology REF Abbott Fellowship
Outstanding Teaching Assistant University of Florida
Captain Men’s Varsity Swim Team, Goucher College
Ashlee DeSanctis Award for Outstanding Leadership
CAC Academic All-American
Marvin Perry Scholarship
Verizon Scholarship
Rhoda Dorsey Scholarship

Publications: 2013-14
• Refereed Articles:

• Presentations:


Amir H. Faraji, MD, PhD

Amir Faraji, MD, PhD, joined the University of Pittsburgh neurosurgical residency program in July of 2013. He graduated from the Medical Scientist Training Program at the University of Pittsburgh School of Medicine in 2012 after completing his PhD in chemistry in 2011. He graduated as valedictorian from the University of Florida in 2005. Dr. Faraji’s research interests focus on developing novel drug delivery systems for the central nervous system, including nanotechnology and convection-enhanced delivery. Dr. Faraji is a native of Clearwater, FL.

Professional Organization Membership
Allegheny County Medical Society
American Association for the Advancement of Science
Resident Biographies

American Association of Neurological Surgeons
American Chemical Society
American Medical Association
American Physician Scientists Association
Congress of Neurological Surgeons

Honors and Awards
Anderson Scholar, University of Florida
Clinical & Translational Research Pre-Doctoral Research Fellowship
Chemistry Graduate Excellence Fellowship, University of Pittsburgh
Florida Academic Scholars Award
MSTP Post-Doctoral Research Fellowship
Program for Excellence in Science, American Association for the Advancement of Science
United States Delegate, 2010 Lindau Nobel Laureates Meeting
University of Florida Research Scholar
Valedictorian, College of Liberal Arts and Sciences, University of Florida

Publications: 2013-14

Presentations:


Kimberly A. Foster, MD
PGY-6 Resident

Kimberly Foster, MD, graduated from the University of Michigan, Ann Arbor in 2004 while majoring in history with an emphasis on ancient history. She graduated from the University of Chicago Pritzker School of Medicine in 2008. Dr. Foster was born and raised in Allen Park, Mich.

Honors and Awards
Best Presentation Award, Stuart Rowe Research Day, 2013
Runner-up Presentation Award, Stuart Rowe Research Day, 2012
Best Presentation Co-Award, Stuart Rowe Research Day, 2011
University of Chicago Pritzker School of Medicine Dean’s Scholar, 2004-08
Keith Edson Scholar, 2005
University of Michigan History Honors Graduate, 2004
Arthur Fondlier Award for Best Senior Thesis, University of Michigan, 2004
M. Voss Award for Undergraduate Writing, 2004
Play for Peace Fellowship, 2003

Publications: 2013-14

Refereed Articles:
Resident Biographies


• Presentations:
  Jane EP, Premkumar DR, Morales A, Foster KA, Pollack IF. “Inhibition of Phosphatidylinositol 3-Kinase/AKT Signaling by NVP-BKM120 Promotes ABT-737-induced toxicity in a caspase-dependent manner through mitochondrial dysfunction and DNA damage response in established and primary cultured glioblastoma cells.” American Association for Cancer Research Annual Meeting, San Diego, Calif., April 5-9, 2014.


Gurpreet S. Gandhoke, MD

PGY-1 Resident

Gurpreet S. Gandhoke, MD, began his neurosurgery residency at the University of Pittsburgh in July 2013. He was born and raised in Pune, India where he completed his medical school and master's degree in surgery at the University of Pune. He graduated from a neurosurgery residency at the King George's Medical University in India. Dr. Gandhoke came to the United States and spent time pursuing neurosurgical research at the Barrow Neurological Institute and at the University of California, San Francisco. After completing a clinical pediatric neurosurgery fellowship at Northwestern University in Chicago, he came to the University Of Pittsburgh Medical Center for a fellowship in Spine Surgery in July 2012.

Specialized Areas of Interest
Spine; functional neurosurgery.

Board Certifications
Medical Council of India for General Surgery and Neurosurgery

Professional Organization Membership
American Association of Neurological Surgeons
Congress of Neurological Surgeons

Editorial Service
• Ad Hoc Reviewer:
  *British Journal of Neurosurgery*
  *Journal of Neurology, Neurosurgery and Psychiatry*
Resident Biographies

Gurpreet S. Gandhoke, MD

Honors and Awards
Sonntag International Fellowship for Excellence in Neurosurgical Research, Spine Section of the American Association of Neurological Surgeons, 2011.
Sanford Larson Award for Excellence in Neurosurgical Research, Spine Section of the American Association of Neurological Surgeons, 2013.
Gold Medal by the King George’s Medical University, India, 2009
Rank One Certificate by Pune University, India for graduating with honors with master’s degree in surgery, 2006.

Publications: 2013-14
• Refereed Articles:
  Tempel ZJ, Gandhoke GS, Bonfield CM, Okonkwo DO, Kanter AS. Radiographic and clinical outcomes following combined lateral lumbar interbody fusion and posterior segmental stabilization in patients with adult degenerative scoliosis. *Neurosurg Focus* 36(5):E11, 2014


• Presentations:


  Gandhoke GS. “Determination of the minimum improvement in pain, disability, and health state associated with cost-effectiveness in patients undergoing stand-alone LLIF for degenerative spondylosis (n=29), Spine Section Meeting of the American Association of Neurological Surgeons, Miami, Fla., March 5-8, 2014.

  Gandhoke GS. “Determination of the minimum improvement in pain, disability, and health state associated with cost-effectiveness in patients undergoing stand-alone XLIF for scolio-
Gurpreet S. Gandhoke, MD

Resident Biographies

Gandhoke GS. "Determination of the minimum improvement in pain, disability, and health state associated with cost-effectiveness in patients undergoing LLIF + PS for scoliosis (n=40)." Spine Section Meeting of the American Association of Neurological Surgeons, Miami, Fla., March 5-8, 2014.

Gandhoke GS. "Determination of the minimum improvement in pain, disability, and health state associated with cost-effectiveness in patients undergoing one level stand-alone XLIF vs. One level TLIF for degenerative spondylolisthesis (n=29 vs. with calculation of the Incremental Cost Effectiveness Ratio." Spine Section Meeting of the American Association of Neurological Surgeons, Miami, Fla., March 5-8, 2014.


Ramesh Grandhi, MD
Chief Resident

Ramesh Grandhi, MD, received his undergraduate degree in psychology from Duke University in 2001. After graduating from Georgetown University in 2002 with a master’s degree in physiology and biophysics, Dr. Grandhi taught high school biology in Santo Domingo, Dominican Republic. He subsequently earned his medical degree from the Medical College of Virginia in 2007. In June of 2014, Dr. Granhí completed his seven-year residency program at the University of Pittsburgh and subsequently accepted a cerebrovascular fellowship with Lyerly Neurosurgery in the Baptist Health System in Jacksonville, Fla.

Honors and Awards
Best Presentation Award, Stuart Rowe Research Day, 2012.
Best Resident Teaching Award, University of Pittsburgh Department of Neurosurgery, 2014.

Publications: 2013-14
• Refereed Articles:

Resident Biographies

**Stephen A. Johnson, MD**

*PGY-2 Resident*

Stephen A. Johnson, MD, joined the department residency program in June of 2012. He received his medical degree from the University of Pennsylvania. He also received his BA degree from Penn, graduating summa cum laude in 2008. Dr. Johnson is a native of Spring Lake, N.J.

**Publications: 2013-14**

- Refereed Articles:

**Ali Kooshkabadi, MD**

*PGY-5 Resident*

Ali Kooshkabadi, MD, graduated magna cum laude from Yale University in 2005 with a BS in biology. He subsequently earned his MD from Johns Hopkins School of Medicine in 2009.

**Specialized Areas of Interest**

Endoscopic endonasal and skull base neurosurgery; complex spine.

**Professional Organization Membership**

Congress of Neurological Surgeons
International Society of Poets
Phi Beta Kappa

**Philip S. Lee, MD, PhD**

*PGY-3 Resident*

Philip S. Lee, MD, PhD, joined the department residency program in June of 2011 after graduating from the University of Pittsburgh School of Medicine. He received a BA degree in psychology from The George Washington University in 1998 and PhD degree in clinical psychology from George Mason University in 2005. He also completed an internship in clinical child psychology at Children’s National Medical Center in 2005 and a postdoctoral fellowship in developmental cognitive neuroscience at Georgetown University in 2007. Dr. Lee is a native of Kingsport, Tenn.

**Professional Organization Membership**

American Association of Neurological Surgeons
American Psychological Association
Cognitive Neuroscience Society
Congress of Neurological Surgeons
Society for Neuroscience

**Honors and Awards**

Theodore Kurze Senior Prize in Neurological Surgery and Clinical Neuroscience, University of Pittsburgh, 2011
Dean’s Summer Research Merit Award, University of Pittsburgh, 2008
Publications: 2013-14

• Refereed Articles:

Robert Miller, MD
PGY-5 Resident

Robert Miller, MD, obtained a bachelor's degree in biochemistry, a minor in chemistry and a minor in biomedical sciences from Colorado State University in 2004. He graduated summa cum laude from Sanford School of Medicine at the University of South Dakota in 2009. Dr. Miller is a native of Denver, Colo.

Specialized Areas of Interest
Skull base

Professional Organization Membership
Alpha Omega Alpha Honor Society
American Association of Neurological Surgeons
Congress of Neurological Surgeons
North American Skull Base Society

Honors and Awards
Alma Carlson Scholarship, 2006
Faithe Family Scholarship, 2007 and 2008
Harry E. Settles, PhD, Memorial Scholarship, 2006
Karl H. Wegner, Award for Excellence in Pathology, 2007
UPMC Presbyterian Neurological Intensive Care Unit Resident of the Year, 2014

Publications: 2013-14

• Published Abstracts:


• Presentations:
W. Christopher Newman, MD  
*PGY-2 Resident*

W. Christopher Newman, MD, began his residency with the University of Pittsburgh Department of Neurosurgery in July of 2012. He graduated from Harvard University in 2008 with a degree in biomedical engineering and earned his medical degree from the University of Florida in 2012. During his medical school career, he started a faculty-student career mentorship program for medical students and was awarded the Senior Excellence in Neurosurgery Award at the University of Florida for his work on healthcare disparities in vascular neurosurgery. He also was awarded The University of Florida College of Medicine Anne L. Copeland Award for his contributions to health equity. Dr. Newman was born in Orlando, Fla.

**Specialized Areas of Interest**

Vascular neurosurgery; trauma; spine.

**Honors and Awards**

- Maren Room Creativity Award and Grant, 2010
- University of Florida College of Medicine, Anne L. Copeland Award, 2012

**Publications: 2013-14**

- Refereed Articles:
  

David Panczykowski, MD  
*PGY-3 Resident*

David Panczykowski, MD received his bachelor’s degree from Clemson University in 2006 while concurrently employed as a fire fighter with the Clemson Fire Department. He matriculated to the University of Miami School of Medicine, where he had the opportunity to participate in research at the Miami Project to Cure Paralysis. Dr. Panczykowski was later selected for the Campagna Scholarship in Neurological Surgery at Oregon Health and Science University in 2008, completing research on cerebral vasospasm. In 2009, he performed a Doris Duke Clinical Research Fellowship at the University of Pittsburgh as well as a Traumatic Brain Injury Research Fellowship under David O. Okonkwo, MD, PhD.

**Specialized Areas of Interest**

Cranial and spinal trauma; skull base surgery; cerebrovascular surgery.

**Professional Organization Membership**

American Association of Neurological Surgeons

**Honors and Awards**

- American Cancer Society Research Scholarship, University of Miami, 2009
- John K. Robinson Award for Student Initiatives, University of Miami, 2008
- Runner-up Presentation Award, Stuart Rowe Research Day, 2013

**Publications: 2013-14**

- Refereed Articles:
  
Phillip Vaughan Parry, MD
PGY-6 Resident

Phillip Vaughan Parry, MD, received his undergraduate degree in biology and chemistry from Wake Forest University in 2003. After graduating from Tulane University in 2004 with a master’s degree in human genetics, Dr. Parry matriculated to Tulane’s School of Medicine earning his medical degree in 2008. Dr. Parry is a native of New Orleans, La. and his interests outside of neurosurgery include running marathons, guitar and sailing.

Professional Organization Membership
Phi Beta Kappa
United States Air Force (Captain)
United States Sailing Association

Honors and Awards
Magna Cum Laude, Wake Forest University, 2003
Sullivan Scholarship, 2002

Publications: 2013-14
• Refereed Articles:


Resident Biographies

Paul S. Richard, MD  
PGY-6 Resident  

Paul S. Richard, MD, joined the department residency program in June of 2008. He received his medical degree from Tulane University after attending undergraduate school at the University of Texas, Austin.

Publications: 2013-14  
- Refereed Articles:  

Christian B. Ricks, MD  
PGY-2 Resident  

Christopher Ricks, MD, entered the University of Pittsburgh Department of Neurological Residency program in July of 2012 after receiving his medical degree from the Baylor College of Medicine. He also has both BS and MS degrees in genetics and biotechnology from Brigham Young University.

Specialized Areas of Interest  
General neurosurgery, neuro-oncology.

David Salvetti, MD  
PGY-1 Resident  

David J. Salvetti, MD, began his residency with the University of Pittsburgh Department of Neurosurgery in July 2013. He graduated from Vanderbilt University in 2009 with a BE in biomedical engineering, and then attended the University of Virginia School of Medicine, graduating in 2013. During both undergraduate and medical school, Dr. Salvetti was heavily involved in neurosurgery research ranging from software development to the clinical outcomes of Gamma Knife surgery. Dr. Salvetti was born in Willow Grove, Pa. and grew up in east Tennessee. Outside neurosurgery his interests include mechanics, hiking, fishing, and other outdoor pursuits.

Samuel S. Shin, MD, PhD  
PGY-1 Resident  

Samuel Shin, MD, PhD, began his residency with the University of Pittsburgh Department of Neurosurgery in July of 2013. He received his bachelor's degree from the University of California, San Diego in bioengineering. His focus of research was in fluid mechanics, specifically on fluid flow through microvasculature. After matriculating into the medical scientist training program at the University of Pittsburgh/Carnegie Mellon University, Dr. Shin studied molecular mechanisms of traumatic brain injury under the guidance of C. Edward Dixon, PhD. In 2010 he was awarded National Research Service Award (F30) from NIH for studying deficits in dopaminergic neurotransmission after traumatic brain injury. After graduating from University of Pittsburgh School of Medicine in December 2012, he continued research in traumatic brain injury as a postdoctoral research fellow in Dr. Dixon's laboratory before beginning his residency at UPMC. Dr. Shin was born in Seoul, Korea and raised in Torrance, Calif.
Resident Biographies

**Zachary J. Tempel, MD**

*PGY-4 Resident*

Zachary J. Tempel, MD, graduated summa cum laude from Miami University in 2006 with degrees in zoology and French. In 2010, he received his medical degree from the Indiana University School of Medicine. During medical school, Dr. Tempel was elected to Alpha Omega Alpha as a junior. Additionally, he was awarded the inaugural Julius M. Goodman scholarship for excellence in neurological surgery. As a senior medical student, Dr. Tempel was selected as a Pittman Surgical Scholar for academic achievement in surgery. During his PGY-5 and PGY-6 years, Dr. Tempel will complete an enfolded spine fellowship focusing on minimally invasive techniques and complex spinal deformity under the direction of Adam Kanter, MD, and David Okonkwo, MD, PhD. Dr. Tempel—born and raised in Indianapolis, Ind.—is married to Claire Tempel, an audiologist at UPMC and enjoys traveling, scuba diving, soccer and other outdoor activities.

**Specialized Areas of Interest**

Minimally invasive spine surgery; scoliosis and complex spinal deformity; outcome measures and cost-effectiveness in spine surgery; traumatic brain injury and concussions.

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**Honors and Awards**

NIH National Research Service Award F30 (April 2010-April 2014)
NIH T32 (September 2009-March 2010; September 2007-April 2008)
Theodore Kurze Senior Neurosurgery/Clinical Neuroscience Award (May 2013)
Nancy Caroline Fellowship Award (June 2012)
Copeland Foundation Grant (2009, 2013, 2014)
Eugene H. Mead Memorial Award for Outstanding Bioengineering Design (June 2006)
Outstanding Research Award (Dept. of Bioengineering, UC San Diego, June 2004, 2005)
Dynes & Hellman Research Scholarship (June 2004)
Provosts Honors at UC San Diego (2001-2006)

**Publications: 2013-14**

- Refereed Articles:


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**Samuel S. Shin, MD, PhD**

**Resident Biographies**

Samuel S. Shin, MD, PhD

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Resident Biographies

Zachary J. Tempel, MD

Professional Organization Membership
Alpha Omega Alpha
American Association of Neurological Surgeons
Congress of Neurological Surgeons
Society of Lateral Access Surgery

Honors and Awards
Summa Cum Laude: Miami University, 2005
Joseph, Samuel and Donald Ferrara Scholarship, 2007
ED Johns Fellowship, 2007
BT Maxam Scholarship, 2009
Julius M. Goodman Award in Neurosurgery, 2010
Pittmann Surgical Scholarship, 2010
W.R. Krickenberger Memorial Scholarship, 2003
William Marion Miller French Scholarship, 2004
L.H. Skinner Memorial French Award, 2005
Culler Physics Award, 2005

Publications: 2013-14
• Refereed Articles:


Gregory M. Weiner, MD
PGY-3 Resident

Gregory M. Weiner, MD, joined the department in July of 2011. He graduated with honors from the University of California, Berkeley with a degree in molecular neurobiology in 2006 and subsequently earned his medical degree from Tulane University in 2011. During his medical school career he was elected to the Alpha Omega Alpha as well as the Arnold P. Gold Humanism in Medicine Honor Society. Dr. Weiner was born and raised in Los Angeles, Calif.

Specialized Areas of Interest
Vascular and functional neurosurgery

Professional Organization Membership
Alpha Omega Alpha Honor Society
American Association of Neurological Surgeons
Arnold P. Gold Humanism in Medicine Honor Society
Congress of Neurological Surgeons
Neurocritical Care Society
Resident Biographies

Gregory M. Weiner, MD

Honors and Awards
National Collegiate Scholars Award, 2002
California Alumni Leadership Scholarship, 2002
Honors Award-Molecular and Cell Biology, UC Berkeley, 2006
Arnold P. Gold Humanism in Medicine Award, 2010

Publications: 2013-14
• Refereed Articles:

• Invited Papers:

Georgios A. Zenonos, MD
PGY-3 Resident

Georgios A. Zenonos, MD joined the Department of Neurological Surgery in July 2011. He was born and raised in the Mediterranean island of Cyprus. After high school, Dr. Zenonos served a 26-month military service as a military officer before matriculating in the University of Athens Medical School in Greece with a full scholarship from the Ministry of Education. Graduating as the valedictorian of his medical school class, he received the Alexander S. Onassis Distinguished Scholar Award, and then joined the Neuroapoptosis Laboratory at the Brigham and Women's Hospital, Harvard Medical School, where he went on to study the molecular mechanisms of programmed cell death in the nervous system. During his fourth year, Dr. Zenonos is planning to initiate a trial investigating the effects of pharmacologic agents on ischemic stroke during carotid revascularization procedures.

Specialized Areas of Interest
Skull base surgery; cerebrovascular surgery; complex spine, pharmacologic neuroprotection.

Hospital Privileges
Children's Hospital of Pittsburgh of UPMC
UPMC Mercy
UPMC Presbyterian
UPMC Shadyside
VA Medical Center

Professional Organization Membership
American Association of Neurological Surgeons
Congress of Neurological Surgeons
Onassis Foundation Honorary Scholars Society

Honors and Awards
Robert Dempsey Cerebrovascular Research Award, 2014
Best score, ABNS written exam 2014
Alexander S. Onassis Scholarship for Post-Graduate Studies, 2010
Valedictorian, Athens Medical School, 2008
Baronos Award for Excellence in Pharmacology, University of Athens Medical School, 2005
National Scholarship Foundation Award, 2002-08
Cyprus Scholarship Foundation Award, 2002-08
Resident Biographies

Georgios A. Zenonos, MD

Top graduate, Military Officer Academy, Megalos Pefkos, Greece, 2001
National Physics Olympiad Prize, 2000

Benjamin M. Zussman, MD
PGY-1 Resident

Benjamin M. Zussman, MD, joined the neurosurgery residency program in July of 2013. Prior to coming to the University of Pittsburgh, he studied medicine at Jefferson Medical College where he was managing editor of the Jefferson Hospital for Neuroscience Journal, co-founder and president of the Neurosurgery Student Interest Group, and a teaching assistant in neuroanatomy. At Jefferson, he was elected to the Gold Humanism Honor Society and the Hobart Amory Hare Medical Honor Society, and he received the annual Senior Student Clinical Research Award. In collaboration with Johnathan Engh, MD, Cameron Riviere, PhD (Carnegie Mellon University Robotics Institute), and Wendy Fellows-Mayle, PhD, Dr. Zussman is the principal investigator for a translational research study entitled “A Novel Steerable Percutaneous Intracranial Navigation System: A Pilot Study of In-Vivo Accuracy, Reliability, and Safety.” Under the mentorship of Joseph Maroon, MD, Dr. Zussman established the University of Pittsburgh Microneurosurgery Training & Research Laboratory within the Department of Neurological Surgery’s Walter Copeland Laboratory. Ongoing efforts include deliberate microsurgical practice utilizing bench, cadaver, and live animal models, and retrospective analysis of videotaped longitudinal performance using quantitative assessment tools. Within UPMC, Dr. Zussman is a member of the Compensation and Benefits Subcommittee of the Graduate Medical Education Committee. He is the resident member of an interdisciplinary committee tasked with designing a novel electronic medical record physician signout application. He has published several neurosurgical articles, book chapters, and abstracts. Dr. Zussman was raised in Wilmington, Del., graduated from Haverford College, and lives with his wife and three sons.

Publications: 2013-14
• Refereed Articles:

• Presentations:

Nathan Zwagerman, MD
PGY-4 Resident

Nathan T. Zwagerman, MD, graduated from Calvin College in 2006 with a degree in psychology. In 2010, he received his medical degree from Wayne State University School of Medicine. During medical school, Dr. Zwagerman was elected to Alpha Omega Alpha as a junior. Additionally, he was awarded the Student’s Golden Heart Award. Dr. Zwagerman will be participating in the endoscopic endonasal skull base fellowship during residency. Dr. Zwagerman, born and raised in Holland, Mich., is married to Lisa Zwagerman, and enjoys traveling, hiking, playing basketball, fishing and other outdoor activities.

Specialized Areas of Interest
Skull base surgery; cardiovascular surgery; functional and stereotactic surgery; trauma; and complex spinal deformity surgery.
Resident Biographies

Nathan Zwagerman, MD

Publications: 2013-14

• Refereed Articles:


Resident Biographies

Chief Resident Graduation Dinner

Graduating chief resident Christopher Bonfield with family.

Graduating chief resident Ramesh Grandhi with family.

William Ares with guest Abbie Yingling.

Christopher Deibert with wife Amy.

Nathan Zwagerman with wife Lisa.

Robert Miller with guest Brittany Tatro.
June 14, 2014 • Pittsburgh Golf Club

Department chairman Robert Friedlander with wife Eugenia.

David Zorub and John Moossy with Hideho Okada and wife Kaori.

Daniel Salvetti with guest Kathryn B. Ridder.

Partha Thirumala with wife Anita.

Adam Kanter with wife Jodi.

Daniel Wecht with wife Anna.
Chief Resident Graduation Dinner

Ramesh Grandhi, Robert Friedlander and Christopher Bonfield.

Residents.

Dr. Friedlander makes opening remarks.

Adam Kanter, spine fellow Bryan Bolinger and David Okonkwo.

Juan Fernandez Miranda, cranial base fellow Francisco Daz Guimaraes Filho and Paul Gardner.

Dr. Grandhi receives resident teaching award from Dr. Friedlander.
Pediatric fellow Ashley Tian and Ian Pollack.

Paul Gardner receives attending teaching award from Dr. Friedlander.

Georgios Zenonos receives ABNS exam award from Dr. Friedlander.

Friends, family and colleagues listen to Dr. Grandhi’s remarks.

Dr. Bonfield receives diploma from Dr. Friedlander and L. Dade Lunsford.

Dr. Grandhi receives diploma from Drs. Friedlander and Lunsford.
The goal of the Department of Neurological Surgery at the University of Pittsburgh is to improve the care and treatment of patients with neurosurgical disease. This goal is being achieved partly through the conduct of state-of-the-art basic and translational research. The department, with more than 40 faculty members and investigators, seeks to be at the forefront of this endeavor; and numerous advances have already been achieved—research translated into practice.

Annually, the department has been highly ranked in National Institutes of Health funding, a direct result of the success and quality of our research and development. In the past fiscal year, our faculty and residents were involved in more than 100 research projects having a total budget award of more than $7.5 million. Total department research funding increased by more than 9% over fiscal year 2013. Since fiscal year 2010, the department’s total research funding has increased by 62%.

Ongoing research includes the disciplines of molecular biology, neurophysiology, neurochemistry, neuroanatomy, neuroradiology and other neuroscience arenas. Specific questions addressed include research into the acute and chronic care following neurotrauma, neural recovery and plasticity, the neurobiologic and therapeutic response in neuro-oncology, the underlying mechanisms and treatment of movement traumas, cell death and radiation injury, and cerebrovascular physiology and modeling. The department provides an outstanding research environment for fellows, residents, and students seeking training in neurosurgical research.

Intramural research support for junior faculty and residents is available through the Walter L. Copeland Fund. The Walter L. Copeland Fund was established at The Pittsburgh Foundation in 1961, with instructions that the entire annual proceeds support cranial research in the Department of Neurosurgery at the University of Pittsburgh. More than $2 million has been granted for various research projects. In November 2001, the neurosurgical labs on the ninth floor of Scaife Hall were dedicated as the Walter L. Copeland Laboratory for Neurosurgical Research.
The Walter L. Copeland Laboratory

The Walter L. Copeland Laboratory serves as a central facility for research and development within the Department of Neurological Surgery. Located on the ninth floor of Scaife Hall, the laboratory was dedicated on November 29, 2001 by L. Dade Lunsford MD. The laboratory houses several research disciplines and core facilities which provide resources and services for a wide range of neurosurgery faculty, residents, visiting fellows, and students. Core services in the areas of biochemistry, histology, and immunohistochemistry are offered in this facility. Neurotrauma, brain tumor, brain imaging, and neuroanatomical research are the primary initiatives being conducted in the laboratory. A significant amount of this work is funded by The Walter L. Copeland Fund of The Pittsburgh Foundation, a fund that has provided resources for research at the University of Pittsburgh since 1961.

Brain tumor research conducted in the Copeland Laboratory range from the molecular assessment of tumor properties to the development of in vivo tumor models which undergo various therapeutic regimes. These therapies include the use of immunologic agents, neural stem cells, or radiation. Some studies utilize dendritic cells to enhance the activity of therapeutic immunity while others involve the use of neural stem cells to enhance tumor killing by genetically engineering transplanted cells for the delivery of therapeutic agents. Radiation therapy research aims to limit or prevent damage to normal brain while enhancing the affects of radiation on neoplastic tissue. In addition to therapeutic advances, molecular studies targeted at unraveling gene expression changes in angiogenesis are also under way.

The laboratory for Clinical Neurotrauma Research Team is also located in the Copeland Laboratory. Led by David Okonkwo, MD, PhD, the team conducts innovative clinical research on brain monitoring methods and biomarkers as well as the evaluation of neurotherapeutics for traumatic brain injury.

Neuroanatomical research is also conducted in the Copeland Laboratory. Residents and visiting fellows train in neuroanatomy and the development of minimally invasive endoNeuro-surgical approaches to the brain. New routes to various brain locations are developed using in vitro models. New MRI techniques for presurgical planning are being developed and the effects of endoscopic endoport surgery on white matter tracts are also being investigated.

Wendy Fellows-Mayle, PhD, is coordinator of the Copeland Laboratory.

Neurotrauma Research

C. Edward Dixon, PhD, directs the Department of Neurological Surgery’s Brain Trauma Research Center (BTRC) at the University of Pittsburgh. The BTRC is a multidisciplinary, multidisciplinary research program aimed at improving outcome following severe traumatic brain injury. Research conducted both at our Center and at other brain injury research programs clearly demonstrates the potential for improving outcomes using therapies designed to treat biochemical derangements that occur following impact to the brain. In order to identify the most critical of these sequelae of brain injury and to find newer therapies that are effective in treating them, the BTRC has established several basic science head injury laboratories and clinical research projects.

David O. Okonkwo, MD, PhD, leads the department’s efforts in clinical neurotrauma research. The clinical brain injury research is wide spanning and includes the conduct of clinical trials funded by the federal agencies and industry to study new therapies, novel brain monitoring, neuroimaging and biomarkers. The Department of Neurological Surgery has pioneered efforts using hypothermia and cerebral blood flow monitoring in the treatment of severe head injury and has conducted landmark investigations into the mechanisms of induction and recovery of head trauma and secondary injury.
Research

Overview

The Safar Center for Resuscitation Research is directed by Patrick Kochanek, MD, of the Department of Critical Care, and has a strong collaborative and productive relationship with several members of the Brain Trauma Research Center. Neurosurgical faculty Dr. Dixon and Larry W. Jenkins, PhD, serve as associate directors of the Safar Center. This facility includes basic science laboratories directed by Drs. Dixon and Jenkins. The mission of the Safar Center is to improve understanding of the mechanisms of secondary injury after traumatic brain injury, cardiopulmonary arrest, severe hemorrhage from whatever cause, and to contribute to the development and implementation of novel and increasingly more effective therapies.

Brain Tumor Research

Innovative research in the area of brain tumor therapies include the use of immunologic agents, the study of signal transduction in the growth of tumor cells, and the use of oncolytic viruses in order to treat brain tumors and minimize morbidity.

In immunotherapy approaches to brain tumor destruction, there currently exists a trade off in terms of targeting tumor antigens without killing normal brain tissue. Possible adverse events in immunotherapy may include the induction of an autoimmune response against normal brain tissue. We have identified glioma-associated antigens that are overexpressed glioma cells but not expressed in normal brain cells. We have developed phase I clinical trials of vaccines targeting these antigens, and demonstrated robust induction of antigen-specific immune responses and some clinical activity in both adult and pediatric patients with glioma. Current research studies in the laboratory utilize next generation sequencing of individual tumors so we can identify tumor-specific mutated epitopes for personalized immunotherapy.

Another strategy in brain tumor research is to inhibit the pathways that promote tumor growth or to stimulate those that promote tumor cell killing. The poor response of malignant gliomas to conventional therapies, such as cytotoxic chemotherapy or radiotherapy, reflects resistance of these tumors to undergoing apoptosis in response to DNA damage or mitogen depletion. Through a large-scale screening study, we have identified several exploitable targets, which when inhibited induce tumor cytotoxicity. We have been examining pharmacological agents to inhibit these targets, alone and in combination with agents that induce apoptotic signaling in these tumors. These preclinical studies are coupled with a robust clinical trials effort in association with the Adult Brain Tumor Consortium and the Pediatric Brain Tumor Consortium (PBTC), which are examining novel molecularly agents in the treatment of these tumors.

In this regard, the Brain Tumor Program currently runs “personalized” clinical studies based on patients’ gene markers, such as human leukocyte antigen (HLA)-A2 (for immunotherapy studies), epidermal growth factor receptor (EGFR) variant III and chromosome 1p/19q co-deletion. In addition, the program offers a host of molecularly targeted treatment approaches for children whose brain tumors have genomic alterations that make them ideally suited for specific novel-agent trials. These include studies of MEK inhibitors (e.g. AZD6244) for children with BRAF-altered low-grade gliomas and Sonic hedgehog (SHH) inhibitors for children with medulloblastomas that have alterations in the SHH signaling pathway, which are being conducted by the PBTC.

Another important aspect of brain tumor research focuses on strategies to improve killing of brain tumor cells while minimizing damage to the surrounding normal tissue. To this end, researchers in our department have developed genetically engineered oncolytic herpes-simplex viruses that can selectively kill proliferating glioma cells but not normal brain cells. Further safety testing in preclinical models is warranted to move this strategy into clinical trials.
Research

Overview

Other elements of this work involve studying improvements to virus delivery, which include overcoming limited vector distribution, a consequence of injected virus getting trapped in the tumor extracellular matrix.

These basic and translational research efforts are also coupled with active clinical programs in radiosurgery and minimally invasive neurosurgery, discussed elsewhere in this report.

Pediatric Neurotrauma Center

The Pediatric Neurotrauma Center (PNTC), under the leadership of Michael J. Bell, MD, (Critical Care Medicine) and Mandeep Tamber, MD, PhD, has both basic science and clinical research programs aimed at understanding the pediatric response to neural injury as well as the unique elements of recovery that are specific to traumatic central nervous system injuries in children. This section coordinates services for injured children at Children’s Hospital of Pittsburgh, which operates the region’s only Level I pediatric trauma center. The goal of the center is to provide optimal care between the time of injury and discharge. Subspecialists in all pediatric medical and surgical disciplines are readily available to provide definitive care. As one of the most established and comprehensive programs in the country, the PNTC has been at the forefront of pediatric neurotrauma research not only locally but also nationally and internationally, serving as an important resource for collaborative programs such as multi-institutional clinical trials designed to improve outcomes as well as efforts aimed at developing consensus clinical guidelines for the care of children with traumatic neurological injury. Research is progressing at a vigorous pace, with the completion of the “Cool Kids” trial, the implementation of several new phase I/II clinical trials, the start of a comparative effectiveness study to discern barriers to implementation of evidenced-based guidelines and the continuing support of a T32-training grant in pediatric neurocritical care.

Neurophysiology Research

Research focus at the Center for Clinical Neurophysiology is aimed at analyzing the utility of intraoperative neurophysiological monitoring (IOM) to predict and prevent post operative neurological complications during adult and pediatric neurosurgical, orthopedic, ENT, cardio-thoracic, vascular and interventional neuroradiology procedures.

This research is achieved by reviewing electrophysiological data collected during surgical procedures by 1) critically evaluating the current modalities utilized in IOM, 2) developing and validating new techniques to reduce post operative complications, and 3) evaluating the use of modalities during various surgical procedures.

The research team at the CCN works closely with surgeons and researchers in the departments of orthopedic, ENT, cardiothoracic, and vascular surgery on various research projects.

Bioengineering research, under the direction of Mingui Sun, PhD, is developing a novel skin-surface EEG electrode that requires no electrolyte application, is self-adhering to the unshaved scalp, and has low and stable impedance.

Magnetoencephalography (MEG) Research

The aim of MEG research, directed by Avniel Singh Ghuman, PhD, is to facilitate, develop, and advance clinical and basic neuroscience research using magnetoencephalography. To this end, Dr. Ghuman is helping to develop new research applications for MEG in collaboration with researchers throughout the community.

MEG is the most powerful functional neuroimaging technique for noninvasively recording magnetic fields generated by electrophysiological brain activity, providing millisecond temporal resolution and adequate spatial resolution of neural events.
It has been another banner year for MEG research, with a large number of new and completed projects, exciting new publications, and a number of recently funded grants with substantial MEG components from the NIH, NSF, and DARPA. MEG is currently being used to study the healthy brain, both in adults and during development, in order to understand the neural basis of cognitive processes, including reading, vision, audition, motor control, semantic memory, executive functioning, emotional processing, and working memory. Furthermore, groups in the community are also using MEG to understand how neural processing is disturbed in a host of pathologies, including TBI, schizophrenia, spinal cord injury, HIV-AIDS, epilepsy, autism spectrum disorders, Alzheimer’s disease, and Parkinson’s disease. We anticipate another year of excellent growth with some very exciting new research projects planned and a substantial number of exciting new grant proposals being submitted involving MEG.

**Neuroapoptosis Research**

The Neuroapoptosis Laboratory, directed by Robert Friedlander, MD, is focused on the study of the basic mechanisms of apoptosis, as mediated by the caspase apoptotic family in neurologic diseases. In addition, discovering novel approaches to ameliorate the impact of cell death in a variety of neurological diseases is a central theme of the Neuroapoptosis Laboratory.

**Brain Modulation Laboratory**

The Brain Modulation Laboratory, directed by R. Mark Richardson, MD, PhD, studies human brain electrophysiology, imaging, histopathology and cognition in patients undergoing surgery for epilepsy and movement disorders. The goal of these studies is to improve our understanding of potential targets for therapeutic modulation. A related focus of the lab is the development of nonhuman primate models to test novel hypotheses related to the treatment of these disorders.

**Neurodegeneration Research**

Robert Friedlander, MD, is investigating the neuropathology and mechanisms of neurodegeneration in adult-onset neurological diseases. Pre-clinical drug trials in mouse models of neurological disease act as a conduit of therapeutic agents for direct translation to human clinical trials in Huntington’s disease and amyotrophic lateral sclerosis patients. A major goal of current clinical research is to identify parallels in peripheral and central biomarker detection of disease and manifestations of neuronal dysfunction with translation to potential disease-modifying therapies that are being developed and evaluated in the clinical setting, especially in early stage disease. The goal is to create a data set of multiple markers that can be used with multivariate techniques to develop a unique biochemical signature relating to neurological diseases and to evaluate correlative biomarkers and biomarkers in response to therapy.

**Surgical Neuroanatomy Laboratory**

The Surgical Neuroanatomy Lab (SNL)—under the direction of Juan C. Fernandez-Miranda, MD—has a dual educational and research role aiming to improve surgical techniques and outcomes by mastering knowledge of relevant surgical neuroanatomy. Many national and international students, residents, and fellows have conducted training and research at the SNL during the last few years. The working philosophy at the SNL is meticulous and exquisite anatomical microdissections to better understand the intricacies of the complex anatomy of the human brain and skull base. The lab has three main research/educational areas: endoscopic skull base anatomy, microsurgical neuroanatomy, and white matter anatomy/brain connectivity/surgical planning.
• **Endoscopic Skull Base Anatomy**
The Expanded Endonasal Approach (EEA) has revolutionized skull base neurosurgery. The EEA has anatomical and technical advantages over open skull base approaches for the treatment of selected lesions. EEA is not minimally invasive but maximally effective for the treatment of a wide variety of skull base lesions. The SNL at the University of Pittsburgh has pioneered anatomical work on the area of skull base endoscopy, and its goal is to continue providing landmark contributions to the skull base community. Meticulous knowledge of the ventral skull base anatomy as seen from the endoscopic perspective is critical to apply endonasal endoscopic surgery in an effective and safe manner.

• **Microsurgical Neuroanatomy**
Conventional skull base approaches are being compared with novel endoscopic endonasal approaches to aid in understanding indications and limitations of different but complementary skull base approaches. Contemporary skull base surgeons should combine expertise in open and endoscopic skull base approaches to select the most appropriate approach and technique for each particular case. Emphasis is made on the circumferential conceptualization of the skull base and the selection of “anatomically-favorable” surgical routes.

**Fiber Tractography Laboratory**
High-Definition Fiber Tractography (HDFT) is an advanced MRI-based non-invasive imaging technique that is being used in our lab—under the direction of Juan C. Fernandez-Miranda, MD—to study the intrinsic structure and connectivity of the living human brain, both in normal subjects and neurosurgery/neurology patients.

• **Neuroanatomy of Fiber Tracts**
Nearly two decades ago, Sir Francis Crick, neuroscientist, discoverer of the DNA molecule and 1962 Nobel Prize for Medicine, wrote: "to interpret the activity of living human brains, their neuroanatomy must be known in detail. New techniques to do this are urgently needed, since most of the methods now used on monkeys cannot be used on humans." Nowadays, HDFT allows us to investigate the intrinsic structure of the brain with unprecedented detail, which will invariably facilitate a better understanding of brain functioning.

Studies in the Fiber Tractography Lab have contributed to elucidate the structure and connectivity of the Middle Longitudinal Fascicle showing that interconnects the superior temporal gyrus with the superior parietal lobule and parieto-occipital region. Based on the roles of these interconnected cortical regions, it is hypothesized that the MdLF may contribute to the dorsal "where" pathway of the auditory system.

We have also studied the asymmetry, connectivity, and subsegmentation of the arcuate fascicle, confirming the highly leftward asymmetry of this tract as well as the existence of a strong structural subsegmentation in the left arcuate, but not in the right one. We proposed the existence of primary and supplementary language pathways within the dominant arcuate fascicle with potentially distinct functional and lesional features.

There are other ongoing research projects regarding the connectivity of the superior longitudinal fascicle, the superior fronto-occipital fascicle, the claustrum, and the thalamic radiations.

• **Presurgical Assessment of Fiber Tracts and Surgical Planning**
HDFT provides a superior presurgical evaluation of the fiber tracts for patients with complex brain lesions. Our presurgical studies are built upon precise and accurate neuroanatomical knowledge, which allows us to reconstruct fiber tracts and design the less invasive trajectory into the target lesion.
Our clinical experience applying HDFT has been reported in *Neurosurgery*, and we have are currently investigating its potential for not only presurgical planning and intraoperative navigation but also for neurostructural damage assessment, estimation of postsurgical neural pathways damage and recovery, and tracking of postsurgical changes and responses to rehabilitation therapy.

The ultimate goal is to facilitate brain function preservation and recovery in patients undergoing complex brain surgery.

- **Fiber Tract Integrity and Damage Progression in Neurodegenerative Disorders**
  We are currently studying patients with ALS and Huntington Disease aiming to obtain quantifiable measures of white matter tract integrity that can be correlated with the speed of disease progression and with clinical measures. The ultimate goal is to find an accurate biomarker of the disease that can be monitored and serve as a reference for treatment response.

- **Language Connectivity Pathways and Neuroplasticity in Aphasic Stroke Patients**
  We are correlating specific white matter tract disconnections evidenced by HDFT with phonological and semantic deficits aiming to improve our understanding of language related pathways. We are also investigating the neuroplasticity in this stroke population by determining whether targeted intensive behavioral therapy induces structural neuroplastic changes in perilesional and/or contralateral fiber tracts of aphasic patients and whether any observed neuroplastic changes are correlated with behavioral improvements and predict the potential for speech recovery.
Investigator Research Summaries

Jeffrey Balzer, PhD
Associate Professor of Neurological Surgery, Neuroscience & Acute and Tertiary Care Nursing
Associate Director for Clinical Services
Director of Cerebral Blood Flow Laboratory

Dr. Balzer’s main clinical research over the past year focused on characterizing the development of delayed cerebral ischemia in the SAH. He has been able to identify several key genetic biomarkers and evaluate how their concentrations change after SAH as well as to characterize how cerebral perfusion pressure influences long-term outcomes in this patient population. He has also characterized how the use of a non-invasive bedside monitor, namely cerebral oximetry, correlates with delayed cerebral ischemia.

In addition to Dr. Balzer’s clinical research in the SAH patient population, he has also begun to extensively characterize the utility of SSEP and MEP in prognosis in the severe TBI patient population. He also just received a Copeland grant to use the same diagnostic technology in the ICU to serially test SAH patients in an attempt to characterize changes in their neurological status as well as predict outcomes. He is also involved in early clinical trials in humans evaluating the use of transvenous stimulation of the vagus nerve to treat cardiac arrhythmias.

Dr. Balzer also has begun a series of studies investigating the effects of various degrees of spinal cord injury on SSEP and MEP recordings in the acute and chronic phases in rats. He would like to use this animal model as a means by which to characterize and predict how changes in intraoperative monitoring data in patients undergoing spinal procedures will ultimately translate to transient and permanent clinical deficits.

Diane L. Carlisle, PhD
Assistant Professor of Neurological Surgery

The use of stem cells to both understand prenatal development and to advance the development in therapeutics has been a major advancement, and the Carlisle Laboratory uses stem cells for both approaches.

In the United States, each year approximately one in 10 newborns is exposed to cigarette smoke during gestation. Cigarette smoke exposure during this critical time of organogenesis and subsequent organ growth and maturation causes morbidity and mortality after birth. In the lung, prenatal cigarette smoke exposure causes decreased lung function at birth and into childhood, as well as increased incidence of asthma and allergies. The mechanisms by which cigarette smoke has these effects is not known; however, it is modeled in non-human primates (NHP) exposed during pregnancy to nicotine, a major component of cigarette smoke. These studies find that although there are thousands of chemicals in cigarette smoke, NHP infants subjected to nicotine alone via a maternal exposure during development, have increased thickness of the inner airway wall and altered complexity of branching, decreased respiratory volumes, and altered response to airway challenges. This is possible because nicotine easily crosses the placenta and accumulates in amniotic fluid with average concentrations of 150 nM. The physiological alterations described above that are caused by nicotine exposure may be linked to altered regulation of proliferation and apoptosis during organogenesis and organ growth. Our preliminary data demonstrate that nicotine may affect differentiation by altering the expression of a key regulators of proliferation and apoptosis during development. We are exploring these changes in gene expression that are caused by nicotine exposure. The ability of prenatal nicotine exposure to alter expression of genes responsible
for proliferation and apoptosis during development could provide a mechanism for the adverse effects that have been documented in infants born to smoking mothers.

The second stem approach used by the Carlisle Laboratory is to take stem cells derived from patients with neurological disease, differentiate them into neural cells, and use them to screen compounds for treatment. A proof of principle for this strategy was recently published for ALS (Egawa et al 2012), where it was demonstrated that skin biopsies from ALS patients could be reprogrammed into stem cells, and these stem cells can then be differentiated into motor neurons and used in a drug screening assay. We plan to expand this approach to develop novel therapies for ALS patients.

**Yue-Fang Chang, PhD**  
*Research Assistant Professor of Neurological Surgery*

1) Women’s Health Across the Nation (SWAN)

The study aims are: 1) to identify and validate reliable markers of the transition from pre- to perimenopause and describe their normal variation in a multi-ethnic cohort of mid-aged women; 2) to estimate the normal variations in the full menopause process, including the two transitions from pre-to perimenopause and peri- to postmenopause, with a hypothesized accelerated rate of endocrinological change in the perimenopause; and 3) to estimate the relative contributions of reproductive and chronological aging on important disease processes.

2) Epidemiology of Diabetes Complication: Phase III

This is the renewal of a study that has examined the prevalence and incidence of and risk factors contributing to diabetes complications for 24 years. These issues will continue to be examined as they relate to population subgroup and specific complications. The study will continue to advance knowledge of diabetes complications and lead to appropriate preventive strategies.

3) Study of Mechanisms Linking Hot Flashes to Cardiovascular Risk

This research is aimed at understanding whether and how menopausal hot flashes are linked to cardiovascular disease (CVD) risk. This project is to examine whether women with daily hot flashes have adverse indicators of cardiovascular risk, including poorer endothelial function, higher carotid intima media thickness, lower cardiac vagal control, and an adverse inflammatory and hemostatic profile, relative to women without hot flashes. This work has the potential to change the way that this common midlife symptom has long been understood.

**Donald J. Crammond, PhD**  
*Assistant Professor of Neurological Surgery  
Associate Director, Movement Disorder Surgery*

In addition to a review of clinical outcome data to determine the impact of various modalities of IONM to prevent and/or reduce iatrogenic injury, Dr. Crammond’s major clinical interest is in using neurophysiological mapping of the basal ganglia and cerebral cortex to map motor and language functions in various neurosurgical procedures. For example, this includes mapping basal ganglia in order to finalize the placement of deep brain stimulation (DBS) electrodes in basal ganglia of movement disorder patients, or mapping so-called eloquent cortical areas in tumor resection and epilepsy surgeries in order to preserve functional
Dr. Crammond’s major clinical research interest is to record neurophysiological data from micro-electrode recording (MER) in the basal ganglia and Electroencephalography (EEG) from sensorimotor cortex, to examine the physiological relationship between basal ganglia and cortical structures. This research examines how several neural structures are involved in different aspects of movement planning and execution by having human subjects perform a controlled behavioral choice-reaction time task. One novel aspect is to also study if and how neural structures contribute to the evaluation of risk and motivation of rewarded task performance. As researchers understand more about basal ganglia physiology, Dr. Crammond hopes this will also help improve DBS placement to treat movement disorder patients.

Dr. Crammond is a co-investigator involved in a USAMRAA / AFIRM II funded translational research project. He is investigating the rate of peripheral nerve regeneration in a non-human primate model of long median nerve gaps, using nerve conduction studies, somatosensory evoked potentials (SSEPs) and trans-cranial motor evoked potentials (Tc-MEPs) in order to research the differential effect of various nerve growth factors on afferent versus efferent axonal regeneration.

Dr. Dixon’s current studies are exploring the role of synaptic vesicles on neurotransmitter release deficits chronically after traumatic brain injury. Neurotransmitter release at the synapse requires fusion of synaptic vesicles with the presynaptic plasma membrane. A crucial step in this process involves the assembly of a soluble N-ethylmaleimide-sensitive factor attachment protein receptor (SNARE) complex, a highly stable, parallel four-helix bundle formed between the synaptic vesicle SNARE synaptobrevin 2 (SYB2) and the plasma membrane SNAREs syntaxin 1 and synaptosome-associated protein of 25 kDa (SNAP-25). The pathology of SNARE proteins may play an important role in TBI. Dr. Dixon has reported at the National Neurotrauma Society meeting that SNARE complex formation was reduced at one and two weeks in hippocampal whole cell lysates of CCI-injured rats compared to sham-injured rats. Assembled SNARE complexes were localized and quantified between 50 and 150 kDa by antibodies recognizing SNAP-25 in unboiled lysates.

Another important finding this year is that synaptic vesicle distribution is altered in hippocampal dentate gyrus synapses at one week following experimental TBI. In an initial study, the distribution and density of synaptic vesicles in pre-synaptic nerve terminals appeared altered in transmission electron micrographs from CCI-injured rats at one week post-injury. As part of the U.S. Army-funded Operation Brain Trauma Therapy consortium, Dr. Dixon’s lab screened three drugs in the controlled cortical impact model of TBI: Simvastatin, Levetiracetam (Keppra) and glibenclamide.
Andrew F. Ducruet, MD
Assistant Professor of Neurological Surgery

Dr. Ducruet conducts both clinical and basic/translational research focused on cerebrovascular disease, and has published over 70 papers in peer-reviewed journals as well as numerous book chapters. He is an investigator on multiple clinical trials evaluating novel endovascular strategies for the treatment of cerebral aneurysms and acute ischemic stroke. Dr. Ducruet also directs a translational stroke research laboratory. His laboratory uses both in vitro and in vivo models of ischemia to investigate the role of inflammation and complement activation following cerebral ischemia. His investigations focus on identifying the mechanisms of complement-mediated neurovascular injury in the hopes of identifying new targets for therapeutic intervention for stroke.

Matt El-Kadi, MD, PhD
Clinical Professor of Neurological Surgery
Vice Chairman
Chief of Neurosurgery, UPMC Passavant

Over the past year, Dr. El-Kadi has been collecting data regarding patients that have undergone lumbar spinal fusion. He has been analyzing variables that affect length of stay and patient outcome. He has found that obesity alone is not an indication of poor surgical outcome or prolonged hospital stay. The data emphasizes the importance of pain control and social services to facilitate transfer to rehabilitation facilities when appropriate. He has analyzed among these patients variables that may predispose to screw fracture, and this data will be published in the upcoming year.

Johnathan Engh, MD
Associate Professor of Neurological Surgery
Director, Neuroendopart Surgery Program
Director, Adult Neurosurgical Oncology

Johnathan Engh, MD, and his research partner, Gregg Podnar, designed a prototype dilatable endoscopic port for brain surgery which is the subject of a patent published by the University of Pittsburgh on August 1, 2013 (US 2013/0197316 A1). The first prototype of this device was recently constructed.

Established research projects include analysis of stem cell markers in glioma specimens and molecular differentiation of central nervous system metastases from solid organ metastases. A comprehensive revamped neurosurgical tissue banking program has been established under his leadership, which has led to new collaborations among neurosurgeons and researchers at the Hillman Cancer Center.

Additional research projects include study of the application of minimally invasive navigational techniques (flexible needle steering) within the white matter of the brain. This project is in collaboration with Cameron Riviere, PhD, of Carnegie Mellon University. Animal safety testing trials of the needle-steering device in a pig model were completed in the Copeland laboratories of the University of Pittsburgh in spring of 2014.

Dr. Engh is a co-investigator on multiple clinical trials for brain tumor patients through the Hillman Cancer Center.
Investigator Research Summaries

Juan C. Fernandez-Miranda, MD
Assistant Professor of Neurological Surgery
Associate Director, Center for Cranial Base Surgery
Director, Surgical Neuroanatomy Lab
Director, Fiber Tractography Lab

• Fiber Tractography Lab:
1) Presurgical Assessment of Fiber Tracts and Surgical Planning

Cavernous malformations: Using HDFT, we aimed to characterize the perilesional changes in the white matter around cavernous malformations located both in the supra- and the infratentorial compartments. The perilesional changes were consistent with both disruption and/or displacement of the white matter around the cavernous malformations. We also evaluated these perilesional white matter changes better using a combined qualitative and quantitative model. The usefulness of the qualitative information was assessed in relation to the surgical trajectory planning and subsequent reduction of morbidity associated with the surgical resection. Using quantitative anisotropy (QA), we assessed the integrity of the perilesional tracts in a segmental fashion with potential future applications for prognostication and neurological recovery. Our results with respect to the supratentorial cavernous malformations were published in the Journal of Neurosurgery.

CNS tumours: We carried out a preliminary evaluation of the qualitative data obtained from the HDFT and assessed its utility in the surgical trajectory planning for high grade gliomas. In particular, the usefulness of the HDFT in demonstrating white matter tracts in their accurate spatial orientation in the perilesional oedematous zones was assessed. These findings have been submitted to the journal Neuro-oncology.

2) Neuroanatomy of the Fiber Tracts

The human superior fronto-occipital fasciculus does not exist: Human Connectome based tractographic study with microdissection validation.

The superior fronto-occipital fasciculus (SFOF), a long association bundle that connects frontal and occipital lobe, is well-documented in monkey but is controversial in human brain. Its assumed role is in visual processing and spatial awareness. To date, anatomical and neuroimaging studies on human and animal brains are not in agreement about the existence, course and terminations of SFOF. To clarify the existence of the SFOF in human brains, we applied deterministic fiber tractography to a template of 80 healthy subjects from the Human Connectome Project (HCP) and validated the results with white matter microdissection of post-mortem human brains. The imaging results showed that previous reconstructions of the SFOF were generated by two false continuations, namely between superior thalamic peduncle (STP) and stria terminalis (ST), and ST and posterior thalamic peduncle (PTP). The anatomical microdissection confirmed this finding. Hence, the SFOF does not exist in the human brain.

3) Application in Neurodegenerative Disorders

Amyotrophic lateral sclerosis (ALS): In a series of patients with ALS we have been able to demonstrate changes in the white matter of the brain in a longitudinal fashion. These changes have correlated with clinical progression in patients with ALS. The aim of the program has been to develop a tool with which these white matter changes can be monitored over time. The hope is that with future drug trials in these conditions, an imaging biomarker will allow
us to indirectly test the effectiveness of novel treatments. A detailed description of our analytical approach in ALS has been published as a methods article in the Frontiers in Human Neuroscience.

Huntington's disease (HD): Preliminary results have been encouraging in this group. We have been able to see changes in multiple areas of the brain and have been able to track their progression. Both in patients with ALS and HD, we have adapted a methodology (automated) that can be used to track progression of their disease in relation to a normal population. Preliminary results from the analysis of data from the HD patients have been presented in a recently accepted paper (in press) in BBA: Molecular Basis of Disease. Importantly using our analytical approach, we have been able to see changes in the so-called premanifest group where subjects with genetically identified abnormalities have not yet clinically manifested the disease.

- Surgical Neuroanatomy Lab:
  1) Endoscopic Endonasal Approach to the Optic Canal: Anatomical Considerations and Surgical Relevance

In this recently completed study, using endonasal sphenoidal landmarks, we proposed an anatomical classification for the optic nerve (ON). In particular we have emphasized the distinction of the preforaminal ON from the intracanalicular segment in the osseous optic canal. The implication of these findings was explored for preoperatively ascertaining the presence of true optic canal invasion in cases with tuberculum sellae menigiomas. A step-by-step surgical strategy for carrying out maximal optic canal decompression and subsequent safe dural opening was developed in relation to the anatomical findings.

2) Endoscopic Endonasal Transclival Transcondylar Approach for Foramen Magnum Menigioma: Anatomical and Technical Note

Here we aim to determine the amount of condyle to be resected in order to obtain appropriate exposure of the lateral wall of the foramen magnum. Five colored silicon-injected anatomic specimens were dissected at the Surgical Neuroanatomy Lab at the University of Pittsburgh to simulate endonasal access to the foramen magnum region in a stepwise manner. Each specimen was imaged with a CT scan twice, pre-dissection and post-dissection. The mean volume of condyle resection in 5 specimens (10 condyles) was 18% (range, 9.7%– 28.3%). This amount of medial condyle resection was efficient in all specimens to expose the lateral wall of the foramen magnum and identify the entrance of the vertebral artery into the posterior fossa.

3) Surgical Anatomy of the Maxillary Nerve

A classification scheme for the different segments of the maxillary nerve has been developed based upon the anatomical dissection. Specifically implication of the presence of the interdural segment of the maxillary nerve has been explored in relation to the ability to resect lesions extending posteriorly towards the Meckel’s cave without violating the integrity of the middle fossa dura.
Investigator Research Summaries

Robert Friedlander, MD, MA
Chairman, Department of Neurological Surgery
Walter E. Dandy Professor of Neurosurgery and Neurobiology
Head of Cerebrovascular Neurosurgery

The Neuroapoptosis Laboratory had a robust and productive year. Dr. Friedlander made significant progress on a number of projects.

1) Demonstrated a fundamental step in the pathogenesis of Huntington’s disease. It is clear that expression of mutant huntington (mHtt) in neurons is responsible for disease pathogenesis. However, the manner by which mHtt causes neuronal dysfunction and death is not well understood. Dr. Friedlander demonstrated that mHtt directly binds and obstructs a key channel responsible of importing proteins through the mitochondrial inner membrane into the matrix resulting in progressive mitochondrial dysfunction ultimately leading to cell death. This process is most prominently displayed at the synapse where the mitochondria are farthest from the soma. This was published in Nature Neuroscience with the article featured on the cover and with an accompanying New and Views commentary.

2) Melatonin not only plays a key role regulating the circadian rhythm but it is also an important neuroprotective molecule. Melatonin is an antioxidant; it is an important cofactor in the electron transport chain as well as it inhibits neuronal death through its interaction with the melatonin type 1a receptor (MT1R). Melatonin production in Huntington’s is deficient. However, the cause of this deficit is not known. Researchers have new data that the last two of the four enzymes required for melatonin synthesis reside in neuronal mitochondrial matrix, indicating that melatonin synthesis exclusively occurs in the mitochondria. In HD, potentially due to the import defect described in (1), there is a reduction of aralkylamine N-acetyltransferase (AANAT), the rate limiting enzyme in the production of melatonin. In addition, Dr. Friedlander found that AANAT is sequestered in neuronal inclusion bodies. These findings are being prepared for publication and have been led by a terrific Tsingua Scholar Wei Li.

3) Dr. Friedlander recently identified that MT1R, a G-protein coupled receptor is localized in the mitochondria. This is only the second GPCR to be identified in the mitochondria. In collaboration with Dr. Jean Pierre Vilardaga from the Department of Pharmacology Chemical Biology, Dr. Friedlander has made a transgenic mouse overexpressing MT1R in neurons. This mouse is protected from cerebral ischemic injury. Dr. Friedlander is collaborating on evaluating the role of microglia in these mice with Dr. Jun Chen from the Department of Neurology.

4) In collaboration with Dr. Lance Taylor and the Drug Development Institute faculty, Dr. Friedlander is in the process of developing several screening paradigms to identify neuroprotective drugs for neurodegenerative diseases, in particular for Huntington’s disease and ALS. Researchers are developing a number of cell models, including iPS lines from our own ALS patients.

5) In Collaboration with Dr. Takis Benos from the Department of Biomedical Informatics and Dr. William Laframboise of the Department of Pathology, Dr. Friedlander has performed a detailed analysis of carotid plaques removed at surgery using a platform of microarrays. Researchers have developed methods to analyze plaque miRNA, mRNA and cytokines and have identified key molecular differences between symptomatic and asymptomatic carotid plaques. This work was led by Ellen Caparosa (fourth year medical student).
Research
Investigator Research Summaries

Paul A. Gardner, MD
Associate Professor of Neurological Surgery
Executive Vice Chairman, Surgical Services
Co-Director, Center for Skull Base Surgery

In addition to continued clinical series examining outcomes following skull base surgery, significant progress has been made with chordoma genomic sequencing. In a project comparing exomes in tumor with patient blood and the known human genome, multiple potential targets for both oncogenesis and possible future treatments have been identified. These targets are currently being evaluated for current knowledge about their involvement in other tumors.

In addition, an ongoing prospective, randomized trial evaluating the role of lumbar drainage following endoscopic endonasal skull base surgery is nearing completion of enrollment.

Peter C. Gerszten, MD, MPH, FACS
Peter E. Sheptak Professor of Neurological Surgery
Vice Chairman, Quality Improvement
Director, Percutaneous Spine Service

Dr. Gerszten serves as the neurosurgical principal investigator of the National Cancer Institute Supported Radiation Therapy Oncology Group Cooperative Clinical Trial entitled “Phase II/III Study of Single Dose Radiosurgery for Localized Spinal Metastases.” Patient accrual into the phase II trial was successfully completed and have been published. Dr. Gerszten continues to investigate the expanding role of radiosurgery for the treatment of both malignant as well as benign disease. His work evaluating the successful use of cone beam computed tomography image guidance for spine radiosurgery for benign tumors continues to expand.

Ongoing research includes the incorporation of spine radiosurgery into minimally invasive and percutaneous spine procedures. Dr. Gerszten’s research related to spine radiosurgery is conducted in cooperation with the International Spine Oncology Study Group as well as the International Spine Radiosurgery Consortium. Current efforts include the development and adoption of international standards for contouring and defining targets and organs at risk. These efforts have led to the development and analysis of the largest and most comprehensive database of spine radiosurgery that currently exists. Future initiatives include the use of noninvasive radiosurgery techniques as an ablative tool for extracranial functional procedures such as pain modulation.

Dr. Gerszten’s clinical research also focuses on co-morbidities that may prevent patients, especially older patients, from achieving good clinical outcomes after elective lumbar spine surgery. This research is performed in collaboration with members of the Department of Psychiatry and Department of Geriatrics. One study evaluates the neuropsychiatric and cognitive predictors (e.g. depression and dementia) of surgical outcomes for lumbar spine disease in late-life patients. Another multi-institutional trial evaluates medical co-morbidites and hip osteoarthritis in older patients undergoing lumbar spine surgery. The goal of these studies is to determine if future patients might benefit from proper diagnosis and treatment of these co-morbidities before spine surgery is performed in order to improve the outcomes in this patient population.

Along these same lines, research was undertaken this year to determine the safety and efficacy of percutaneous cement augmentation for compression fractures in very elderly...
patients. The results indicated that Balloon Kyphoplasty is a highly safe and effective treatment for symptomatic compression fractures, even for very elderly patients. Age alone should not be an exclusion criterion for candidate patients.

Finally, Dr. Gerszten continues to expand and systematically analyze the clinical outcomes and safety profiles associated with the use of new spinal implant devices such as zero profile cervical fusion implants as well as posterior lumbar dynamic stabilization for motion preservation.

Avniel Singh Ghuman, PhD
Assistant Professor of Neurological Surgery
Director, MEG Research

In the past year, Dr. Ghuman’s research has focused on the using magnetoencephalography (MEG) and electrocorticography (ECoG) to examine the neurodynamics of visual object processing in the temporal lobe. In particular, Dr. Ghuman has discovered important new details regarding the dynamics of face and word perception.

Face and word perception are critical for communication and everyday functioning. Indeed, disordered face and word processing are associated with a host of clinical pathologies, including dyslexia, alexia, prosopagnosia, schizophrenia, and autism. Dr. Ghuman recently used multivariate pattern classification methods to decode the neural activity associated with various aspects of face and word processing. Specifically, from participants’ neural activity, Dr. Ghuman’s lab decoded whether a person was viewing a face, word, or other object (face and word detection), which face or word they saw (face and word recognition), and task-specific face and word information. Of note, is that these different aspects of face and word information were present in the neural activity at different times, demonstrating the important temporal evolution that occurs in the brain when recognizing faces and words.

One limitation of classic MEG is that they are limited to large stationary installations due to cryogenic requirements of SQUID-based magnetic sensors and the need for large magnetically-shielded rooms. Dr. Ghuman is part of a team developing a new magnetometry technique using optically-pumped atoms with sensitivity that is already comparable to and potentially better than existing SQUID magnetometers. In contrast to SQUIDs, atomic magnetometers do not require cryogenic cooling. Due to the lack of the dewar gantry, the atomic-based MEG system has a degree of portability lacking in SQUID-based MEG. This will potentially allow MEG systems to have a degree of portability and customizability. This customizability can potentially allow for more sensitive MEG measurements of the brain. A particularly exciting use of atomic magnetometry based MEG is that it can be used to study the infant and fetal brain, something that is very difficult with current non-invasive neuroimaging technologies. In the past year, the University of Pittsburgh became only the fifth location in the world to measure neural activity using atomic-based MEG sensors.

Paola Grandi, PhD
Assistant Professor of Neurological Surgery/Molecular Genetics and Biochemistry

Dr. Grandi’s research is focused on the development of novel oncolytic Herpes Simplex Virus-based vectors useful in the treatment of recurrent malignant glioblastoma, a form of cancer having a very poor prognosis. Oncolytic HSV vectors (oHSV) have shown promise for treatment of preclinical models of glioblastoma multiforme (GBM), and early phase human clinical trials in patients with recurrent malignant GBM have demonstrated vector safety with some evidence of efficacy. Her research efforts are intended to overcome impediments...
that remain in achieving efficient tumor killing, namely: (i) lack of effective vector targeting to tumor cells, (ii) inadequate intra-tumoral virus growth, (iii) reduced vector distribution due to poor initial penetration of the tumor mass and limited spread of new virions, (iv) tumor cell migration from resected tumor margins, and (v) innate immune responses that inhibit virus replication.

In the last year, Dr. Grandhi has developed oHSVs whose selective replication in GBM cells does not rely on defective genes. This was accomplished by (i) full retargeting of oHSV to utilize the epidermal growth factor receptor (EGFR) for infection of human GBM tumor cells and (ii) further vector engineering to modify the essential HSV immediate early gene (ICP4) for sensitivity to repression by the microRNA mir-124. Mir-124 is highly expressed in neurons but virtually absent in GBM and highly conserved among different species.

To enhance vector intra-tumor vector spread, Dr. Grandi’s EGFR retargeted-mir-124 controlled vector was further modified by vector arming with the matrix metalloproteinase gene encoding MMP9. MMP9 degrades collagen type IV, a major component of the extracellular matrix (ECM) and basement membranes of glioblastomas but absent in normal brain tissue. Studies are ongoing to determine whether MMP9 expression enhances vector spread in GBM neurospheres and as a therapeutic agent for enhanced treatment of human GBM in animals.

Miguel E. Habeych, MD, MPH  
Assistant Professor of Neurological Surgery  
Director, Center for Clinical Neurophysiology

Miguel E. Habeych, MD, MPH, is studying the usefulness of intraoperative neurophysiological monitoring (IONM) during intra-cardiac transcatheter endovascular procedures (IcTcEv-Ps). Intra-cardiac procedures such as patent foramen ovale (PFO) and atrial septum defect (ASD) closures, as well as, Mitral and/or Aortic valve replacements, all in adult populations are performed on a trans-catheter, endovascular manner with more frequency every day. However, the differences between the traditional surgical approach, and this novel minimally invasive one, have not been completely established yet. It is very well known that any intra-cardiac procedure performed endovascularly with the use of catheters, increases the risk to have a stroke during and/or after the procedure at an average rate of approximately 2%, according to different sources. Thus, Dr. Habeych is looking at the usefulness of IONM, carried out through the simultaneous recording of somatosensory evoked potentials (SEPs) and electro-encephalography (EEG) during these procedures, in the prevention, or early detection and treatment of these heart-to-brain, or, vessel-to-brain, clinically significant embolisms. The presence of micro-emboli detected through trans-cranial doppler (TCD) use during these procedures has also been informed. However, so far, neither its significance, nor its impact on these procedures’ outcomes, has also been established.

Wenyan Jia, PhD  
Research Assistant Professor of Neurological Surgery

Dr. Jia is researching the development of a wireless EEG system to provide critical point-of-care information about brain electrical activity. A novel dry electrode, which can be installed rapidly, is used to acquire EEG from the scalp. A wireless data link between the electrode and a data port (i.e., a smartphone) is established based on bluetooth technology. A prototype of this system has been implemented and its performance in acquiring EEG has been evaluated. Our current interest is to further improve the performance of this system while minimizing its physical dimension.
Research
Investigator Research Summaries

Hideyuki Kano, MD, PhD
Research Associate Professor of Neurological Surgery
Director of Clinical Research at the Center for Image-Guided Neurosurgery

Outcomes research or comparative effectiveness research using a large clinical database is critical to understand the long-term benefit as well as risks of minimally invasive procedures for AVM management. The use of radiosurgery in the management of AVMs as well as brain metastases can be optimized by an extensive outcomes research based on our large clinical experience with AVMs as well as brain metastases. Dr. Kano will seek to establish the Impac Metric data management system as the technology to perform his AVM outcome study. In addition he will collaborate with AB Elekta to implement the Impac Metric registry and data management system as the vehicle to perform additional multicenter outcome studies under the umbrella of the in the North American Gamma Knife Consortium (NAGKC).

L. Dade Lunsford, MD
Lars Leksell Professor and Distinguished Professor
Director, Center for Image-Guided Neurosurgery
Director, Residency Training Program

The Center for Image-Guided Neurosurgery at the University of Pittsburgh Medical Center has been involved in active clinical research programs for more than 35 years. On an annual basis, the program publishes between 10 and 20 articles per year, based on our extensive experience in image-guided neurosurgery, including gamma knife radiosurgery. At present, 12,800 patients have undergone gamma knife radiosurgery and are currently in our initial database. Our current research activities are directed towards defining long-term outcomes of arteriovenous malformations; brain metastases; skull-based tumors including acoustic neuroma, pituitary tumor as well as other cranial tumors such as meningiomas, gliomas and less common tumors. The center currently trains not only residents, but also trains visiting scholars from other nations, having trained more than 50 such visiting scholars at this program over the last 30 years. Research activities are directed at looking at the long-term clinical outcome of patients who have undergone radiosurgery, as well as continuing to explore the benefits of other image-guided surgical techniques using minimally invasive strategies for tumors such as gliomas as well as more common clinical problems.

Dr. Lunsford continues to serve as chair of the North American Gamma Knife Consortium (NAGKC.) Since its inception, the consortium’s mandate has been the review of the long-term outcomes of radiosurgery using the Gamma Knife by utilizing both prospective and retrospective clinical data. There are currently 23 medical centers (from America, Canada, Puerto Rico, Taipei) who have joined the NAGKC. Dr. Lunsford anticipates the membership to continue to grow both nationally and internationally. The NAGKC consistently publishes between three and five articles a year. There are three clinical trials proposed, developed and administered by the NAGKC that are underway: 1) a randomized controlled study of outcomes in patients with five or more brain metastases treated with radiosurgery vs. whole brain radiotherapy; 2) a multi-center phase II study of border zone stereotactic radiosurgery with Bevacizumab in patients with recurrent or progressive glioblastoma multiforme; and 3) radiosurgery or open surgery for epilepsy (ROSE) trial.
Research
Investigator Research Summaries

Ajay Niranjan, MD, MBA
Associate Professor of Neurological Surgery
Director, UPMC-Brain Mapping Center (MEG)
Associate Director, Center for Image-Guided Neurosurgery
Director of Radiosurgery Research

Ajay Niranjan, MD, MBA, is currently the principal investigator on two clinical trials, “Multicenter Phase II Study of Border Zone Stereotactic Radiosurgery with Bevacizumab Chemotherapy in Patients with Recurrent or Progressive Glioblastoma Multiforme” and “A Safety and Feasibility Study of Minocycline Therapy for Management of Adverse Radiation Effects after Brain Metastases Radiosurgery.” He also serves as subsite-PI for the clinical trial “Randomized Study of Neurocognitive Function Changes in Patients with > 4 Brain Metastases Initially Treated with Whole Brain Radiotherapy versus Gamma-Knife Radiosurgery.”

Additionally, Dr. Niranjan serves as co-investigator on two projects, “The Safety of High Dose Minocycline in the Patient Population Undergoing Carotid Revascularization. A Phase I Study” and “Functional Imaging Evidence of Cortical Plasticity with Spinal Cord Stimulation.”

Hideho Okada, MD, PhD
Professor of Neurological Surgery, Surgery and Immunology

In clinical studies, researchers have been actively running phase I vaccine studies in both adult and pediatric fields. The highlights of our adult studies are results from our phase I studies of peptide-based vaccines in WHO grade II low-grade gliomas (LGGs) with high risk factors. We evaluated the safety and immunogenicity of subcutaneous vaccinations with synthetic peptides for glioma-associated antigen (GAA) epitopes in HLA-A2+ adults with high-risk LGGs in the following three cohorts: 1) patients without prior progression, chemotherapy or radiation therapy (RT); 2) patients without prior progression or chemotherapy but with prior RT, and 3) recurrent patients. Cohorts 1, 2, and 3 enrolled 12, 1, and 10 patients, respectively. No regimen-limiting toxicity was encountered except for one case with Grade 3 fever, fatigue and mood disturbance (Cohort 1). ELISPOT assays demonstrated robust and sustained IFN-γ responses against at least 3 of the 4 GAA epitopes in 10 and 4 cases of Cohorts 1 and 3, respectively. Cohort 1 patients demonstrated significantly higher IFN-γ responses than Cohort 3 patients. Median progression-free survival (PFS) periods since the 1st vaccine are 17 months in Cohort 1 (range 10-42) and 12 months in Cohort 3 (range 3-26). The only patient with large astrocytoma in Cohort 2 has been progression-free for over 60 months since diagnosis. The current regimen is well tolerated and induces robust GAA-specific responses in WHO grade II glioma patients. These results warrant further evaluations of this approach.

In our basis studies, our highlight is a discovery of a novel mechanism of type-1 interferon (IFN) pathway for anti-glioma immunity. While type-I IFNs play critical roles in antiviral and antitumor activity, it remains to be elucidated how type-I IFNs are produced in sterile conditions of the tumor microenvironment and directly impacts tumor-infiltrating immune cells. We found that both human and de novo mouse gliomas show increased expression of type-I IFN messages, and in mice, CD11b+ brain-infiltrating leukocytes (BILs) are the main source of type-I IFNs that is induced in response to DNA, at least partially in a STING (stimulator of IFN genes)-dependent manner. Consequently, glioma-bearing Sting−/− mice showed shorter survival, and lower expression levels of Ifns compared with wild-type mice. Furthermore, BILs of Sting−/− mice show increased CD11b+ Gr-1+ immature myeloid suppressor and CD25+ Foxp3+ regulatory T (Treg) cells, while decreased IFN-γ-producing CD8+ T cells. CD4+ and CD8+ T cells that received direct type-I IFN signals...
demonstrate lesser degrees of regulatory activity and increased levels of antitumor activity, respectively. Finally, intratumoral administration of a STING agonist (cyclic diguanylate monophosphate; c-di-GMP) improves the survival of glioma-bearing mice associated with enhanced type-I IFN signaling, Cxcl10 and Ccl5 and T cell migration into the brain. In a combination with subcutaneous OVA peptide-vaccination, c-di-GMP increased OVA-specific cytotoxicity of BILs and prolonged the survival. These data demonstrate significant contributions of STING to antitumor immunity via enhancement of the type-I IFN signaling in the tumor microenvironment, and imply a potential use of STING agonists for development of effective immunotherapy, such as the combination with antigen-specific vaccinations.

David O. Okonkwo, MD, PhD
Associate Professor of Neurological Surgery
Executive Vice Chairman, Clinical Operations
Clinical Director, Brain Trauma Research Center
Director, Neurotrauma Program
Director, Scoliosis and Spinal Deformity Program

1) Transforming Research and Clinical Knowledge in Traumatic Brain Injury (TRACK-TBI)

TRACK-TBI is an 11-site consortium that is recruiting 3,000 acute TBI subjects. TRACK-TBI will directly impact the public health by creating an open-access Information Commons of integrated clinical, imaging, proteomic, genomic, and outcome biomarkers, that will permit more precise TBI diagnosis, prognosis, and treatment. Dr. Okonkwo is principal investigator of the clinical core.

2) Targeted Evaluation, Action, and Monitoring of Traumatic Brain Injury (TEAM-TBI)

TEAM-TBI is a monitored multiple intervention clinical trial for TBI patients designed to address the heterogeneity of TBI and identify evidence-based therapies for participating subjects. In TEAM-TBI, small groups of TBI patients undergo a comprehensive intake evaluation, complemented by advanced neuroimaging, biomarker analysis and an innovative sleep study analysis. A multi-disciplinary panel reviews all data, stratifies subjects into clinical TBI subtypes (trajectories) and recommends targeted therapeutic interventions. Each participant departs Pittsburgh with a customized TEAM-TBI toolkit containing necessary materials for targeted therapies.

3) In Vivo Neuroimaging Biomarker Panel for Chronic Traumatic Encephalopathy

This project develops and tests an in vivo neuroimaging biomarker panel for chronic traumatic encephalopathy, consisting of use high-resolution positron emission tomography (PET) imaging combined with white matter damage using MR-based High Definition Fiber Tracking (HDFT) and cerebrospinal fluid analyses for detecting pathological changes in total tau, phosphorylated tau, and Aβ peptides. The goal is to provide quantitative early non-invasive assessment of CTE disease to identify targets for CTE therapy.

4) High Definition Fiber Tracking Biological Diagnosis of TBI Providing Actionable Clinical Report of Quantified Damage

The goal of this project is to test and deploy a technology that will provide a biological diagnosis of acute traumatic brain injury (TBI) based on a new MRI diffusion method called High Definition Fiber Tracking (HDFT).
1) Molecular Markers of Prognosis in Gliomas

Malignant astrocytomas are among the most common and deadly brain tumors of childhood. Most affected children die within several years of diagnosis, despite current treatments; however, 20 to 30% respond favorably to therapy and are cured. The basis for these diverse outcomes has been enigmatic, even taking into account clinical and histological factors. In preliminary studies with an institutional cohort of pediatric gliomas, we observed that molecular markers could supplement histological data to refine prognostic assessments. Based on these findings, we began a more extensive study of the cohort of Children’s Cancer Group study CCG-945, the largest group of pediatric high-grade gliomas accrued to date, and subsequently the Children’s Oncology Group ACNS0126 study. The large size of these cohorts and the consistent treatment approaches used, coupled with the availability of central neuropathology review and comprehensive clinical data, provided a unique opportunity to address issues of molecular etiology and prognostic factors. Our studies demonstrated a striking association between outcome and several molecular features, including MGMT expression status, independent of clinical or histological factors; identified significant differences between molecular features of childhood and adult gliomas; and generated a sizeable resource of tumor tissue for further analyses. Our ongoing studies will use this resource as well as newly acquired tumor specimens and paired normal tissue, derived from children treated on two new Children’s Oncology Group high-grade glioma studies, to define the genetic alterations that characterize pediatric malignant gliomas, as a basis for prioritizing novel targets for prognostic and therapeutic stratification. We hypothesize that categorization of these tumors by their genomic alterations and drug resistance phenotype will improve accuracy of diagnostic and prognostic assessments, and provide insights into novel therapeutic targets. To test these hypotheses, we have initiated studies with the following aims: 1) Assess the frequency, composition, and prognostic relevance of alterations in Akt and MAPK pathway activation in pediatric malignant gliomas; 2) Determine whether O6-methylguanine-DNA methyltransferase (MGMT) overexpression and promoter methylation are associated with progression-free survival, independent of alkylator therapy; 3) Define, on a genome-wide basis, the spectrum and prognostic relevance of genomic alterations in pediatric malignant gliomas, using high-density SNP microarray-based profiling. Relevant markers will be evaluated in the context of conventional prognostic factors, such as histology, to determine their utility for biologically classifying childhood malignant gliomas. Taken together, these studies will incorporate a unique resource of childhood malignant brain tumor samples to provide new insights into the molecular categorization of pediatric high-grade gliomas. This work will establish a foundation for risk-adapted stratification and treatment planning, and the design of future therapeutic strategies for children with these tumors.

2) Molecularly Targeted Therapies for Malignant Gliomas

The limited response of malignant gliomas to conventional therapy reflects resistance to undergoing apoptosis in response to DNA damage or mitogen depletion, resulting from tumor suppressor gene mutations and aberrant activation of growth factor signaling. However, our previous studies indicated that despite the limitation in apoptotic triggering, effector pathways of apoptosis may remain intact and can be activated by inhibiting growth factor-
mediated signaling or stimulating death receptor pathways. These studies also demonstrated that although a subset of gliomas were responsive to modulation of individual signaling pathways, many showed incomplete growth inhibition, reflecting activation of parallel pathways or intrinsic resistance mechanisms. This led us to examine the efficacy of combinatorial strategies for signaling inhibition, using agents targeting distinct pathways. Based on our findings, we hypothesized that therapeutic approaches that block rationally selected combinations of growth signaling pathways or that enhance apoptosis signaling will provide a novel strategy for inducing glioma cytotoxicity. To test this hypothesis, we are examining the effects on glioma growth and viability of inhibiting combinations of parallel pathways that transmit proliferative signals from aberrantly activated upstream receptors. These studies incorporate a panel of cell lines with defined genetic alterations to assess whether genotypic features influence efficacy, and establish biological surrogates of response. Second, we are determining whether signaling mediators that promote caspase expression can enhance apoptosis induced by stimulation of death receptor pathways by TRAIL, and evaluating biological factors that predict efficacy. Third, we are examining whether signaling modulation can enhance efficacy of radiotherapy and conventional chemotherapy in all, or a genotypically defined subset of, gliomas. These studies will provide a foundation for the translation of signal transduction inhibition and death receptor activation as therapeutic approaches for gliomas, and indicate ways in which these strategies can be used to enhance efficacy of other therapies.

3) Vaccine Therapy for Pediatric Gliomas

Diffuse brainstem gliomas, other malignant astrocytomas, and recurrent low-grade gliomas and ependymomas carry a poor prognosis, and new therapies are needed. Having gained experience with immunotherapy for adult gliomas, we extended these insights to childhood gliomas, based on our observations regarding their profiles of glioma-associated antigen (GAA) expression. We initiated a pilot trial of subcutaneous vaccinations with peptides for GAA epitopes emulsified in Montanide-ISA-51 given every 3 weeks for 8 courses along with intramuscular injections of poly-ICLC in HLA-A2+ children with newly diagnosed brainstem gliomas (BSG), high-grade gliomas (HGG), or recurrent gliomas. GAAs were EphA2, IL13Rα2, and survivin. Over 50 children have been treated to date in various pilot study cohorts. The primary objectives of this study were to assess immunologic response and safety, given that this was the first such trial in the pediatric age group. Principal toxicities have included local injection site reactions and low grade fevers and flu-like symptoms in almost all patients, referable to the poly-ICLC, which have been generally mild and controlled with acetaminophen or ibuprofen. To date, there have been 7 cases of at least possible immunologically-mediated pseudoprogression, and analysis of advanced imaging features that correlate with this finding are in progress. Objective radiological responses have been observed in each of the cohorts, with a particularly high rate in the recurrent low-grade glioma stratum, and approximately 65% of children have demonstrated an immune response against at least one of the vaccine antigens based on ELISPOT analysis.

More extensive analyses of efficacy in a multi-institutional context are planned within the Pediatric Brain Tumor Consortium. NIH funding has also been obtained for a study of this vaccine strategy in children with recurrent ependymomas, which has recently been initiated.

Daniel R. Premkumar, PhD
Research Assistant Professor of Neurological Surgery

Glioblastomas are highly invasive primary tumors with poor prognosis despite current therapies. Individual targeted therapies have failed to offer long-term survival benefits,
although combinations of rationally selected inhibitors may have significant therapeutic applicability for these tumors. Studies by Dr. Premkumar’s group and others have also shown aberrant, constitutive activation of NF-κB and Akt as common features of malignant gliomas, supporting their functional role in contributing to apoptosis resistance and refractory growth despite cytotoxic chemotherapy, irradiation, and molecularly targeted therapies. This activation may in part reflect deletions of NF-κB inhibitor-α, a common alteration in malignant gliomas, dysregulated stimulation by cell surface tyrosine kinases, such as EGFR and PDGFRα, which are amplified in molecular subsets of malignant gliomas, and mutations in PTEN and other molecular targets that drive Akt and NF-κB activation. Thus, new therapeutic approaches are urgently needed. Researchers have demonstrated that inhibition of NF-κB, Akt, and Bcl-2 may constitute a promising strategy to enhance the efficacy of conventional therapies, such as irradiation and cytotoxic chemotherapy, and potentiate the activity of agents targeted against growth signaling mediators.

**Ava Puccio, RN, PhD**
Assistant Professor of Neurological Surgery & Nursing
Co-Director, Neurotrauma Clinical Trials Center

The ultimate goal of Dr. Puccio’s career trajectory is to research innovative treatment paradigms for individualized care of TBI patients, with an emphasis on the secondary injury mechanisms following TBI. Mechanisms include temperature management, brain oxygenation optimization and genetic influences including variations and genomic (for example hypoxic signaling). Dr. Puccio is currently the PI on a K99/R00 training grant funded through NIH/NINR, titled "Transcriptomics in Traumatic Brain Injury: Relationship to Brain Oxygenation and Outcomes." This funded grant completed Year 2 and is a career plan to develop research skills and training in the area of genomics, with a focus on brain oxygenation in severe traumatic brain injury (sTBI). In addition, Dr. Puccio is interested in investigating the metabolic consequences of a severe TBI through formal calorimetry in association with a biological profile of nutritional state and ultimately, correlation to the neurological outcome of the adult patient following severe TBI.

Current translational studies in pharmacotherapy in TBI patients include a dose-escalation study to evaluate the safety, pharmacokinetics and preliminary evidence of the neuroprotective effect of NNZ-2566 in patients with moderate to severe TBI (GCS 4-12) and also the effect of glyburide (InTRUST trial) on the TBI patient (David O. Okonkwo, MD, PhD, principal investigator). Another interventional study is the HOPES study, a randomized trial to evaluate the effect of hypothermia on TBI patients requiring an emergent craniotomy for a subdural hematoma evacuation.

Additional clinical studies include the prospective collection of demographics, blood and cerebrospinal fluid and neurological outcomes for the Neurotrauma Clinical Trials Center (PI: David O. Okonkwo, MD, PhD; Co-PI: Dr. Puccio) and genetic repositories (severe TBI, PI: Yvette Conley, PhD; moderate/mild TBI PI: David O. Okonkwo, MD, PhD). Collaborative research with the University of Cincinnati (PI: Jed Hartings, PhD) examining the impact of brain seizure-like activity (spreading depressions) on recovery from TBI, and with the University of California, San Francisco (PI: Geoff Manley, MD, PhD) examining and refining a standard for data collection in TBI studies, suitable for use across the broad spectrum of TBI and to explore novel approaches for classification of the initial injury severity and outcome after TBI, making use of emerging technology.

Current Department of Defense (DoD) funded projects investigating High Definition Fiber Tracking (HDFT) MRI technology in the civilian and military populations to correlate
neuropsychological deficits and track damage for acute/chronic blunt and blast traumatic brain injury, as well as chronic traumatic encephalopathy are in collaboration with David O. Okonkwo, MD, PhD and Walter Schneider, PhD.

**Shengjun Ren, PhD**
*Assistant Professor of Neurological Surgery*

Dr. Ren has made some significant progresses in a few projects. His research group has found that neuronal cell cycle reentry from quiescence is prior to neuronal death initiation, and that cyclin C dependent pRb kinase regulates this coordinated control. By collaborating with Drs. Robert Friedlander and others, they have also found that this pathway is dysregulated during the onset of disease symptoms in the Huntington's disease (HD) and ALS mouse models (to be submitted to *Cell* shortly). Researchers have successfully corrected HD gene mutation with high efficiency and accuracy by using CRISPR/Cas9-directed genome editing. This mutation correction approach not only efficiently and precisely corrected HD gene "CAG" expansion mutation but also significantly improved the biological functions of the corrected HD cells (to be submitted to *Nature* shortly). In addition, Dr. Sen's lab found that a microRNA-suppressed cyclin C protein expression is required for cellular senescence in both normal primary cells and cancer cells (to be submitted to *PNAS*).

**R. Mark Richardson, MD, PhD**
*Assistant Professor of Neurological Surgery*
*Director, Adult Epilepsy and Movement Disorders Surgery*
*Director, Brain Modulation Laboratory*

Dr. Richardson's Brain Modulation Lab currently is focused in four main areas: 1) study of high frequency oscillations in epilepsy and normal cognition, 2) exploring the motor vigor hypothesis of bradykinesia in Parkinson's disease through study of the encoding of motor motivation in basal ganglia-cortical and cortico-limbic loops, 3) the application of deep brain stimulation to the treatment of epilepsy, and 4) the analysis of GABAergic innervation of dentate granule cells in resected human epileptic hippocampus.

**Raymond F. Sekula Jr, MD**
*Assistant Professor of Neurological Surgery*
*Director, Cranial Nerve Disorders Program*

Dr. Sekula's research efforts focus on improving the care for patients with cranial nerve disorders such as hemifacial spasm and trigeminal neuralgia. Recently, the Center for Cranial Nerve Disorders published the most extensive risk/benefit analysis of microvascular decompression for hemifacial spasm in individuals above and below the age of 65 years in *Muscle and Nerve*. Additionally, the center has undertaken a large project evaluating quality of life in patients with hemifacial spasm who have undergone trigeminal neuralgia. The results show the majority of patients experience significant improvements in all quality of life metrics despite the fact that majority of patients are self-referred for the operation. We believe these projects are important because they will encourage practitioners to consider microvascular decompression in patients previously thought to be poor candidates for the operation.

Additionally, Dr. Sekula has been working closely with the department’s electrophysiologists to improve hearing outcomes in patients undergoing microvascular decompression for hemifacial spasm. Since Dr. Sekula assumed leadership of the Center for Cranial Nerve Disorders, the incidence of high frequency hearing loss has decreased from 50% to 6% on the side of the operation. This is important because although high frequency hearing loss is not
as debilitating as hearing loss across all frequencies—which occurs at a much lower rate—it can affect the ability of a patient to understand speech in a noisy environment.

Another major area of research is in the imaging evaluation of patients with hemifacial spasm and trigeminal neuralgia. Often patients with these conditions are told that their, “MRI is normal.” MRIs typically performed for these patients at other centers are not structured sufficiently to detect vascular compression so that, in the majority of cases, a radiologist cannot visualize the offending blood vessel. In a minority of cases, the blood vessel compressing the facial nerve is evident, but the radiologist back home has not been trained to see it. Along with colleagues in the department of neuroradiology, Dr. Sekula has begun to overcome these two obstacles by developing a protocol to detect vascular compression of the facial nerve and a step-by-step method for radiologists to use to determine if there is vascular compression. Most importantly, Dr. Sekula has found that this type of imaging is sensitive but not highly specific, meaning that its true utility is in preventing patients who are unlikely to respond to microvascular from undergoing an operation.

Mingui Sun, PhD
Professor of Neurological Surgery, Bioengineering and Electrical Engineering

1) Wearable eButton for Evaluation of Energy Balance with Environmental Context and Behavior

In this study, Dr. Sun proposes the refinement of eButton, an electronic device that was developed under the NIH GEI diet and physical activity research program. This button-like device can be attached to clothing and worn on the chest using a pair of magnets or a pin. The new eButton will contain numerous innovative designs, including a motion sensor to detect physical activity, an optical eating detector to monitor eating/drinking/smoking, two miniature cameras that produce a stereo vision to measure food portion size without depending on a reference card. The eButton will store the multimedia data acquired by these advanced miniature sensors in a flash memory within the device. It will also have a wireless link to a smart phone which will allow researchers to monitor the operating status of eButton and communicate with subjects remotely in real time. During the first year of this research, the new eButton and associated algorithms/software is being designed and constructed in our laboratory by an experienced team of electronic/software engineers based on its early version developed under the NIH GEI diet and physical activity research program. Once eButton is constructed, Dr. Sun will implement a thorough validation process using human subjects to evaluate its accuracy in diet and physical activity assessment.

2) Biomimetic Self-Adhesive Dry EEG Electrodes

This biomedical engineering project aims to develop a novel skin-surface electroencephalogram (EEG) electrode. This new electrode does not require application of electrolyte; is able to penetrate scalp hair easily during electrode placement; can be quickly applied and removed; has low and stable electrode impedance; and has an extraordinary ability to self-adhere to the scalp without glue or tape. Its unconventional design is inspired from a biological system (the toe of geckos) which has shown clear effectiveness in the natural environment. In the current stage, design and construction of the electrode is being conducted and a test bed is being constructed to evaluate its performance.
Diagnostic Accuracy of Brainstem Auditory Evoked Potentials during microvascular decompression (MVD): The primary aim of the study was to assess the sensitivity and specificity of intraoperative monitoring in predicting post-operative hearing loss during MVD. The study was designed as a study of diagnostic accuracy of brain stem auditory evoked potentials compared to the reference standard the 1995 AAO-HNS HL classification system for non-serviceable hearing loss (Class C/D). All patients underwent surgery and audiograms at a UPMC facility in the study period 2005-2012. All participants received a pre- and post-audiogram within 90 days before or after the operation. During the operation participants received intraoperative monitoring with a supervising physician. A total of 238 patients were selected. BAEPs were indexed into categories of change based on their maximum change and response at the end of surgery. Differences in hearing outcome by BAEP change were analyzed. Age and gender did not affect outcomes. Patient outcome was affected by condition. The BAEP categories significant changes, transient loss and persistent loss show a sensitivity and specificity of (0.905,0.701), (0.667,0.903) and (0.429,0.972) respectively. The ROC curve has an AUC of 0.870 with a 95% CI of 0.783-0.957.

BAEPs show a high degree of specificity which indicates they are protective such that a patient without a change is highly unlikely to experience HL.

Yu Zhang, PhD
Assistant Professor of Neurological Surgery

Yu Zhang, PhD, work focuses on the role of microRNAs (miRNAs) in the pathophysiology of Huntington’s disease (HD) in an effort to create a miRNA-based therapy for the HD. Based on the previous results form microRNA profiling of disease affected brain region in HD patients and functional screening of human microRNA library in cells expressing mutant HD protein, the role of miRNAs that are dysregulated and inhibitor/inducer of neuronal death were further observed in vitro and in vivo to explore the potential of therapeutic approach to treat HD. MiRNAs mimics and their inhibitors were delivered into HD transgenic mice R6/2 and tested their effects on animal behavior and mortality. In addition, using a nine D-arginine coupled rabies virus glycoprotein (RVG) coupled or non-coupled antimir/mimics of microRNA, they worked on crossing BBB delivery of small RNA to central nerves system through system administration in transgenic mouse models of HD.

Another major part of Dr. Zhang’s research is to combine non-viral/high efficiency genetic correction of causative mutant HD gene with cellular reprogramming technique to model Huntington’s disease and develop a patient-specific cellular replacement therapy for HD.
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<td>Polynitrolylated Pegylated Hemoglobin for Traumatic Brain Injury</td>
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<td>(BOOST) Phase II, Randomized Controlled Trial of Brain Tissue Oxygen Monitoring</td>
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<td>Molecular Markers as Predictors of Outcome in Gliomas</td>
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<td>Novel Strategies for Brain Tumor Therapy-Project 1</td>
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<td>Peptide Vaccine-Based Immunotherapy for Children with Recurrent Ependymomas</td>
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<td>Transcriptomics in Traumatic Brain Injury: Relationship to Brain Oxygenation and Outcomes</td>
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<td>Cortical Control of A Dextrous Prosthetic Hand</td>
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<td>Determining Genetic and Biomarker Predictors of DCI and Long-Term Outcomes after aSAH</td>
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<td>Wearable eButton for Evaluation of Energy Balance with Environmental Context and Behavior</td>
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<td>Yue-Fang Chang</td>
<td>Mechanism Linking Hot Flashes to Cardiovascular Risk</td>
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<td>U10 NEXT Network of Excellence in Neuroscience Clinical Trials</td>
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<td>NuVasive</td>
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<td>UPMC Quality Improvement Study: Interbody Fusion Clinical Outcomes Registry</td>
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<td>CTO - Multimodality Neuromonitoring in Extreme Lateral Interbody Fusion (XLI)</td>
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<td>OneMind</td>
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<td>Hideho Okada</td>
<td>PCI - Grants</td>
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<td>Avmiel Ghuman</td>
<td>The effect of Subthalamic nucleus deep brain stimulation on neocortical neural synchrony in Parkinson's disease</td>
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<td>Novel Amyloid-Targeting Therapies for Preserving Cognitive Function in Alzheimer’s Disease</td>
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<td>A. Ohkuri-Kosaka</td>
<td>Type 17 CAR-transfected T-Cell therapy for Glioma</td>
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<td>Pittsburgh Foundation</td>
<td>Hideho Okada</td>
<td>IDH mutations promote immunosuppression in gliomas by blocking yeloid cell differentiation</td>
<td>$18,301</td>
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<td>Pittsburgh Foundation</td>
<td>Ava Puccio</td>
<td>Examination of Hypoxia-Inducible Gene Expression and Variation in Traumatic Brain Injury</td>
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<td>Pittsburgh Foundation</td>
<td>Samuel Shin</td>
<td>Enhancing Behavioral Function by Deep Brain Stimulation after Traumatic Brain Injury</td>
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<td>Pittsburgh Foundation</td>
<td>Hong Qu Yan</td>
<td>Role of CDK5 Inhibitors on Tau Phosphorylation in Traumatic Brain Injury</td>
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<td>RPERSKT</td>
<td>Ava Puccio</td>
<td>Nutrition and Metabolic Biomarkers in Head Injury</td>
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<td>Solving</td>
<td>Ian Pollack</td>
<td>Peptide Based Vaccination for Recurrent Ependymomas</td>
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<tr>
<td>SpineOL</td>
<td>Adam Kanter</td>
<td>CTO - Lumbar Interbody Fusion Trial (SPINEOLOGY-LIFT)</td>
<td>$17,144</td>
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<td>Synthes</td>
<td>David Okonkwo</td>
<td>CTO - Prospective, Multi-Center Clinical Outcomes Study Evaluating the chronOS Strip</td>
<td>$15,782</td>
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<tr>
<td>Texas</td>
<td>David Okonkwo</td>
<td>Hypothermia for Patients Requiring Evacuation of Subdural Hematoma</td>
<td>$37,990</td>
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<tr>
<td>UC</td>
<td>David Okonkwo</td>
<td>Spreading Depressions as Secondary Insults after Traumatic Brain Injury to the Human Brain</td>
<td>$16,740</td>
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### Research Grant Summary

<table>
<thead>
<tr>
<th>Source</th>
<th>Investigator</th>
<th>Title</th>
<th>Total Budget Award</th>
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<tr>
<td>UCSF</td>
<td>Ajay Niranjan</td>
<td>Randomized controlled study of neurocognitive outcomes in patients with five or more brain metastases treated with radiosurgery or whole-brain radiotherapy</td>
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<tr>
<td>UMB</td>
<td>David Okonkwo</td>
<td>A Randomized Clinical Trial of Glyburide (RP-1127) for TBI</td>
<td>$514,825</td>
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<td>UPBI</td>
<td>Robert Friedlander</td>
<td>High-Definition Fiber Tractography (HDFT)</td>
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<td>Robert Friedlander</td>
<td>QSP Approach to HD (DDI)</td>
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<td>USAMR</td>
<td>C. Edward Dixon</td>
<td>Operation Brain Trauma Therapy</td>
<td>$178,775</td>
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<tr>
<td>USAMR</td>
<td>David Okonkwo</td>
<td>HDFT Biological Diagnosis of TBI Providing Actionable Clinical Report of Quantified Damage</td>
<td>$473,644</td>
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<tr>
<td>Utah</td>
<td>Mandeep Tamber</td>
<td>Phase II Clinical Study In Children Presenting with New Diagnoses of Hydrocephalus, in Ventrical Size Associated with Neuropsych Outcomes at six months</td>
<td>$3,842</td>
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<tr>
<td>Veterans Administration</td>
<td>C. Edward Dixon</td>
<td>IPA Agreement: DARPP32 Mediation of Chronic TBI Pharmacotherapy (Ma)</td>
<td>$6,916</td>
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<td>Veterans Administration</td>
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<td>IPA Agreement - Role of Cyclopentenone Prostaglandins in Promoting Recovery after TBI (Ma)</td>
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<td>Veterans Administration</td>
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<td>IPA Agreement - Role of Cyclopentenone Prostaglandins in Promoting Recovery after TBI (Culver)</td>
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<td>Veterans Administration</td>
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<td>C. Edward Dixon</td>
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<td>Veterans Administration</td>
<td>Larry Jenkins</td>
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<tr>
<td>Veterans Administration</td>
<td>Hong Qu Yan</td>
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<td>Wisc Un</td>
<td>Ian Pollack (Co)</td>
<td>Outcomes in Patient Undergoing Surgical Intervention for Chiari Type 1 Malformation with Syringomyelia</td>
<td>$667</td>
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<td>WU</td>
<td>Mandeep Tamber</td>
<td>Park Reeves Syringomyelia Research Consortium</td>
<td>$185</td>
</tr>
</tbody>
</table>
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Past Residents

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(Deceased)

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Omitama-shi Ibaraki-Ken 311-3434

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(Deceased)
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Hooshang Kasravi, MD

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Alvin Szojchet, MD

Bertrand Marlier, MD

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Daniel Soriano, MD

Mario Ludmer, MD

Class of 1967
Sydney Walker, MD

John D.H. Johnston, MD

Class of 1966

Class of 1965
Jerry Brown, MD

Sydney Walker, MD

Class of 1964

John D.H. Johnston, MD
Past Residents

Class of 1963
Rafael Dovarganes, MD
Ayuntamiento #93
Coyoacan, C.P. 0400
Mexico D.F.
MEXICO

Taghy Tingary, MD

Class of 1962
Joseph Arditti, MD
113 Horsler Dr.
St. John, NB E2M-4B4, Canada

Anthony Gallo, MD
Robert Kyle, MD

Class of 1961
Paul Renton, MD

Leslie DeLima, MD

Class of 1959
Ernest Reigh, MD

Class of 1958
Robert Brocker, MD
1616 Covington St.
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James Davis, MD

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Norman Uddstrom, MD

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Robert L. Baker, Sr., MD
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Class of 1952
Robert Wright, MD

Note: If you would like to update information listed in this section, contact Melissa Lukehart at (412) 647-6777 or lukehartml@upmc.edu. You can also send the information to:

Melissa Lukehart
Department of Neurological Surgery
UPMC Presbyterian
200 Lothrop Street, Suite B-400
Pittsburgh, PA 15213
ATTN: Annual Report Alumni
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(July 1, 2013 through June 30, 2014)

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  Dr. Stephen R. Honeygosky
  Dolores Ling
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  Glenda J. Truax

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