



HENRY FORD

SYNAPSE

Neurosurgery

April 2015



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LETTER FROM THE CHAIR

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Dear Colleagues and Friends,



In this issue of Synapse, we highlight some of the latest innovations and advances in the Henry Ford Department of Neurosurgery, where we have an extraordinary team of specialists dedicated to improving patient care.

Examining Spine Outcomes

As the leader of the Michigan Spine Surgery Improvement Collaborative (MSSIC), Henry Ford has been active in coordinating spine patient outcomes

and treatment protocols for medical centers throughout the state. In 2014 we completed our fully functional website registry and made great strides in our data collection capabilities, among many other milestones. 2015 also has started off well, with 15 new sites joining MSSIC during our latest recruitment period. With data collection from a total of 22 sites, we will better be able to develop specific quality improvement initiatives.

New Epilepsy Procedures

Epilepsy is a complex spectrum of disorders that affects millions of Americans each year – introducing challenges with work, school, social situations and independence. Our Comprehensive Epilepsy Center, recognized by the National Association of Epilepsy Centers as a Level 4 center, has one of the largest programs in Michigan, featuring specialists from the departments of Neurology and Neurosurgery, as well as our experts in neuroradiology, neuropsychology, speech-language pathology and nursing. This team holds a weekly epilepsy surgical conference to discuss and review patients who may be candidates for epilepsy surgery, a potentially curative treatment that is tragically underutilized by patients, in part due to the fear of surgery.

However, Henry Ford offers new minimally invasive procedures that improve accuracy while minimizing risk. We were one of the first institutions in the nation to use stereotactic placement of depth electrodes for a shorter, safer procedure. We also have helped lead the clinical trial for an implantable responsive neurostimulation system that works like a pacemaker to stop seizures. In addition, we offer a minimally invasive, MRI-guided laser ablation technique that for certain patients may be an alternative to traditional open surgery. All of these procedures are supported by the most advanced diagnostic techniques, including our MEG (magnetoencephalography) system, which offers advanced neuroimaging that improves our ability to localize seizures.

Advancing Research and Education

As part of our relentless pursuit of academic discovery, our faculty continues to be active in clinical trials that explore life-saving translational, molecular and personalized medicine research. This includes engaging in more treatment-specific clinical trials for brain tumors than anywhere in the Midwest, and presenting our work to the broader professional community in a variety of journals, clinical reference books and national conferences. We also are active in graduate education, and in this issue we highlight the latest strides our residents have taken to help advance care.

I am proud of the work our team has done to advance the field of neurosurgery while providing innovative, personalized care that transforms our patients' lives.

Most sincerely,

STEVEN N. KALKANIS, M.D.



MSSIC UPDATE

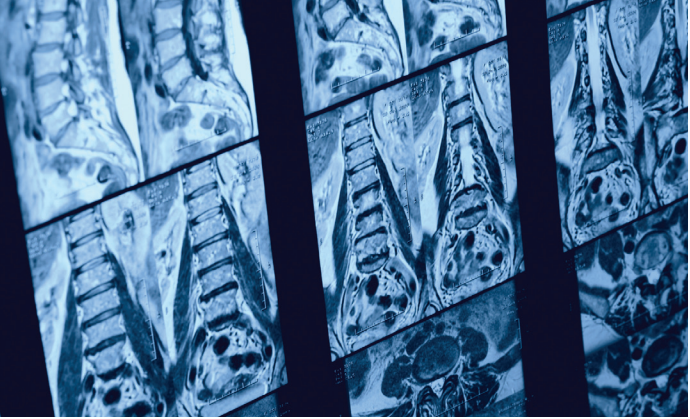


Henry Ford Health System is the Coordinating Center for the Michigan Spine Surgery Improvement Collaborative (MSSIC). MSSIC continues to move forward toward the goal of improving spine surgery for patients in Michigan. 2014 was a very busy year of development with many accomplishments. Some of the milestones include:

- A fully functional website registry, including “real-time” data reporting and a patient web portal for completing patient surveys;
- Formal “go live” of registry data collection after several rounds of pre-testing and refinement;
- Active data collection at all seven of the “founding” sites, with data from over 3,000 cervical and lumbar cases entered into the registry by the end of the year;
- Qualified Data Registry status to support Physician Quality Reporting System (PQRS) reporting for participating physicians;
- Regularly scheduled quarterly meetings and conference calls for surgeons and data abstractors;
- Continuing Medical Education (CME) units awarded to participants for attending quarterly meetings;
- Development of the MSSIC Manual of Operations;
- Development of daylong training curriculum for data abstractors.

Looking Forward

2015 promises to be an equally exciting year. The second wave of recruitment recently closed with 15 new sites joining MSSIC in January 2015. With data collection fully under way, data on surgical outcomes (including patient self-reported outcomes), complications and details of surgical procedures are being continuously monitored and analyzed. We hope to identify and begin specific, focused quality improvement initiatives in late summer.



Founding Participating Sites

Borgess Medical Center
Henry Ford Hospital
Henry Ford West Bloomfield Hospital
UP Health System – Marquette
McLaren – Flint
Sparrow Hospital
St. Joseph Mercy – Ann Arbor

New Sites for 2015

Allegiance Health
Beaumont Health System – Grosse Pointe Hospital Campus
Beaumont Health System – Royal Oak Hospital Campus
Beaumont Health System – Troy Hospital Campus
Bronson Methodist
Covenant Health Care
Genesys Regional Medical Center
McLaren – Greater Lansing
Mid-Michigan Health – Midland
Providence Hospital & Medical Centers
St. John Hospital & Medical Centers
St. John Macomb Oakland Hospital
St. Joseph Mercy Oakland
St. Mary's Mercy Grand Rapids
University of Michigan Health System

MSSIC TEAM

Directors:

Muwaffak Abdulhak M.D.
Stephen Bartol, M.D.

Associate Directors:

David Nerenz, Ph.D.
Jason Schwalb, M.D.
Victor Chang, M.D.

Program Manager:

Lisa Pietrantoni

Surgeon Champions, Henry Ford Hospital:

Donald Seyfried, M.D.
Stephen Bartol, M.D.

Surgeon Champions, Henry Ford West Bloomfield:

Mokbel Chedid, M.D.
Stephen Bartol, M.D.

FOR MORE INFORMATION CONTACT LISA PIETRANTONI, LPIETRAI@HFHS.ORG, (313) 874-1892 (OFFICE), (313) 399-7263 (MOBILE).

FOCUS ON EPILEPSY SURGERY

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NEW TECHNOLOGIES OFFER HOPE

Higher Precision, Less Risk

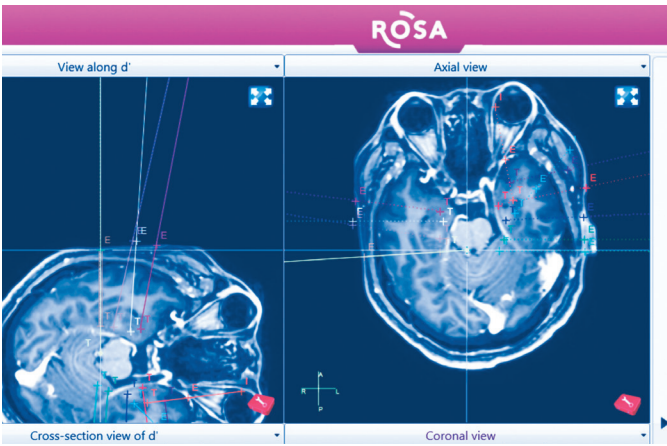
Epilepsy is the fourth most common neurological disorder in the United States, affecting an estimated 2.2 million Americans, with 150,000 new cases diagnosed annually. A complex spectrum of disorders, epilepsy is characterized by unpredictable seizures that often have a large impact on a patient's quality of life.

The Risk of Sudden Death

While epilepsy medications can reduce seizures, they may not eliminate them. "If a patient is having seizures once a week with a change in their levels of consciousness, they're still at risk of sudden death from epilepsy," says Jason Schwalb, M.D., Surgical Director of Henry Ford's Movement Disorder and Comprehensive Epilepsy Centers. "With epilepsy surgery and appropriately chosen patients, we can cure a significant percentage and make a huge difference."

Epilepsy Surgery Is Underutilized

According to a 2012 Institute of Medicine report and National Association of Epilepsy Centers survey data, only 4,000 patients get epilepsy surgery in the United States each year – while up to 200,000 people are candidates. Many epilepsy patients don't know about surgical options, given their restrictions on driving, which can make it difficult to attend support groups where they can learn more about these procedures. In addition, many patients have an inherent fear of brain surgery.



Co-Directors, Functional Neurosurgery Program Henry Ford Department of Neurosurgery



ELLEN L. AIR,
M.D., PH.D.



JASON M. SCHWALB,
M.D., FAANS, FACS

New Epilepsy Technologies

"One of the ways we have tried to address that fear and get patients appropriate treatment is with newer, less-invasive technologies," Dr. Schwalb says.

- **ROSA™ robot:** Henry Ford was the third center in the United States to perform stereotactic placement of depth electrodes (sEEG) using the ROSA robot. ROSA allows for a much shorter and safer surgery, with less risk for bleeding, infection and anesthesia complications. This technology reduces a 10-hour case to about an hour and a half.
- **RNS® System:** For the last decade, Henry Ford has been a lead institution in a responsive neurostimulation clinical trial. The technology – developed by NeuroPace, Inc., and recently approved by the FDA – uses an implantable device that detects and responds to seizure onset with electrical stimulation, similar to a defibrillator.
- **Visualase®:** This minimally invasive technique uses laser ablation to destroy a targeted area of the brain that is causing seizures. A flexible laser fiber is guided into the targeted area through a small hole in the skull, then MRI guidance is used to monitor the temperature in the brain and ensure that only the target area is ablated.
- **MEG system:** Henry Ford also is one of 29 centers in the United States and the only one in Michigan that has a magnetoencephalography (MEG) system, which offers advanced neuroimaging through recording magnetic fields produced by the brain.

PATIENT STORY: JOE MOON

"I was 17 when I had my first grand mal seizure and blackout. Ten years later, I was on epilepsy medication that didn't totally work, and the uncertainty was affecting my life. I wasn't able to drive and it was hard to hold down a job. Ultimately, I went into the emergency room at Henry Ford Hospital after having a massive headache that lasted for two days. While there, I met with neurologist Dr. Andy Zillgitt, who diagnosed me with drug-resistant focal epilepsy. I felt he really did care, and he told me there was a surgery that could help me. When I learned more

about the ROSA robot and laser ablation, I was scared, and I wondered, will this really work? But I desperately wanted my independence. Before the surgery, I was having up to six small seizures a day. Now, a year and a half later, I'm cured of my epilepsy and can live normal again. It's unbelievable. It feels like a resurrection and I'm so appreciative of Dr. Zillgitt and my surgeon, Dr. Jason Schwalb. I don't have to constantly worry about having these seizures, and I can drive again. In fact, now I'm working on getting my CDL license."

CLINICAL TRIALS

IRB 3099 – Epilepsy Registry (Internal Funding)

IRB 5702 – Primary Brain Tumor_PROMIS (Internal Funding)

IRB 5702 – The Use of Patient Reported Outcomes Measurement Information System (PROMIS) Measures and the PROMIS Assessment Center in Clinical Populations

IRB 5905 – Assessment of Clinical Outcomes in Patients Receiving Combination Anterior-Posterior Cervical Fusion Surgery (Internal Funding)

IRB 5998 – Potential Racial Disparities in Treatment of Trigeminal Neuralgia (Internal Funding)

IRB 6340 – BOLDER/Back Pain Outcomes using Longitudinal Data – Registry and Repository (University of Washington), Grant# B40625

IRB 6588 – PCORI LESSER_Long Term Outcomes of Lumbar Epidural Steroid Injections for Spinal Stenosis (University of Washington), Grant# B45150

IRB 6784 – National Neurosurgery Quality and Outcomes Database (N2QOD): A Prospective Registry for Quality Reporting

IRB 7763 – Mechanomyography for Evaluation of Pedicle Screw Placement (Sentio, LLC), Grant# E12101

IRB 8138 – OPTIMISE STUDY: Occipital Nerve Stimulation (ONS) for Migraine (A4003) (Boston Scientific), Grant# E14045

IRB 8179 – Vascular Malformation Registry (John R. Davis Chair) Grant# J90092

IRB 8198 – The effect of treating non ruptured cerebral aneurysms on confounding headaches

IRB 8231 – The Development of a Pre-Operative Predictor Model of Outcomes in Patients Undergoing Lumbar Spine Fusion Surgeries (Internal Funding), Grant# Pending

IRB 8436 – Tissue Bank for NPH Patients

IRB 8777 – Efficacy of Vagal Nerve Stimulator for Dravet Syndrome using Social Media

IRB 8787 – Surgical Technique For Repair of Complex Skull Base Defects

IRB 8842 – Phase 1 trial of laser interstitial thermal therapy for cerebral radiation necrosis (Harris Grant) H10194

IRB 8924 – A Randomized Cross-over Study for Normal Pressure Hydrocephalus (ARCS-NPH) (Johns Hopkins)

IRB 9053 – Metastatic Cancer Study_Spine Surgery

IRB 9165 – Three Dimensional Motion Analysis in Patients Status Post Anterior Cervical Fusion and Cervical Disc Arthroplasty, a Clinical Study (Internal Funding)

IRB 9229 – The Application of Morphometrics As a Predictor for Peri-operative Complications After Lumbar Spine Surgery (Internal Funding)

IRB 9246 – Comparing Engagement Techniques for Incorporating Patient Input in Research Prioritization_SMARTER

IRB 9251 – PI Initiated: Retrospective Safety and Efficacy Evaluation of Spinal Fusion Procedures Utilizing Autologous Concentrated Bone Marrow Aspirate (cBMA) (Isto Technologies), Grant# E14195

IRB 9405 – Preoperative External Tissue Expansion for Complex Cranial Reconstructions

BTTC09-01 – A Phase I-II Trial Everolimus and Sorafenib in Patients With Recurrent High-Grade Gliomas

BTTC12-01 – A Phase II Trial of Oral Pazopanib Plus Oral Topotecan Metronomic Antiangiogenic Therapy for Recurrent Glioblastoma Multiforme (A) Without Prior Bevacizumab Exposure and (B) After Failing Prior Bevacizumab

CERN09-02 – Phase II Trial of Carboplatin and Bevacizumab for the Treatment of Recurrent Low-grade and Anaplastic Supratentorial, Infratentorial and Spinal Cord Ependymoma in Adults

CTSU N0577 – Phase III Intergroup Study of Radiotherapy versus Temozolomide Alone versus Radiotherapy with Concomitant and Adjuvant Temozolomide for Patients with 1p/19q Codeleted Anaplastic Glioma

HFHS 11-01 – Prospective Study of Stereotactic Radiosurgery Using Diffusion-weighted Abnormality for Recurrent Glioblastoma After Second Line Chemotherapy

NCI-2014-00907 – Pilot Study of MLN0128 in Preoperative Recurrent Glioblastoma (GBM) Patients

NCT01790503 – An Open Label Phase 1b/2 Study of Orally Administered PLX3397 in Combination With Radiation Therapy and Temozolomide in Patients With Newly Diagnosed Glioblastoma

N-HFHS 09-08 – An Open Label, Phase 2 Trial of Orally Administered PF-00299804 in Adult Patients with Relapsed/Recurrent Glioblastoma (GBM)

Pharm CA209143 – A Randomized Phase IIB Open Label Study of Nivolumab or Nivolumab in Combination with Ipilimumab versus Bevacizumab in Adult Subjects with Recurrent Glioblastoma (GBM)

Pharm DCVAX_020221 – A Phase II Clinical Trial Evaluating DCVax-Brain, Autologous Dendritic Cells Pulsed with Tumor Lysate Antigen for the Treatment of Glioblastoma Multiforme

Pharm STML-701-0114 – A Phase I/ II Study of SL-701, a Subcutaneously Injected Multivalent Glioma-Associated Antigen Vaccine, in Adult Patients with Recurrent Glioblastoma

Pharm Tocagen 511-II-01 – A Phase 1 Ascending Dose Trial of Safety and Tolerability of Toca 511, a Retroviral Replicating Vector, Administered to Subjects at the Time of Resection for Recurrent High Grade Glioma and Followed by Treatment With Toca FC, Extended-Release 5-FC

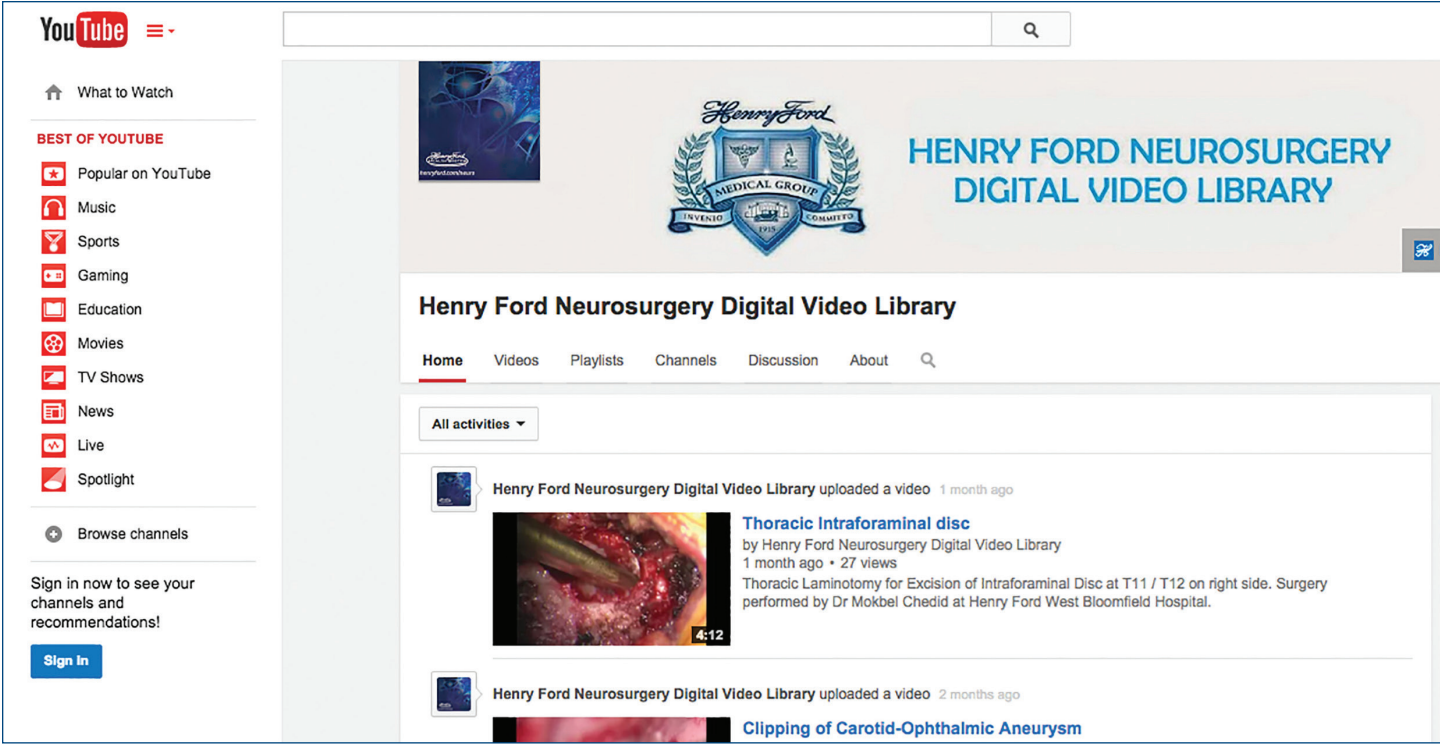
Pharm Tocagen 511-13-01 – A Phase 1 Ascending Dose Trial of the Safety and Tolerability of Toca 511, a Retroviral Replicating Vector, Administered Intravenously Prior to, and Intracranially at the Time of, Subsequent Resection for Recurrent High Grade Glioma and Followed by Treatment With Extended-Release 5-FC

RTOG 0834 – Phase III trial on Concurrent and Adjuvant Temozolomide Chemotherapy in Non-1P/19Q Deleted Anaplastic Glioma. The CANTON Intergroup trial

FOR MORE INFORMATION ABOUT CURRENT CLINICAL TRIALS, VISIT HENRYFORD.COM/NEURO.

RESIDENTS’ CORNER

Henry Ford Hospital has been delivering cutting-edge neurosurgical care for more than 90 years and has graduated dozens of neurosurgeons who touch the lives of many people across the globe. In order to drive our mission forward to enhance health through patient care, education and research, a team of current residents led by senior resident Dr. Aqueel Pabaney have created a YouTube™ channel, Henry Ford Neurosurgery Digital Video Library (tinyurl.com/hfndvl).



Sharing Surgical Insights

New state-of-the-art, high definition, fluorescence-ready operative microscopes are utilized to record in high resolution some of our most complex and insightful cases that can now be shared with not only our own residents, but also neurosurgery residents and medical students from all over the world. In addition, with the use of GoPro™ mounted cameras – an innovation introduced by senior resident Dr. Adam Robin – patient positioning, incision and early parts of the surgical approach can also be incorporated. Background commentary emphasizing salient features of the operation will be included as well.

“We think this may lead to better outcomes in the future,” say Drs. Robin and Pabaney. “We are excited to continue working with our fellow residents on these projects and others that will positively impact our patients through new developments in education, research and patient care.”

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Anil Nanda, M.D., at Louisiana State University’s Health Sciences Center.

AQUEEL H. PABANEY, M.D.

Dr. Aqueel H. Pabaney is a senior neurological surgery resident at Henry Ford Hospital. He received his medical education at the Aga Khan University in Pakistan. He is a member of the AANS, CNS and North American Skull Base Society. His clinical and research interests include intracranial aneurysms, arteriovenous malformations and surgical approaches to the skull base. He will pursue further training in cerebrovascular and skull base surgery as a Fellow under



ADAM M. ROBIN, M.D.

Dr. Adam M. Robin is a senior neurological surgery resident at Henry Ford Hospital. He obtained his undergraduate degree at University of Michigan and studied neuroscience and medical research in graduate school at Wayne State University School of Medicine, before earning his medical doctorate. He is a member of the AANS, CNS and Society for Neuro-Oncology. His clinical and research interests include glioma, meningioma, brain and spinal metastases, brain plasticity and surgical adjunctive technologies to improve the efficacy and safety of brain tumor surgery. He will pursue his training in neurosurgical oncology as a Fellow at Memorial Sloan-Kettering Cancer Center in New York City under Philip Gutin, M.D.

PUBLICATIONS: JUNE 2014 – MARCH 2015

Aldape K, Huan Y, Wu J, Wani K, Necesito-Reyes MJ, Colman H, Dhali G, Lieberman FS, Metellus P, Mikkelsen T, Omuro A, Partap S, Robins HI, Suffietti R, Wu J, Gilbert MR, Armstrong TS on behalf of the CERN Foundation. Clinical course and progression-free survival of adult intracranial and spinal ependymoma patients. *Neuro-oncology* 2014, Aug. 13 [Epub ahead of print]

Alexander BM, Galanis E, Yung WK, Ballman KV, Boyett JM, Cloughesy TF, Degroot JF, Huse JT, Mann B, Mason W, Mellinghoff IK, Mikkelsen T, Mischel PS, O'Neill BP, Prados MD, Sarkaria JN, Tawab-Amiri A, Trippa L, Ye X, Ligon KL, Berry DA, Wen PY. Brain Malignancy Steering Committee clinical trials planning workshop: Report from the Targeted Therapies Working Group. *Neuro-Oncology* 2015;17(2):180-188.

Fiscella K, Burstin HR, Nerenz DR. Quality measures and sociodemographic risk factors: To adjust or not to adjust. *JAMA* 2014;312(24):2615-2616.

Friedly JL, Comstock BA, Turner JA, Heagerty PJ, Deyo RA, Sullivan SD, Bauer Z, Bresnahan BW, Avins AL, Nedeljkovic SS, Nerenz DR, Standaert C, Kessler L, Jarvik, and the LESS Investigators. A double-blind randomized controlled trial of lumbar epidural steroid injections for spinal stenosis (LESS). *N Engl J Med* 2014;371(1):11-21.

Gross R, Ali R, Kole M, Dorbeistein C, Jayaraman MV, Khan M: Tentorial dural arteriovenous fistula presenting as myelopathy: Case series and review of literature. *World J Clin Cases* 2014;2(12): 907-911. PMID: 25516869.

Holder CA, Wintermark M, Rao A, Colen RR, Kirby J, Freymann J, Jaffe CC, Mikkelsen T, Flanders A. Outcome prediction in patients with glioblastoma by using imaging, clinical, and genomic biomarkers: Focus on the nonenhancing component of the tumor. *Radiology* 2014;272(2):484-493. Aug.

Jarvik JG, Gold LS, Comstock BA, Heagerty PJ, Rundell SD, Turner JA, Avins AL, Bauer Z, Bresnahan BW, Friedly JL, James K, Kessler L, Nedeljkovic SS, Nerenz DR, Shi X, Sullivan SD, Chan L, Schwalb JM, Deyo RA. Association of early imaging for back pain with clinical outcomes in older adults. *JAMA* 2015;313(11):1143-1153. doi: 10.1001/jama.2015.1871.

Kast RE, Auner GW, Rosenblum ML, Mikkelsen T, Yurgelevic SM, Raghunathan A, Poisson LM, Kalkanis SN. Raman molecular imaging of brain frozen tissue sections. *J Neurooncol* 2014;120(1):55-62.

Leung D, Han X, Mikkelsen T, Nabors LB. Role of MRI in primary brain tumor evaluation. *J Natl Compr Cancer Netw* 2014;12(11):1561-1568.

Market-Velker BA, deCarvalho AC, Mikkelsen T, Fidalgo da Silva E, Porter LA. The cyclin-like protein Spy1 regulates growth and division characteristics of the CD133(+) population in human glioma. *Cancer Cell* 2014;25(1):64-76.

Meng Y, Chopp M, Zhang Y, Liu Z, An A, Mahmood A, Xiong Y. Subacute intranasal administration of tissue plasminogen activator promotes neuroplasticity and improves functional recovery following traumatic brain injury in rats. *PLoS One* 2014; 9(9):e106238. Sept. 4.

Mueller C, deCarvalho AC, Mikkelsen T, Lehman NL, Calvert V, Espina V, Liotta LA, Petricoin EF 3rd. Glioblastoma cell enrichment is critical for analysis of phosphorylated drug targets and proteomic-genomic correlations. *Cancer Res* 2014;74(3): 818-828.

Nazem-Zadeh MR, Schwalb JM, Elisevich KV, Bagher-Ebadian H, Hamidian H, Akhondi-Asl AR, Jafari-Khouzani K, Soltanian-Zadeh H. Lateralization of temporal lobe epilepsy using a novel uncertainty analysis of MR diffusion in hippocampus, cingulum, and fornix, and hippocampal volume and FLAIR intensity. *J Neurol Sci* 2014;342(1-2):152-61. July 15. doi: 10.1016/j.jns.2014.05.019.

Nazem-Zadeh MR, Elisevich KV, Schwalb JM, Bagher-Ebadian H, Mahmoudi F, Soltanian-Zadeh H. Lateralization of temporal lobe epilepsy by multimodal multinomial hippocampal response-driven models. *J Neurol Sci* 2014;Sept. 28. pii: S0022-510X(14)00627-3. doi: 10.1016/j.jns.2014.09.029.

Nicolasjlwan M, Hu Y, Yan C, Meerzaman D, Holder CA, Gutman D, Jain R, Colen R, Rubin DL, Zinn PO, Hwang SN, Raghavan P, Hammoud DA, Scarpance LM, Mikkelsen T, Chen J, Gevaert O, Buetow K, Freymann J, Kirby J, Flanders AE, Wintermark M; TCGA Glioma Phenotype Research Group. Addition of MR imaging features and genetic biomarkers strengthens glioblastoma survival

prediction in TCGA patients. *J Neuroradiol* 2014 July 2 ii:S0150-9861(14)00187-4.

Pabaney AH, Reinard KA, Massie LW, Naidu PK, Mohan VS, Marin H, Malik GM. Management of perisylvian arteriovenous malformations: A retrospective institutional case series and review of the literature. *Neurosurg Focus* 2014;37(3):E13. Sept.

Poisson LM, Gutman D, Scarpance L, Hwang SN, Holder CA, Wintermark M, Rao A, Colen RR, Kirby J, Freymann J, Jaffe CC, Mikkelsen T, Flanders A. Outcome prediction in patients with glioblastoma by using imaging, clinical, and genomic biomarkers: Focus on the nonenhancing component of the tumor. *Radiology* 2014;272(2):484-493. Aug.

Reinard K, Basheer A, Pabaney A, Marin H, Malik G. Spontaneous resolution of a flow-related ophthalmic-segment aneurysm after treatment of anterior cranial fossa dural arteriovenous fistula. *Surg Neurol Int* 2014;5(suppl 14):S512-S515. Nov.

Robin AM, Walbert T, Mikkelsen T, Kalkanis SN, Rock J, Lee I, Rosenblum ML. Through the patient’s eyes: The value of a comprehensive brain tumor center. *J Neurooncol* 2014;119(3):465-72. Sept.

Robin AM, Kalkanis SN, Rock J, Lee I, Rosenblum ML. Through the patient’s eyes: an emphasis on patient-centered values in operative decision making in the management of malignant glioma. *J Neurooncol*. Sept.;119(3):473-9. 2014.

Schiff D, Kesari S, de Groot J, Mikkelsen T, Drappatz J, Coyle T, Fichtel L, Silver B, Walters I, Reardon D. Phase 2 study of CT-322, a targeted biologic inhibitor of VEGFR-2 based on a domain of human fibronectin, in recurrent glioblastoma. *Invest New Drugs* 2015;33(1):247-253.

Yang D, Han Y, Chopp M, Seyfried D. Thymosin beta 4 improves neurological outcome. *World J Neurosci* 2014;4(5): 395-405. Nov. doi: 10.4236/wjns.2014.45043.

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PUBLICATIONS

(Continued)

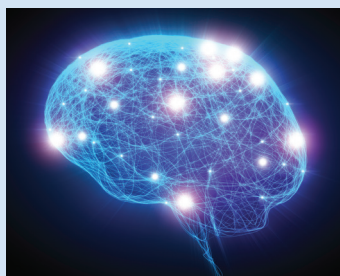
Yechieli R, Kim JK, Mikkelsen T, Kalkanis SN, Rock J, Rosenblum M, Ryu S. Patterns of failure after radiosurgery to two different target volumes of enhancing lesions with and without FLAIR abnormalities in recurrent glioblastoma multiforme. *J Neurooncol* 2014;116(2):291-297

Zhang Y, Chopp M, Meng Y, Katakowski M, Xin H, Mahmood A, Xiong Y. Effect of exosomes derived from multipotent mesenchymal stromal cells on functional recovery and neurovascular plasticity in rats after traumatic brain injury. *J Neurosurg* 2015, Jan. 16 [Epub ahead of print].

Zhang Y, Chopp M, Meng Y, Zhang ZG, Doppler E, Winter S, Schallert T, Mahmood A, Xiong Y. Cerebrolysin improves cognitive performance in rats after mild closed-head injury. *J Neurosurg*. 2015, Jan. 3 [Epub ahead of print]

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SYMPOSIUM REMINDER



The 2015 Henry Ford Brain Tumor Symposium, *Focused Forward: New Thoughts on Brain Tumor Treatment*, will take place on April 24 at the MGM Grand Detroit. We are very excited to welcome multiple brain tumor experts to our event from around the country.

TO REGISTER, VISIT
HENRYFORD.COM/2015BRAINTUMORSYMPOSIUM
OR CALL (313) 916-8212.

OTHER UPCOMING EVENTS

Epilepsy Symposium

Evaluation and Modern Management of Epilepsy
June 5-6
Henry Ford Hospital
2799 W. Grand Blvd.
Detroit, MI 48202

Fourth Annual Malik Lecture

Guest Lecturer:
Evando de Oliveira, M.D., Ph.D.
Sept. 17
Townsend Hotel
100 Townsend St.
Birmingham, MI 48009

TO REGISTER FOR THESE EVENTS OR FOR MORE INFORMATION, CALL (313) 916-8212 OR EMAIL CWILL30@HFHS.ORG.