

## RESEARCH INITIATIVE TAKES OFF

*Donna Shaffer, Research Associate and Tom Smith, Outreach & Media Liaison*

**W**e are proud to announce research grants to scientists at five medical research facilities across the nation. This is the culmination of a longstanding dream of the Hydrocephalus Association (HA) and our community, to take an active part in creating innovative research in hydrocephalus, with the goal of one day finding a cure.

These "Mentored Young Investigator" awards demonstrate our first step in finding a cure. Our longer-term goal is to increase the volume of research tenfold by the year 2013, and to further stimulate federal funding.

The process started in July 2009 when the HA announced a Request for Applications (RFA) for a Mentored Young Investigator (MYI) research award. Each application was evaluated by the HA Scientific and Medical Review Committee (SMRC), based upon the following criteria: mentor and training environment; likelihood that the proposed project will advance hydrocephalus treatment/cure; scientific merit of the research proposal; and applicant training and career potential.

As a result of this competitive application process, the HA Board of Directors is awarding \$110,000 per research project for years 2010-2011 to the following investigators:

**Abhishek Deshpande, MD**, at the Cleveland Clinic for: "Effects of VEGF agonist (rVEGF) and VEGF antagonist (Bevacizumab) treatment on cerebrovascular density and permeability and learning in a kaolin model of hydrocephalus."



**Ramin Eskandari, MD**, at the University of Utah for: "Early versus late CSF drainage treatment in experimental neonatal hydrocephalus."



**Dana W. Moore, PhD**, at the Weill Cornell Medical College of Cornell University for: "Quantitative measurement of ventricular volume and cortical atrophy to improve diagnosis of normal pressure hydrocephalus."



**Joon W. Shim, PhD**, at Children's Hospital Boston for: "The role of angiogenesis in hydrocephalus."



**Yun C. Yung, doctoral student** at the Scripps Research Institute for: "Lysophosphatidic acid (LPA) signaling in hydrocephalus."

Conference 2010

For exciting information on our upcoming conference, please check out pages 3 & 4.



## WELCOME TO A NEW YEAR! Letter from the Editor

Tom Smith, Outreach & Media Liaison

Welcome to the Winter 2010 edition of Pathways. We hope that 2010 is being kind to you. Now, to business!

Our Research Initiative has been launched at last! I am utterly thrilled. Credit goes to the vision, drive and efforts of our members, Board of Directors, Medical Advisory Board and generous donors. Five talented young scientists are being directly funded by the HA to pursue hydrocephalus research that will benefit our entire community. We've talked a good deal about launching this initia-

tive over the last several newsletters; having talked that talk, now we get to walk that walk.

Registration is now open for the 11<sup>th</sup> Annual National Conference on Hydrocephalus, scheduled for June 17-20. We look forward to seeing you in Cleveland, the Rock 'n' Roll Capital of the United States. It is the best way to educate ourselves about hydrocephalus and an unparalleled opportunity to connect with our wonderful community. Be there or be a geometric shape with four sides of equal length. ❖

## INTRODUCING OUR NEW CEO

Rick Smith, Acting CEO

Since last fall, the Hydrocephalus Association has been engaged in a search for a new CEO. On February 1, the Board of Directors successfully concluded that search with the appointment of Laurene McKillop, PhD. Laurene emerged from an incredibly strong pool of candidates. The Board was extremely impressed with Laurene's background and experience, along with her demonstrated commitment and energy to improving health care. We all look forward to working with her in the years ahead.



Laurene comes to the Hydrocephalus Association with more than 25 years of experience in the management of non-profit organizations, primarily in the areas of health, children and family services. She is a dynamic leader who combines sage leadership with a demonstrated ability to generate growth.

Laurene's skills include strategic planning and fundraising, corporate and fiscal oversight, research direction, and marketing and communications. She has managed large centralized staffs as well as national coalitions of community advocates; directed complex national programs, and worked across the three branches of government.

Laurene will oversee the Hydrocephalus Association's strategic relocation to the Washington, D.C. metropolitan area. This move will increase the visibility and the impact of the Association as we work to find a cure for hydrocephalus, and improve the lives of those who are living with it. We welcome Laurene, who looks forward to advancing our cause. ❖

### IN MEMORY

Dr. Anthony Marmarou, one of our esteemed members of the HA Medical Advisory Board, passed away on January 22. Dr. Marmarou held the Dr. Harold I. Nemuth Distinguished Professorship in neurosurgery and served as vice chair of research in the department of neurosurgery at the Virginia Commonwealth University, Richmond, Va. Known internationally for excellence in research on patients with traumatic brain injury and spinal fluid physiology, he was respected as a master at bringing bench research quickly and safely to the bedside to improve patient care. Dr. Marmarou played a leading role in establishing clinical guidelines and standards of care for the treatment of patients with idiopathic normal pressure hydrocephalus.



During his more than 27 years at VCU, Dr. Marmarou received significant and sustained NIH and industry funding. This included the prestigious Javits Neuroscience Investigator Award from the National Institute of Neurological Disorders and Stroke. He trained more than 200 research scientists, who are furthering his legacy in leading laboratories around the world.

We will remember his many contributions to neuroscience and to the HA, as well as his wisdom and dedication to scientific advancement.



If you would like more information about how to include the Hydrocephalus Association in your will or estate plan, please contact Rick Smith at:

[rick@hydroassoc.org](mailto:rick@hydroassoc.org)  
or 415-732-7040

The HA will maintain two offices,  
Education & Support in San Francisco and  
Research & Advocacy in Washington DC.

## Join us in Cleveland For Our 11<sup>th</sup> National Conference

### IT'S FOR YOU!

*Pip Marks, Director of Support & Education and Karima Roumila, MPH, Outreach Coordinator*

The goal of the Hydrocephalus Association's biennial national conference is to provide tools to address the medical, educational and social challenges of living with hydrocephalus – and to enjoy each other's company!

Highlights of the conference scheduled for **June 17-20, in Cleveland**, include a keynote address by world-renowned doctor, author and motivational speaker Dr. Michael Roizen; first time ever live feed screening of shunt placement surgery and endoscopic third ventriculostomy, performed by our conference Medical Chair, Dr. Mark Luciano; the second Robert Pudenz lecture sponsored by the Rudi Schulte Research Institute; a hands-on brain anatomy and physiology lab; our ever-popular interconnection sessions where you can share experiences, and the cornerstone educational sessions by our top-notch team of medical professionals and researchers. And lastly, a dinner and dance with talent show and closing picnic for all attendees.

We are grateful to our conference sponsors who generously underwrite a significant portion of the expenses, allowing us to keep the registration fee well below production costs. Many of these sponsors design and manufacture shunts and they will have models there for you to see and feel.

We thank the following sponsors:

Aesculap, Inc.

Codman, a Johnson & Johnson Company

Medtronic Neurosurgery

Rudi Schulte Research Institute

One of the key ingredients of a great conference is the participants, and we invite you to join us in creating our best gathering ever. The 11<sup>th</sup> National Conference on Hydrocephalus is **"For YOU,"** patients, families, friends, caretakers and health professionals. We hope it will be an empowering time for us all. Our conference medical co-chairs are Drs. Mark Luciano and Stephen Dombrowski of the Cleveland Clinic.

#### CONFERENCE REGISTRATION:

You can register online. Please go to [www.hydroassoc.org](http://www.hydroassoc.org). If you are unable to register via the website, please contact our office at **888-598-3789** or e-mail us at: [info@hydroassoc.org](mailto:info@hydroassoc.org).

#### ACCOMMODATIONS:

This year's conference will be at the **Intercontinental Cleveland Hotel and Conference Center**. To make your hotel reservations, call **877-707-8999** and mention the Hydrocephalus Association conference. We have two other hotels available close by for attendees to choose from. The reservation number is the same for all three hotels. Attendees must specify they are with the Hydrocephalus Association conference and their accommodation preference. The cut-off date for the group block is May 26.

#### AIRPORT TRANSPORTATION:

Super Express Transportation. Tel.: **877-251-5701**

Advanced reservation is not required, but is preferred. There will be a greeter/welcome desk on the baggage claim level of the airport displaying the conference name and information. The table will be staffed from 8 a.m. to 6 p.m., but if you arrive outside of that time frame, call **877-251-5701** for pick-up. The cost is \$10 per person, one way, including tax and tip. Passengers with a wheelchair exceeding 250 pounds must make an advance reservation for a separate car and the cost is \$45 each way. Guests have the option of prepaying for the roundtrip (\$20) when they arrive at the welcome desk.

#### FINANCIAL AID:

Limited financial aid is available to members of the Hydrocephalus Association to cover conference registration fees. Financial aid is awarded based on need. Please call our office to request a financial aid application form.

#### CHILDCARE

We are thrilled to announce the availability of childcare during the conference.

#### CHILDREN AGES 7-12; \$70 PER DAY:

**Day 1:** The Cleveland Museum of Natural History will provide an all-day program for 25 children per day (Friday and Saturday) from 9 a.m. to 5 p.m. The program includes exploration of the traveling exhibit Wild Music, visits to the planetarium, dinosaur hall, live animals and hands-on activities, including take-home craft. Transportation to and from the museum, lunch and snack are included.

**Day 2:** All day entertainment at the Intercontinental with education, crafts, games and other fun activities.

#### CHILDREN AGES 3-6; \$80 FOR FRIDAY AND SATURDAY:

All day entertainment at the Intercontinental with education, crafts, games and other fun activities. The fee covers Friday and Saturday. Lunch is included.

#### CONFERENCE SCHEDULE:

Sessions begin at 4 p.m. on Thursday, June 17, and conclude at 2 p.m. on Sunday, June 20. Much of the appeal of the conference lies in connections and conversations outside of scheduled sessions.

Hydrocephalus is a chronic condition for which there is no cure. Our patient-centered conferences empower all of us to reach out to programs and services that will meet our needs now and in the future. We hope you will join us.

## Join us in Cleveland For our 11<sup>th</sup> National Conference

### HOP ON BOARD AT THE HA CONFERENCE: Tips on how you can afford it!

Tom Smith, Outreach & Media Liaison

The National Conference on Hydrocephalus is our biennial gathering to self-educate and make or renew connections. Join doctors, nurses, parents, children, people living with hydrocephalus and people affected by it, as we celebrate our community.

While we strive to keep costs down for attendees and provide some financial aid for registration, there are other costs to consider, such as airfare and accommodations. Because of the chronic nature of hydrocephalus, many of us struggle to make ends meet. So we have put together a tip sheet to give you ideas on identifying sources that might provide financial assistance.

#### CLUBS/ASSOCIATIONS:

It often pays to solicit professional or charitable organizations. Consider non-specific organizations such as the Elks, Kiwanis and Rotary clubs; regional groups, like the Native Sons of the Golden West; and historical, veteran or recreational associations, such as the Daughters of the American Revolution, the Veterans of Foreign Wars and the YMCA. These large organizations often promote raising money for worthy causes, including those involving chronic illness.

Here is a list of clubs and organizations to get you started. Keep in mind that these usually have a local chapter, and it's best to deal with them at that level.

[www.kiwanis.org](http://www.kiwanis.org)

[www.elks.org](http://www.elks.org)

[www.lionsclub.org](http://www.lionsclub.org)

[www.moosintl.org](http://www.moosintl.org)

[www.rotary.org](http://www.rotary.org)

[www.nsgw.org](http://www.nsgw.org)

#### REGIONAL CENTERS

Regional Centers are also a great resource for parents. These are state-run organizations set up to assist parents with children who are at-risk developmentally. As the conference is geared to providing information for these children, Regional Centers are another potential source of financial assistance.



#### LOCAL FAMILY RESOURCE CENTERS AND NONPROFITS FOR MEDICAL CONDITIONS

There are many conditions that are either concomitant, related or causal to hydrocephalus. Consider approaching a non-profit related to this other condition to see if it provides funding to promote better education or quality of life.

#### TREATMENT CLINICS

Some clinics provide grants to further the education of patients with chronic conditions.

#### CREATE YOUR OWN OPPORTUNITY

Create an event and invite friends, family and people from your community. Let them know what the funds raised will be used for, why it's important and how much their contribution is appreciated. Perhaps a community group, like the local chapter of the Boy Scouts, would be willing to assist.

### Hydrocephalus and YOU: A Symposium for Healthcare Professionals

Treating hydrocephalus requires a multi-disciplinary team effort, involving primary care physicians, nurses, therapists, neurologists, neurosurgeons, psychologists and others. Knowing how these professionals interact with each other in the overall treatment of hydrocephalus leads to better patient care.

This half-day symposium will be held during our annual conference on June 17 and will cover all aspects of hydrocephalus: from the basics of anatomy and physiology, to identifying the condition, treatment options, long term management and other disorders associated with hydrocephalus. The goal is to provide healthcare professionals with the tools they need to help patients with hydrocephalus improve their quality of life.

**Open to Healthcare Professionals Only!**

## HIGHLIGHTS IN HYDROCEPHALUS RESEARCH

The following summaries are a small sample of research papers, which have appeared in peer-reviewed medical and scientific journals last year. Due to space limitations resulting from the abundance of exciting developments, we have collapsed the abstracts to include only the conclusions. We have categorized them into six groups: adult including normal pressure hydrocephalus, basic science, ETV (endoscopic third ventriculostomy), pediatric, shunt and other.

For more information on these and other studies, visit our website at: [www.hydroassoc.org](http://www.hydroassoc.org), and go to "Research and Advocacy" on the left panel and then find "Medical Journal Articles."

### ADULT INCLUDING NORMAL PRESSURE HYDROCEPHALUS (NPH)

**A prospective study of cerebral blood flow and cerebrovascular reactivity to acetazolamide in 162 patients with idiopathic normal pressure hydrocephalus.** Chang, Chia-Cheng; Asada, Hiroyuki; Mimura, Toshiro; Suzuki, Shinichi. *Journal of Neurosurgery*, 2009 Sep, 111(3):610-7; Department of Neurosurgery, Yokohama Minami Kyosai Hospital, Yokohama, Japan.

Both cerebral blood flow (CBF) and cerebrovascular reactivity (CVR) decrease with the development of NPH, suggesting that hemodynamic ischemia may be responsible for manifestation of the symptoms. Impaired CVR and reduced CBF with the development of symptoms can be proposed as diagnostic criteria for idiopathic NPH.

**Cerebrospinal fluid drainage and dynamics in the diagnosis of normal pressure hydrocephalus.** Woodworth, Graeme F; McGirt, Matthew J; Williams, Michael A; Rigamonti, Daniele. *Neurosurgery*, 2009 May, 64(5):919-25; Department of Neurosurgery, Johns Hopkins Hospital, Baltimore, MD.

In this study of 51 INPH patients who underwent CSF pressure (Pcsf) monitoring with waveform analysis and CSF drainage followed by shunt surgery, there was no correlation between specific Pcsf wave characteristics and objective symptomatic improvement after shunt placement. Pcsf monitoring with B-wave analysis contributes little to the diagnostic dilemma with INPH patients. Clinical response to continuous CSF drainage over a 72-hour

period suggests a high likelihood of shunt responsiveness.

**Cognitive dysfunction in normal pressure hydrocephalus (NPH): a case report and review of the literature.** Zarrouf, Fahd; Griffith, James; Jesse, Jane. *The West Virginia Medical Journal*, 2009 Mar-Apr, 105(2):22, 24-6; Medicine-Psychiatry Residency, WVU, Charleston, WV.

A review of the literature about NPH pathophysiology, evaluation, its association with several psychiatric and cognitive symptoms, available treatment outlines and suggested future research directions.

**Glaucomatous disease in patients with normal pressure hydrocephalus.** Chang, Ta C; Singh, Kuldev. *Journal of Glaucoma*, 2009 Mar, 18(3):243-6; Department of Ophthalmology, Stanford University Medical Center, CA. We found the prevalence of a glaucoma diagnosis to be threefold greater in patients with NPH as compared with age-matched non-NPH controls with hydrocephalus.

**Hyponatraemia in patients with normal pressure hydrocephalus.** Chou, C-Y; Liu, J-H; Wang, S-M; Yang, Y-F; Lin, H-H; Liu, Y-L; Huang, C-C. *International Journal of Clinical Practice*, 2009 Mar, 63(3):457-61; Department of Internal Medicine, China Medical University Hospital, North District, Taichung, Taiwan.

Hyponatraemia is not uncommon in patients with NPH. Physicians should be aware of this complication and obtain necessary laboratory examination for early detection of hyponatraemia.

**Noninvasive biomarkers in normal pressure hydrocephalus: evidence for the role of neuroimaging.** Tarnaris, Andrew; Kitchen, Neil D; Watkins, Laurence D. *Journal of Neurosurgery*, 2009 May, 110(5):837-51; Victor Horsley Department of Neurosurgery, National Hospital for Neurology and Neurosurgery, London, U.K.

There is at present Level A evidence for using MR spectroscopy in patients with secondary NPH, and Level B evidence for using SPECT and phase-contrast MR imaging to select patients with idiopathic NPH for shunt placement.

**Normal pressure hydrocephalus.** Finney, Glen R. *International Review of Neurobiology*, 2009, 84:263-81; *Memory and Cognitive Disorders*

*Program, University of Florida Department of Neurology, Gainesville, FL.*

Modern criteria recognize a wider range of diagnostic criteria, and new positive and negative prognostic indicators for treatment benefit have been discovered, though the mainstay remains initial drainage of a large volume of cerebrospinal fluid and monitoring for clinical improvement.

**Relationship between ventricular morphology and aqueductal cerebrospinal fluid flow in healthy and communicating hydrocephalus.** Chiang, William W; Takoudis, Christos G; Lee, Sang H; Weis-McNulty, Annette; Glick, Roberta; Alperin, Noam. *Investigative Radiology*, 2009 Apr, 44(4):192-9; Departments of Radiology, University of Illinois, Chicago, IL.

Aqueductal CSF flow is strongly correlated with ventricular morphology, especially with the total ventricular volume and the third ventricle width, but not with the tested hydrodynamic parameters. In addition, aqueductal stroke volume (ASV) is linearly correlated with aqueductal lumen area, suggesting that the aqueductal CSF flow characteristics can be explained by oscillating pressure differences on the order of less than 0.01 mmHg. These findings may explain why a standalone ASV is a poor diagnostic marker and an insensitive indicator of shunt outcome in idiopathic normal pressure hydrocephalus.

**The longitudinal profile of CSF markers during external lumbar drainage.** Tarnaris, A; Toma, A K; Chapman, M D; Petzold, A; Kitchen, N D; Keir, G; Watkins, L D. *Journal of Neurology, Neurosurgery, and Psychiatry*, 2009 Oct, 80(10):1130-3.; Victor Horsley Department of Neurosurgery, National Hospital for Neurology and Neurosurgery, London, U.K. Evidence is provided that external lumbar drainage (ELD) is producing measurable changes in the CSF composition of patients with iNPH. The paper discusses how such changes may be implicated in the pathophysiology of the condition.

**Treatment of hydrocephalus in adults.** Hamilton, Mark G. *Seminars in Pediatric Neurology*, 2009 Mar, 16(1):34-41; Department of Clinical Neurosciences, University of Calgary, Canada.

A comprehensive adult hydrocephalus clinic model is described and recommended to advance our understanding of this diverse

(Continued on page 6.)

## HIGHLIGHTS IN HYDROCEPHALUS RESEARCH (continued)

## ADULTS/NPH (Continued)

patient population, which will ultimately lead to the development and provision of a better standard of patient care.

**Upper extremity motor measures of Tap Test response in normal pressure hydrocephalus.**

Tsakanikas, Diamanto; Katzen, Heather; Ravdin, Lisa D; Relkin, Norman R. *Clinical Neurology and Neurosurgery*, 2009 Nov, 11(9):752-7.; Department of Neurology and Neuroscience, Weill Medical College of Cornell University, New York, NY.

Our data suggest that measures of upper extremity motor functions may be useful as measures of Tap Test response in patients with iNPH. These upper extremity motor tasks can be rapidly administered (<5 min) in clinical practice and may provide an additional dimension beyond gait and cognition for evaluating response to LP.

**Voxel-based analysis of Tc-99m ECD brain perfusion SPECT in patients with normal pressure hydrocephalus.**

Yoon, Bora; Yang, Dong-Won; Shim, Yong-Soo; Chung, Sung-Woo; Ahn, Kook-Jin; O, Joo-Hyun; Kim, Sung-Hoon; Sohn, Hyung-Sun; Chung, Soo-Kyo; Chung, Yong-An. *Applied Radiation and Isotopes*, 2009 Jul-Aug;67(7-8):1377-81, Catholic University of Korea, Seoul, South Korea.

In statistical probabilistic brain anatomic map (SPAM) analysis, regional cerebral blood flow (rCBF) reduction was observed in bilateral prefrontal area, anterior, posterior cingulate gyri and caudate nuclei. We have found that rCBF changes occurred predominantly in prefrontal and subcortical areas, the changes were associated with frontal subcortical circuit, and the affected frontal subcortical circuit may contribute to the cognitive decline seen in the iNPH patients. The reduction of rCBF and clinical cognitive impairment are closely connected in patients with iNPH.

**Changes in aqueductal CSF stroke volume in shunted patients with idiopathic normal-pressure hydrocephalus.**

Scollato, A; Gallina, P; Gautam, B; Pellicanò, G; Cavallini, C; Tenenbaum, R; Di Lorenzo, N. *AJNR. American Journal of Neuroradiology*, 2009 Sep, 30(8):1580-6.; Department of Neurosurgery, University of Florence, Italy.

Aqueductal CSF stroke volume (ACSV) decreases in all patients in whom the ventricu-

loperitoneal shunt (VPS) system works properly, with the rate of ACSV decrease being higher in the patients who show clinical improvement. Postoperative ACSV increase suggests shunt malfunction. A precipitous drop of ACSV values after VPS may be the consequence of increased drainage and herald the occurrence of subdural fluid collection (SDFC).

**Repetitive lumbar punctures as treatment for normal pressure hydrocephalus.**

Lim, T S; Yong, S W; Moon, S Y. *European Neurology*, 2009, 62(5):293-7; Department of Neurology, Ajou University School of Medicine, Yeongtong-Gu, Suwon, South Korea.

Our study showed that some NPH patients could maintain favorable courses for at least one year after LP without shunt operation. Repeated LP could be an alternative treatment in selected NPH patients.

## BASIC SCIENCE

**A mathematical model of blood, cerebrospinal fluid and brain dynamics.**

Linninger, Andreas A; Xenos, Michalis; Sweetman, Brian; Ponkshe, Sukruti; Guo, Xiaodong; Penn, Richard. *Journal of Mathematical Biology*, 2009 Dec, 59(6):729-59; Laboratory for Product and Process Design (LPPD), Department of Bioengineering and Chemical Engineering, University of Illinois at Chicago, IL.

Using first principles of fluid and solid mechanics a comprehensive model of human intracranial dynamics is proposed. The compartmental model predicts intracranial pressure gradients, blood and CSF flows and displacements in normal and pathological conditions like communicating hydrocephalus.

**A novel mouse model reveals that polycystin-1 deficiency in ependyma and choroid plexus results in dysfunctional cilia and hydrocephalus.**

Wodarczyk, Claas; Rowe, Isaline; Chiaravalli, Marco; Pema, Monika; Qian, Feng; Boletta, Alessandra. *PLoS One*, 2009, 4(9):e7137; Dulbecco Telethon Institute (DTI) at Dibat, San Raffaele Scientific Institute, Milan, Italy.

We observed hydrocephalus formation both in the ubiquitous knock-out embryos and in newborn mice with conditional inactivation of the Pkd1 gene in the brain. We propose that the role of PC-1 in the brain cilia might be to prevent hydrocephalus, a previously unrecognized role for this receptor and one that might have important im-

plications for other genetic or sporadic diseases.

**Characterization of juvenile and young adult mice following induction of hydrocephalus with kaolin.**

Lopes, Luiza da Silva; Slobodian, Ili; Del Bigio, Marc R. *Experimental Neurology*, 2009 Sep, 219(1):187-96; Departamento de Cirurgia e Anatomia, Faculdade de Medicina de Ribeirão Preto, Universidade de São Paulo, Brazil.

Hydrocephalus induced by percutaneous injection of kaolin in juvenile and young adult mice is feasible. The associated periventricular alterations are essentially the same as those reported in rats of comparable ages.

**Congenital hydrocephalus associated with abnormal subcommissural organ in mice lacking huntingtin in Wnt1 cell lineages.**

Dietrich, Paula; Shanmugasundaram, Revathi; Shuyu, E; Dragatsis, Ioannis. *Human Molecular Genetics*, 2009 Jan 1, 18(1):142-50; Department of Physiology, University of Tennessee, Health Science Center, Memphis, TN.

Hydrocephalus in mice lacking htt in Wnt1 cell lineages is associated with increase in CSF production by the choroid plexus and abnormal subcommissural organ.

**Development of a theoretical framework for analyzing cerebrospinal fluid dynamics.**

Cohen B, Voorhees A, Vedel S, Wei T. *Cerebrospinal Fluid Res.* 2009 Sep 22;6:12; Mechanical, Aerospace and Nuclear Engineering, Rensselaer Polytechnic Institute, 110 8th Street, Troy, NY.

Control volume analysis provides a framework to guide the type and location of measurements, and a way to interpret the resulting data within a fundamental fluid physics analysis.

**Dissociation between vascular endothelial growth factor receptor-2 and blood vessel density in the caudate nucleus after chronic hydrocephalus.**

Deshpande, Abhishek; Dombrowski, Stephen M; Leichter, Anna; Krajcir, Natalie; Zingales, Nicholas; Inoue, Masahiro; Schenk, Soren; Fukamachi, Kiyotaka; Luciano, Mark G. *Journal of Cerebral Blood Flow and Metabolism, official journal of the International Society of Cerebral Blood Flow and Metabolism*, 2009 Nov, 29(11):1806-15; Department of Neurological Surgery, CSF

## HIGHLIGHTS IN HYDROCEPHALUS RESEARCH (continued)

*Physiology Laboratory, Neurological Institute, Cleveland Clinic, Cleveland, OH.*

Changes in cerebrospinal fluid ventricular volume and pressure, as well as in CBF did not correlate with either VEGFR-2 or BVD. These observed findings suggest that destructive forces may outweigh angiogenic forces and possibly show a disassociation between VEGFR-2 and BV expressions.

**Gray matter metabolism in acute and chronic hydrocephalus.** Kondziella, D; Eijolfsson, E M; Saether, O; Sonnewald, U; Risa, O. *Neuroscience*, 2009 Mar 17, 159(2):570-7; Department of Neuroscience, Norwegian University of Science and Technology, Trondheim, Norway.

If confirmed in humans, early detection of glutamatergic disturbances and lactate accumulation using in vivo(1)H MRS might serve as an indication for surgical treatment of hydrocephalus before irreversible neuronal damage develops.

**Intraventricular injection of antibodies to beta1-integrins generates pressure gradients in the brain favoring hydrocephalus development in rats.** Nagra, Gurjit; Koh, Lena; Aubert, Isabelle; Kim, Minhui; Johnston, Miles. *American Journal of Physiology. Regulatory, integrative and comparative physiology*, 2009 Nov, 297(5):R1312-21; Brain Sciences Program and Department of Laboratory Sunnybrook Health Sciences Centre, University of Toronto, Ontario, Canada.

We conclude that modulation/disruption of beta(1)-integrin-matrix interactions in the brain generates pressure gradients favoring ventricular expansion, suggesting a novel mechanism for hydrocephalus development.

**Low levels of amyloid-beta and its transporters in neonatal rats with and without hydrocephalus.** Deren, Kelley E; Forsyth, Jennifer; Abdullah, Osama; Hsu, Edward W; Klinge, Petra M; Silverberg, Gerald D; Johanson, Conrad E; McAllister, James P. *Cerebrospinal Fluid Research*, 2009, 6:4. Epub: 2009 May 26. Department of Neurosurgery, Division of Pediatric Neurosurgery, Primary Children's Medical Center and the University of Utah, Salt Lake City, UT.

Neonatal rats with and without hydrocephalus had low expression of Abeta and its transporters when compared to adult rats with hydrocephalus. No statistical differences were observed in Abeta and its

transporters between the control and hydrocephalic neonatal animals.

**Reissner's fibre proteins and p73 variations in the cerebrospinal fluid and subcommissural organ of hydrocephalic rat.** Carmona-Calero, E M; González-Marrero, I; González-Toledo, J M; Castañeyra-Ruiz, A; De Paz-Carmona, H; Castañeyra-Ruiz, L; Fernández-Rodríguez, P; Ruiz-Mayor, M L; Castañeyra-Perdomo, A. *Anatomia, Histologia, Embryologia*, 2009 Aug, 38(4):282-5; Departamento de Anatomía, Facultad de Medicina, Universidad de La Laguna, Tenerife, Islas Canarias, Spain.

Hydrocephalus produces a decrease in the secretions of the SCO and an absence of RF and a decrease in p73 and RF proteins in the CSF.

**Resonant and notch behavior in intracranial pressure dynamics.** Wagshul, Mark E; Kelly, Erin J; Yu, Hui Jing; Garlick, Barbara; Zimmerman, Tom; Egnor, Michael R. *J Neurosurg Pediatr*, 2009 May, 3(5):354-64; Department of Radiology, Stony Brook University, Stony Brook, NY.

This transfer function behavior is characteristic of a resonant notch system. This may represent a component of the intracranial Windkessel mechanism, which protects the microvasculature from arterial pulsatility. The impairment of this resonant notch system may play a role in the altered pulse pressure in conditions such as hydrocephalus and traumatic brain swelling. New models of intracranial dynamics are needed for understanding the frequency-sensitive behavior elucidated in these studies and could open a path for development of new therapies that are geared toward addressing the pulsation dysfunction in pathological conditions, such as hydrocephalus and traumatic brain injury, affecting ICP and flow dynamics.

**SCO-ping out the mechanisms underlying the etiology of hydrocephalus.** Huh, Michael S; Todd, Matthew A M; Picketts, David J. *Physiology (Bethesda, MD)*, 2009 Apr, 24:117-26; Regenerative Medicine Program, Ottawa Health Research Institute, Canada.

We review how altered development and function of the SCO and vel cells contributes to hydrocephalus.

**Sporadic obstructive hydrocephalus in Aqp4 null mice.** Feng, Xuechao; Papadopoulos, Marios C; Liu, Jun; Li, Lihua; Zhang, Di; Zhang

Hongguo; Verkman, A S; Ma, Tonghui. *Journal of Neuroscience Research*, 2009 Apr, 87(5):1150-5; Membrane Channel Research Laboratory and Key Laboratory for Applied Statistics of MOE, Northeast Normal University, Changchun, P.R. China.

Our studies establish Aqp4 deletion as a predisposing factor for the development of congenital obstructive hydrocephalus in mice. We suggest that AQP4 polymorphisms might also contribute to the development of aqueduct stenosis in humans.

**The morphology and biochemistry of nanostructures provide evidence for synthesis and signaling functions in human cerebrospinal fluid.** Harrington MG, Fonteh AN, Oborina E, Liao P, Cowan RP, McComb G, Chavez JN, Rush J, Biringier RG, Hühmer AF. *Cerebrospinal Fluid Res.* 2009 Sep 7;6:10; Molecular Neurology, Huntington Medical Research Institutes, Pasadena, CA.

Unique morphology and biochemistry features of abundant and discrete membrane-bound CSF nanostructures are described. Prostaglandin H synthase activity, essential for prostanoid production and previously unknown in CSF, is localized to nanospheres. Considering CSF bulk flow and its circulatory dynamics, we propose that these nanostructures provide signaling mechanisms via volume transmission within the nervous system that are for slower, more diffuse and of longer duration than synaptic transmission.

**The physics of hydrocephalus.** Penn, Richard D; Linninger, Andreas. *Pediatric Neurosurgery*, 2009, 45(3):161-74; Department of Surgery, University of Chicago, IL.

The complications and poor performance of shunts based on pressure-sensitive valves are explained and a system of feedback control is suggested as a solution.

**Ventricular dilation and elevated aqueductal pulsations in a new experimental model of communicating hydrocephalus.** Wagshul, M E; McAllister, J P; Rashid, S; Li, J; Egnor, M R; Walker, M L; Yu, M; Smith, S D; Zhang, G; Chen, J J; Benveniste, H. *Experimental Neurology*, 2009 Jul, 218(1):33-40; Department of Radiology, Health Science Center, Stony Brook University, Stony Brook, NY.

Aqueductal flow can be measured in the rat using high-field MRI and basal cistern-induced CH and is associated with an immediate change in CSF pulsatility. At the same

(Continued on page 8.)

## HIGHLIGHTS IN HYDROCEPHALUS RESEARCH (continued)

## BASIC SCIENCE (Continued)

time, our results highlight the complex nature of aqueductal pulsation and its relationship to ventricular dilation.

**Coupling poroelasticity and CFD for cerebrospinal fluid hydrodynamics.** Tully, Brett; Ventikos, Yiannis. *IEEE Transactions on Biomedical Engineering*, 2009 Jun, 56(6):1644-51; *Fluidics and Biocomplexity Group, Institute of Biomedical Engineering and Department of Engineering Science, University of Oxford, U.K.* Preliminary findings demonstrate clearly the importance that the fluidic-poroelastic coupling plays: ventricular enlargement is significantly smaller with local stenosis patterns and almost all of the observable pressure drop occurs across the stenosis.

**Haploinsufficiency of the murine polycomb gene *Suz12* results in diverse malformations of the brain and neural tube.** Miró, Xavier; Zhou, Xunlei; Boretius, Susann; Michaelis, Thomas; Kubisch, Christian; Alvarez-Bolado, Gonzalo; Gruss, Peter. *Disease Models & Mechanisms*, 2009 Jul-Aug, 2(7-8):412-8.; *Max Planck Institute of Biophysical Chemistry, Department of Molecular Cell Biology, Göttingen, Germany.*

Although the involvement of polycomb genes in human disease is starting to be recognized, this is the first demonstration of their role in nervous system malformations. Our work strongly suggests that brain malformations such as Chiari malformation (CM) can result from altered epigenetic regulation of genes involved in cell proliferation in the brain.

**Normal and hydrocephalic brain dynamics: the role of reduced cerebrospinal fluid reabsorption in ventricular enlargement.** Linninger, Andreas A; Sweetman, Brian; Penn, Richard. *Annals of Biomedical Engineering*, 2009 Jul, 37(7):1434-47. *Laboratory for Product and Process Design, Department of Bioengineering, University of Illinois at Chicago, IL.*

By increasing the value for reabsorption resistance in the subarachnoid villi, our model predicts that the poroelastic parenchyma matrix will be drained and the ventricles enlarge despite small transmantle pressure gradients during the transitional phase. The poroelastic simulation thus provides a plausible explanation on how reabsorption changes could be respon-

sible for enlargement of the ventricles without large transmantle pressure gradients.

## ETV

**A pediatric experience with endoscopic third ventriculostomy for hydrocephalus.** Bullivant, Kelly J; Hader, Walter; Hamilton, Mark. *Canadian Journal of Neuroscience Nursing*, 2009, 31(2):16-9; *Alberta Children's Hospital, Calgary, Canada.*

A case report comparing neurocognitive testing before and after ETV. An additional case report of a patient with a spontaneous third ventriculostomy will help illustrate our understanding of the natural history of hydrocephalus.

**Cine phase-contrast MR images failed to predict clinical outcome following ETV.** Di, Xiao; Ragab, M; Luciano, Mark G. *Canadian Journal of Neurological Sciences. Le journal canadien des sciences neurologiques*, 2009 Sep, 36(5):643-7; *Department of Neurological Surgery, Neurological Institute, Cleveland Clinic, OH.*

PC MRI cine flow failed to demonstrate significant differences between successful and failed ETV groups. This indicates in addition to achieving an adequate fenestration, CSF pathways beyond the basal cisterns around the brain stem and CMJ may play an essential role in achieving ETV success. Endoscopic options in children: experience with 134 procedures.

**Endoscopic options in children: experience with 134 procedures.** Oertel, Joachim M K; Baldauf, Joerg; Schroeder, Henry W S; Gaab, Michael R. *J Neurosurg Pediatr*, 2009 Feb, 3(2):81-9; *Department of Neurosurgery, Nordstadt Krankenhaus Hannover, Germany.*

Overall, endoscopy can be considered safe and effective in children. Based on the authors' data, acute hydrocephalus cases such as those caused by tumors are the best candidates for endoscopic CSF flow restoration. Interestingly, cyst openings to the ventricles or cisterns were the most successful endoscopic techniques with the lowest complication rate. Aqueductoplasty should be reserved for selected cases. Finally, the success rate of endoscopic techniques remains poor in infants <6 months of age; this was not only true of ETV, but also other techniques such as septostomy and aqueductoplasty.

**Endoscopic third ventriculostomy in the treatment of childhood hydrocephalus.** Kulkarni, Abhaya V; Drake, James M; Mallucci, Conor L; Sgouros, Spyros; Roth, Jonathan; Constantini, Shlomi; *Canadian Pediatric Neurosurgery Study Group. Journal of Pediatrics*, 2009 Aug, 155(2):254-9; *Hospital for Sick Children, Toronto, Ontario, Canada.*

Children most likely to succeed with ETV can now be accurately identified and spared the long-term complications of CSF shunting.

**Endoscopic third ventriculostomy versus ventriculo-peritoneal shunt in pediatric patients: a decision analysis.** Drake, James M; Kulkarni, Abhaya V; Kestle, John. *Child's Nervous System: ChNS : official journal of the International Society for Pediatric Neurosurgery*, 2009 Apr, 25(4):467-72; *Division of Neurosurgery, University of Toronto, Ontario, Canada.*

Age is a major determinant of outcome from CSF diversion with worse outcomes in young patients. QALY estimates for either ETV or shunt are similar at one year.

**Endoscopic third ventriculostomy: predicting outcome with phase-contrast MR imaging.** Stivaros, Stavros M; Sinclair, Deborah; Bromiley, Paul A; Kim, Jieun; Thorne, John; Jackson, Alan. *Radiology*, 2009 Sep, 252(3):825-32; *Department of Imaging Science, Wolfson Molecular Imaging Centre, University of Manchester, U.K.*

ETV induces changes in brain volume and cerebral blood flow (CBF) that can be predicted by using simple metrics. These pilot results support a formal trial of these techniques in a larger prospective study.

**Hemorrhagic complications of ventriculostomy placement: a meta-analysis.** Binz, Daniel D; Toussaint, L Gerard; Friedman, Jonathan A; *Neurocrit Care* 2009; 10(2):253-6. *Epub 2009 Feb 18; Departments of Surgery, Neuroscience and Experimental Therapeutics, Texas A&M Health Science Center College of Medicine, College Station, TX.*

The overall hemorrhage risk associated with ventriculostomy placement based on the existing literature is 5.7%. Clinically significant hemorrhage due to ventriculostomy is less than 1%.

**Neurocognitive outcome after endoscopic third ventriculocisternostomy in patients with obstructive hydrocephalus.** Lacy, Maureen; Oliveira, Martin; Austria, Emily; Frim, M David. *Journal of the International*

## HIGHLIGHTS IN HYDROCEPHALUS RESEARCH (continued)

*Neuropsychological Society : JINS, 2009 May, 15(3):394-8; Department of Psychiatry, University of Chicago Medical Center, IL.*

The present study revealed persistent cognitive inefficiencies in memory and executive domains in patients post-ETV intervention.

**Quality of life in obstructive hydrocephalus: endoscopic third ventriculostomy compared to cerebrospinal fluid shunt.** Kulkarni AV, Hui S, Shams I, Donnelly R. *Childs Nerv Syst. 2009 Aug 28; Divisions of Neurosurgery and Psychology, Hospital for Sick Children, Toronto, Ontario, Canada.*

This is the first study to provide a meaningful comparison of QOL after ETV and shunt in children. These preliminary results suggest that there is no obvious difference in QOL after ETV and shunt.

**The role of endoscopic third ventriculostomy in adult patients with hydrocephalus.** Jenkinson, Michael D; Hayhurst, Caroline; Al-Jumaily, Mohammed; Kandasamy, Jothy; Clark, Simon; Mallucci, Conor L. *J Neurosurg. 2009 May; 110(5):861-6; Department of Neurosurgery, Walton Centre for Neurology and Neurosurgery, Liverpool, U.K.*

The success rate of ETVs in adults is comparable, if not better, than in children. In addition to the well-defined role of ETV in the treatment of hydrocephalus caused by tumors and aqueduct stenosis, ETV may also have a role in the management of CM-I, LOVA, persistent shunt infection, and IVH resistant to other CSF diversion procedures.

**Long-term results of a second endoscopic third ventriculostomy in children: retrospective analysis of 40 cases.** Peretta, Paola; Cinalli, Giuseppe; Spennato, Pietro; Ragazzi, Paola; Ruggiero, Claudio; Aliberti, Ferdinando; Carlino, Christian; Cianciulli, Emilio. *Neurosurgery, 2009 Sep, 65(3):539-47; Department of Pediatric Neurosurgery, Regina Margherita Children's Hospital, Turin, Italy.*

A second ETV can be performed with a reasonable chance of restoring patency of the stoma and avoiding placement of an extrathecal shunt. Every effort should be made to detect subarachnoid adhesions in the cistern on preoperative imaging study to select potential candidates and avoid unnecessary procedures.

**The management of hydrocephalus in children with posterior fossa tumours: the role of**

**pre-resectional endoscopic third ventriculostomy.** Bhatia, Robin; Tahir, Mohammed; Chandler, Christopher L. *Pediatric Neurosurgery, 2009, 45(3):186-91; Department of Neurosurgery, Kings College Hospital, London, U.K.*

The use of pre-resectional ETV at this institution is an effective and safe procedure with a high success rate at up to 7.5 years of follow-up. We believe that all pediatric neurosurgical institutions should review their practice regarding hydrocephalus associated with posterior fossa tumors in the light of the controversy surrounding perioperative CSF diversion.

### PEDIATRIC

**External ventricular drains in pediatric patients.** Ngo, Quang N; Ranger, Adrianna; Singh, Ram N; Kornecki, Alik; Seabrook, Jamie A; Fraser, Douglas D. *Pediatr Crit Care Med. 2009 May; 10(3):346-51; Department of Paediatrics, University of Western Ontario, Canada.*

EVDs were placed for traumatic brain injury (TBI), ventriculoperitoneal shunt failure and new-onset hydrocephalus. The overall complication rate was 26%. Complication rates were similar in TBI and hydrocephalus patients, and with EVDs inserted in either the pediatric critical care unit (PCCU) or operating room (OR). Prophylactic antibiotics or antimicrobial-impregnated catheters directed against coagulase-negative Staphylococcus may reduce EVD infections.

**Risk factors of congenital hydrocephalus: a 10 year retrospective study.** Van Landingham, M; Nguyen, T V; Roberts, A; Parent, A D; Zhang, J. *Journal of Neurology, Neurosurgery, and Psychiatry, 2009 Feb, 80(2):213-7; Department of Neurosurgery, University of Mississippi Medical Center, Jackson, MS.*

A number of key risk factors have been identified to be strongly associated with the development of congenital hydrocephalus in an infant. The prevalence of familial patterns of inheritance for congenital hydrocephalus suggests a broader role for genetic factors in the pathogenesis of congenital hydrocephalus.

**Optic nerve sheath ultrasound in the assessment of paediatric hydrocephalus.** McAuley, David; Paterson, Anne; Sweeney, Louise. *Child's Nervous System : ChNS : official journal of the*

*International Society for Pediatric Neurosurgery, 2009 Jan, 25(1):87-90; Paediatric Neurosurgery, Royal Belfast Hospital for Sick Children, Belfast, Northern Ireland.*

Transorbital ultrasound is a reproducible, non-invasive technique for the assessment of optic nerve sheath diameter and is well tolerated in children. Our series revealed asymptomatic baseline value higher than in previous reports. Variation from individual case asymptomatic baseline was the most sensitive variable in the series in determining development of hydrocephalus. This technique is felt to be a useful adjunct in the assessment of hydrocephalus in the pediatric neurosurgical population.

**A review of the current treatment methods for posthaemorrhagic hydrocephalus of infants.** Shooman, David; Portess, Howard; Sparrow, Owen. *Cerebrospinal Fluid Research, 2009, 6:1. Department of Neurosurgery, Wessex Neurological Centre, Southampton General Hospital, U.K.*

Overall, there is still no definitive algorithm for the treatment of PHH or prevention of shunt dependence. New therapeutic approaches in neonatal care, including those aimed at pre-empting PHH, offer the best hope of improving neurodevelopmental outcomes.

**Abnormal optic disc and retinal vessels in children with surgically treated hydrocephalus.** Andersson, S; Hellström, A. *British Journal of Ophthalmology, 2009 Apr, 93(4):526-30; Department of Ophthalmology, The Queen Silvia Children's Hospital, Sahlgrenska University Hospital/Ostra, Göteborg, Sweden.*

Hydrocephalus is associated with subnormal optic disc and rim areas and an abnormal vascular pattern, indicating a pre/perinatal disturbance of the development of these structures. A promising finding is that the frequency of optic atrophy in the present study was lower than previously reported, most likely reflecting improved perinatal care and better regulation of the intracranial pressure.

**Addressing a folate imbalance in fetal cerebrospinal fluid can decrease the incidence of congenital hydrocephalus.** Cains, Sarah; Shepherd, Andrew; Nabiuni, Mohammad; Owen-Lynch, Penelope Jane; Miyan, Jaleel. *Journal of Neuropathology and Experimental*

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## HIGHLIGHTS IN HYDROCEPHALUS RESEARCH (continued)

**PEDIATRIC (Continued)**

Neurology, 2009 Apr, 68(4):404-16; Faculty of Life Sciences, University of Manchester, U.K. These results indicate the complexities of folate metabolism in the developing brain and suggest that folate imbalance leading to hydrocephalus in the hydrocephalic Texas rat fetuses can be treated with maternal folate supplementation, using specific folate metabolites and combinations thereof.

**Visual fixation in Chiari type II malformation.**

Salman, Michael S; Sharpe, James A; Lillakas, Linda; Dennis, Maureen; Steinbach, Martin J. *Journal of Child Neurology*, 2009 Feb, 24(2):161-5; Section of Pediatric Neurology, Children's Hospital, University of Manitoba, Winnipeg, Canada.

Chiari type II malformation is not associated with pathological square wave jerks or abnormal saccadic oscillations.

**Evaluation of the intellectual skill problems of hydrocephalic children: a clinical study.**

Bakar, Emel Erdoğan; Bakar, Bülent; Taner, Yasemen Işık; Akalan, Nejat Turk *Neurosurg. 2009 Jan; 19(1):29-35; Ufuk University, Psychology, Ankara, Turkey.*

Children with hydrocephalus have much more problems with their visuospatial perception, material organization and attention (especially encode, focused/execute attention and sustain attention); and these issues could produce adaptive problems in their social, cultural, behavioral and academic achievement.

**Predicting postresection hydrocephalus in pediatric patients with posterior fossa tumors.**

Riva-Cambrin, Jay; Detsky, Allan S; Lamberti-Pasculi, Maria; Sargent, Michael A; Armstrong, Derek; Moineddin, Rahim; Cochrane, D Douglas; Drake, James M. *Journal Neurosurg. Pediatr.* 2009 May; 3(5):378-85; Department of Neurosurgery, Primary Children's Medical Center, University of Utah, Salt Lake City, UT.

A patient's score on the Preoperative Prediction Rule for Hydrocephalus will allow improved patient counseling and surgical planning by identifying patients at high risk of developing postresection hydrocephalus. These patients might selectively be exposed to the risks of pre-resection CSF diversion to improve outcome.

**Neuropsychological assessment of attention in children with spina bifida.** Vinck, Anja;

Mullaart, Reinier; Rottevel, Jan; Maassen, Ben. *Cerebrospinal Fluid Research*, 2009, 6:6; Department of Medical Psychology, Radboud University Nijmegen Medical Centre, Netherlands.

Assessment of attention functions in children with SBM (SBM: spina bifida with myelomeningocele with accompanying hydrocephalus) by traditional tests may be misleading, because this paediatric population with complex cerebral malformations has difficulty with the cognitive and visual-motor requirements. To control for these interactions, the use of both traditional and computerized attention tests is recommended.

**A multicenter retrospective comparison of conversion from temporary to permanent cerebrospinal fluid diversion in very low birth weight infants with posthemorrhagic hydrocephalus.** Wellons, John C; Shannon, Chevis N; Kulkarni, Abhaya V; Simon, Tamara D; Riva-Cambrin, Jay; Whitehead, William E; Oakes, W Jerry; Drake, James M; Luerssen, Thomas G; Walker, Marion L; Kestle, John R W; *Hydrocephalus Clinical Research Network; Journal Neurosurg. Pediatr.* 2009 Jul; 4(1):50-5; Section of Pediatric Neurosurgery, Children's Hospital of Alabama, Division of Neurosurgery, University of Alabama at Birmingham, AL.

The use of intermittent tapping of ventricular reservoirs in this population appears to lead to a lower incidence of permanent shunt placement than the use of VSG shunts. The incidence of infection during temporization and for the initial six months after conversion appears comparable for both groups.

**L1CAM mutation in association with X-linked hydrocephalus and Hirschsprung's disease.**

Jackson, Sha-Ron; Guner, Yigit S; Woo, Russell; Randolph, Linda M; Ford, Henri; Shin, Cathy E. *Pediatric Surgery International*, 2009 Sep, 25(9):823-5; Department of Pediatric Surgery, Children's Hospital Los Angeles; Keck School of Medicine, University of Southern California, Los Angeles, CA.

The association of HSCR with XLH in the presence of L1CAM mutations remains quite interesting because cell adhesion molecules are involved in the proper migration of neural components throughout the body.

**Functional outcomes among premature infants with intraventricular hemorrhage.** Vassilyadi, Michael; Tataryn, Zachary; Shamji,

Mohammed F; Ventureyra, Enrique C G. *Pediatric Neurosurgery*, 2009, 45(4):247-55; Division of Neurosurgery, Children's Hospital of Eastern Ontario, Ottawa, Canada.

This study describes a large cohort of neonatal IVH, describing how disease severity affects mortality and functional outcome. The overall mortality of nearly 1 in 5 patients is primarily of grade IV patients, with no difference between grade II and grade III. Further, patients surviving their hydrocephalus exhibited no worse functional deterioration if they required surgical intervention.

**Anisotropic diffusion properties in infants with hydrocephalus: a diffusion tensor imaging study.**

Yuan, W; Mangano, F T; Air, E L; Holland, S K; Jones, B V; Altaye, M; Bierbrauer, K. *AJNR. American Journal of Neuroradiology*, 2009 Oct, 30(9):1792-8; Department of Radiology, Cincinnati Children's Hospital Medical Center and University of Cincinnati College of Medicine, Cincinnati, OH.

This retrospective diffusion tensor imaging (DTI) study demonstrated significant white matter (WM) abnormalities in infants with hydrocephalus in both the corpus callosum and internal capsule. The results also showed evidence that the impact of hydrocephalus on WM was different in the corpus callosum and internal capsule.

**Prioritizing neurosurgical education for pediatricians: results of a survey of pediatric neurosurgeons.**

Aldana, Philipp R; Steinbok, Paul. *J Neurosurg Pediatr*, 2009 Oct, 4(4):309-16; Lucy Gooding Pediatric Neurosurgery Center, University of Florida-Jacksonville, FL.

This survey identified what practicing pediatric neurosurgeons perceive to be the most important knowledge deficits of their colleagues in pediatrics. These perceptions may not necessarily be congruent with the perceptions of practicing pediatricians themselves; nevertheless, the data from this survey may serve to inform conversations between neurosurgeons and planners of continuing medical education for pediatricians, pediatrics residency program directors and medical school pediatrics faculty.

**Sensitivity of papilledema as a sign of shunt failure in children.**

Nazir, Sayeda; O'Brien, Mark; Qureshi, Nazer H; Slape, Lamonda; Green, T J; Phillips, Paul H.; *Journal of AAPOS* 2009 Feb; 13(1):63-6. *Epub* 2008 Nov 20; Department of Ophthalmology, University

## HIGHLIGHTS IN HYDROCEPHALUS RESEARCH (continued)

of Arkansas for Medical Sciences, Little Rock, AR.

Papilledema is not a sensitive sign of shunt failure. Even children with severe elevations in intracranial pressure from shunt malfunction may have flat optic disks. Therefore, physicians that evaluate children with shunts should be aware that a normal optic disk does not preclude shunt malfunction.

**The pediatric neurosurgical patient: the challenge of growing up.** ReKate, Harold L. *Seminars in Pediatric Neurology*, 2009 Mar, 16(1):2-8; Division of Neurological Surgery, Barrow Neurological Institute, St. Joseph's Hospital and Medical Center, Phoenix, AZ.

This article explores the causes of these difficulties, which are not uniform across geographic areas, and the need for and challenges of planning the transition of care of pediatric neurosurgical patients from pediatric neurosurgeons to general or adult neurosurgical practices.

**Upper limb motor function in young adults with spina bifida and hydrocephalus.** Dennis M, Salman MS, Jewell D, Hetherington R, Spiegler BJ, MacGregor DL, Drake JM, Humphreys RP, Gentili F. *Childs Nerv Syst*. 2009 Nov;25(11):1447-53; Program in Neurosciences & Mental Health, The Hospital for Sick Children, Toronto, Ontario, Canada.

Young adults with SBM have significant limitations in upper limb function and are more disrupted by some challenges while performing upper limb motor tasks. Within the group of young adults with SBM, upper spinal lesions compromise motor independence more than lower spinal lesions.

**Ventricular reservoirs and ventriculoperitoneal shunts for premature infants with posthemorrhagic hydrocephalus: an institutional experience.** Willis, Brian; Javalkar, Vijayakumar; Vannemreddy, Prasad; Caldito, Gloria; Matsuyama, Junko; Guthikonda, Bharat; Bollam, Papireddy; Nanda, Anil. *J Neurosurg Pediatr*, 2009 Feb, 3(2):94-100; Department of Neurosurgery, Louisiana State University Health Sciences Center-Shreveport, LA.

Birth weight and age are useful parameters in decision making. Preterm neonates with low birth weights benefit from initial CSF drainage procedures followed by permanent CSF diversion with respect to the number of shunt revisions.

**On the changing epidemiology of hydrocephalus.** Massimi, Luca; Paternoster, Giovanna; Fasano, Teresa; Di Rocco, Concezio. *Child's Nervous System : ChNS : official journal of the International Society for Pediatric Neurosurgery*, 2009 Jul, 25(7):795-800; Paediatric Neurosurgery-Institute of Neurosurgery, Rome, Italy.

The present study confirmed data from the literature about the declined incidence of paediatric hydrocephalus, which mainly results from the decrease of congenital malformations. In spite of the recent advances in neuroendoscopy and in the shunting valve design, the impact of hydrocephalus in the paediatric neurosurgical practice remains high.

## SHUNT

**Accuracy of percutaneous placement of a ventriculoatrial shunt under ultrasonography guidance: a retrospective study at a single institution.** Metellus, Philippe; Hsu, Wesley; Kharkar, Siddharth; Kapoor, Sumit; Scott, William; Rigamonti, Daniele. *Journal of Neurosurgery*, 2009 May, 110(5):867-70; Departments of Neurosurgery, Johns Hopkins Hospital, Baltimore, MD.

Percutaneous placement of a VA shunt under preoperative radiographic guidance and ultrasonographic monitoring is a safe, effective and reliable technique that is simple to learn.

**Acute ventriculoperitoneal shunt malfunction following opening of the spinal subarachnoid space: a case series.** Tubbs, R Shane; Pugh, Jeffrey; Acakpo-Satchivi, Leslie; Wellons, John C; Blount, Jeffrey P; Oakes, W Jerry. *Child's Nervous System*: 2009 May, 25(5):599-600; Section of Pediatric Neurosurgery, Children's Hospital, Birmingham, AL.

We theorize that the siphoning effect caused from cerebrospinal fluid egress from the opened spinal subarachnoid space resulted in acute shunt failure. Such alterations in cerebrospinal fluid flow may precipitate complete failure of a shunt that is functioning suboptimally. Clinicians should be aware that spinal procedures that violate the subarachnoid space in shunted hydrocephalic patients may result in acute shunt failure. These patients may warrant more careful observation in the early postoperative period, particularly as shunt failure may compromise spinal wound closures.

**Comparison of shunt infection incidence in high-risk subgroups receiving antibiotic-impregnated versus standard shunts.** Parker, Scott L; Attenello, Frank J; Sciubba, Daniel M; Garces-Ambrossi, Giannina L; Ahn, Edward; Weingart, Jon; Carson, Benjamin; Jallo, George I. *Child's Nervous System* 2009 Jan, 25(1):77-83; Department of Neurosurgery, Johns Hopkins Hospital, Baltimore, MD.

The introduction of AIS catheters into our institutional practice has reduced the incidence of shunt infection in pediatric populations at highest risk for infection. AIS catheters are effective instruments to prevent peri-operative colonization of CSF shunt components.

**Development of pulmonary hypertension in adults after ventriculoatrial shunt implantation.** Kluge, Stefan; Baumann, Hans Jorg; Regelsberger, Jan; Kehler, Uwe; Koziej, Barbara; Klose, Hans; Greinert, Ulf; Kreymann, Georg; Meyer, Andreas. *Respiration; International Review of Thoracic Diseases*, 2009, 78(1):30-5; Department of Respiratory Medicine, University Medical Center, Hamburg-Eppendorf, Germany.

Severe pulmonary hypertension can develop in adult patients with VA shunts. Therefore, clinicians should consider pulmonary hypertension as a potential cause for respiratory symptoms in patients who have received VA shunts.

**Experiences with a gravity-assisted valve in hydrocephalic children. Clinical article.** Haberl, Ernst Johannes; Messing-Juenger, Martina; Schuhmann, Martin; Eymann, Regina; Cedzich, Cornelia; Fritsch, Michael J; Kiefer, Michael; Van Lindert, Eric Johannes; Geyer, Christian; Lehner, Markus; Rohde, Veit; Stroux, Andrea; von Berenberg, Petra. *J Neurosurg Pediatr*, 2009 Sep, 4(3):289-94; SAB Pädiatrische Neurochirurgie der Charité-Universitätsmedizin, Berlin, Germany.

Compared with nongravitational shunt designs, a GAV does not substantially affect the early complication rate. Valve-preserving shunt revisions do not increase the risk of subsequent valve failure and therefore should not be defined as an end point in studies on valve design. A significant impact of any well-established valve design on the early complication rate in shunt surgery is not supported by any current data; therefore, this correlation should be dismissed. As overdrainage-related complications have been shown to occur late, the

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## HIGHLIGHTS IN HYDROCEPHALUS RESEARCH (continued)

**SHUNT** (Continued)

presumed advantages of a pediatric GAV remain to be shown in a long-term study.

**First experiences with an adjustable gravitational valve in childhood hydrocephalus.**

Rohde, Veit; Haberl, Ernst-Johannes; Ludwig, Hans; Thomale, Ulrich-W. *J Neurosurg Pediatr*, 2009 Feb, 3(2):90-3; Department of Neurosurgery, Georg-August University, Goettingen, Germany.

With an overall success rate of 88.7%, the first experiences with the ProGAV in childhood hydrocephalus are promising and justify its further use in the pediatric population.

**Gravitational valves in supine patients with ventriculo-peritoneal shunts.**

Deininger, Martin H; Weyerbrock, Astrid. *Acta Neurochirurgica*, 2009 Jun, 151(6):705-9; Department of Neurosurgery, University of Freiburg Medical School, Freiburg, Germany.

In the subgroup of bedridden patients with ventriculo-peritoneal shunts and gravitational valves, upright posture is a prerequisite for proper cerebrospinal fluid drainage.

**Hydrocephalus in posterior fossa lesions: ventriculostomy and permanent shunt rates by diagnosis.**

Mangubat, Erwin Zeta; Chan, Michael; Ruland, Sean; Roitberg, Ben Zion. *Neurological Research*, 2009 Sep, 31(7):668-73; Department of Neurosurgery, Rush University Medical Center, Chicago, IL.

Acute primary posterior fossa hemorrhage has the highest rate of ventriculostomy for acute hydrocephalus and highest inpatient mortality, but a surprisingly low rate of permanent shunt-dependency. When hydrocephalus was caused by a neoplasm, there was a higher rate of permanent shunt placement.

**Infection rate with application of an antibiotic-impregnated catheter for shunt implantation in children - a retrospective analysis.**

Eymann, R; Steudel, W-I; Kiefer, M. *Klinische Padiatrie*, 2009 Mar-Apr, 221(2):69-73; Department of Neurosurgery, Saarland University, Homburg/Saar, Germany.

An antibiotic impregnated shunt-catheter (AIS) can reduce the incidence of shunt infections in children.

**Infection rates following initial cerebrospinal fluid shunt placement across pediatric hospitals in the United States. Clinical article.**

Simon, Tamara D; Hall, Matthew; Riva-Cambria, Jay; Albert, J Elaine; Jeffries, Howard E; Lafleur, Bonnie; Dean, J Michael; Kestle, John R W; Hydrocephalus Clinical Research Network. *J Neurosurg Pediatr*, 2009 Aug, 4(2):156-65; Divisions of Inpatient Medicine, University of Utah, Salt Lake City, UT.

Infections developed in > 11% of children who underwent uncomplicated initial CSF shunt placements within 24 months. Patient, hospital, and surgeon factors contributed somewhat to the wide variation in CSF shunt infection rates across hospitals.

**Laparoscopically assisted peritoneal shunt insertion for hydrocephalus.**

Sekula, Raymond F; Marchan, Edward M; Oh, Michael Y; Kim, D Kyle; Frederickson, Andrew M; Pelz, Geoffrey; Uchal, Miro. *British Journal of Neurosurgery*, 2009 Aug, 23(4):439-42; Department of Neurosurgery, Allegheny Neuroscience Institute, Allegheny General Hospital, Drexel University, College of Medicine, Pittsburgh, PA.

Laparoscopic placement of peritoneal shunts is safe and efficacious. It provides visualization of the distal catheter target. Moreover, it reduces the risk of visceral complications, CSF pseudocysts, or extraperitoneal placement of the catheter. In the future, laparoscopic placement of the peritoneal portion of the catheter may become a standard treatment in those patients requiring placement of a peritoneal catheter.

**Laparoscopic-assisted placement of ventriculo-peritoneal shunt tips in children with multiple previous open abdominal ventriculo-peritoneal shunt surgeries.**

Johnson, B W; Pimpalwar, A. *European Journal of Pediatric Surgery*, 2009 Apr, 19(2):79-82; Department of Otolaryngology, Head and Neck Surgery, Childrens Hospital Missouri Healthcare, Columbia, MO.

Laparoscopic placement of the peritoneal portion of a ventriculo-peritoneal shunt can be done safely and effectively in children with multiple previous VPS revisions due to improved visualization and placement of the shunt tip in a virgin area of the abdomen. Additionally, any known or unknown complications from previous VPS surgeries can be corrected with the laparoscopic approach. When combined with the reduction in pain, shorter hospital stay, and fewer immediate and future complications,

this is the procedure of choice for patients requiring revision VPS surgeries in our hospital.

**Management of a locked Strata valve.**

Bullivant, Kelly J; Mitha, Alim P; Hamilton, Mark G. *J Neurosurg Pediatr*, 2009 Apr, 3(4):340-3; Division of Neurosurgery, Foothills Medical Centre and Alberta Children's Hospital, University of Calgary, Alberta, Canada.

A known but rare complication of the Strata valve is that the rotor can become locked, causing shunt malfunction. This complication can only occur in a first generation Strata valve.

**Perioperative risk factors for short term shunt revisions in adult hydrocephalus patients.**

Farahmand, D; Hilmarsson, H; Högfeldt, M; Tisell, M. *Journal of Neurology, Neurosurgery, and Psychiatry*, 2009 Nov, 80(11):1248-53; Hydrocephalus Research Unit, Institute of Neuroscience and Physiology, Sahlgrenska Academy, Göteborg University, Sweden.

Right frontal placement of the ventricular catheter was associated with the lowest rate of revisions. Adjustable valves were associated with a lower risk for shunt revision. Shunt revision rates did not differ between ventriculoperitoneal and ventriculoatrial shunts.

**Postoperative cerebrospinal fluid wound leakage as a predictor of shunt infection: a prospective analysis of 205 cases. Clinical article.**

Jeelani, N U Owase; Kulkarni, Abhaya V; Desilva, Pani; Thompson, Dominic N P; Hayward, Richard D. *Journal Neurosurg Pediatr*, 2009 Aug, 4(2):166-9; Department of Neurosurgery, Great Ormond Street Hospital, London, U.K.

The presence of a perioperative CSF leak puts pediatric patients at a very high risk of shunt infection.

**Radionuclide shunt patency study for evaluation of suspected ventriculoperitoneal shunt malfunction in adults with normal pressure hydrocephalus.**

Kharkar, Siddharth; Shuck, John; Kapoor, Sumit; Batra, Sachin; Williams, Michael A; Rigamonti, Daniele. *Neurosurgery*, 2009 May, 64(5):909-16; Department of Neurology, Johns Hopkins University School of Medicine, Adult Hydrocephalus Program, Baltimore, MD.

Shunt patency studies are very useful for evaluation of shunt patency. Their results can be interpreted using a single-variable (T(1/2)) algorithm. Patients most likely to

## HIGHLIGHTS IN HYDROCEPHALUS RESEARCH (continued)

respond to a revision surgery are those who had a good response to original placement of a ventriculoperitoneal shunt.

**Shunt-dependent hydrocephalus after aneurysmal subarachnoid hemorrhage: incidence, predictors, and revision rates. Clinical article.** O'Kelly, Cian J; Kulkarni, Abhaya V; Austin, Peter C; Urbach, David; Wallace, M Christopher. *Journal of Neurosurgery*, 2009 Nov, 111(5):1029-35; Division of Neurosurgery, Toronto Western Hospital, Ontario, Canada.

Shunt-dependent hydrocephalus affects a significant proportion of subarachnoid hemorrhage survivors, contributing to additional morbidity among these patients. Shunt failures occur less frequently in patients who underwent treatment for a ruptured aneurysm than with other forms of hydrocephalus. Most failures occur within six months, suggesting that shunt dependency may be transient in the majority of patients.

**The prevalence of shunt-treated hydrocephalus: a mathematical model.** Stein, Sherman C; Guo, Wensheng. *Surgical Neurology*, 2009 Aug, 72(2):131-7; Department of Neurosurgery, University of Pennsylvania School of Medicine, Philadelphia, PA.

The model gives a comprehensive view of the prevalence of shunt-treated hydrocephalus in both children and adults from 1955 to the present. This model may prove useful in predicting resource use and needs for patients with hydrocephalus.

**The safety of laparoscopy in pediatric patients with ventriculoperitoneal shunts.** Fraser, Jason D; Aguayo, Pablo; Sharp, Susan W; Holcomb III, George W; Ostlie, Daniel J; St Peter, Shawn D. *Journal of Laparoendoscopic & Advanced Surgical Techniques. Part A*, 2009 Oct, 19(5):675-8; Department of Surgery, The Children's Mercy Hospital, Kansas City, MO.

Our data suggest that laparoscopy is safe in patients with ventriculoperitoneal shunts. The ventriculo-gallbladder shunt in the treatment of refractory hydrocephalus: a review of the current literature.

**The ventriculo-gallbladder shunt in the treatment of refractory hydrocephalus: a review of the current literature.** Girotti, Micah E; Singh, R Ramesh; Rodgers, Bradley M. *The*

*American Surgeon*, 2009 Aug, 75(8):734-7; University of Virginia, Charlottesville, VA.

Based on durability and a low incidence of complications, it is the current consensus that VGB shunts are a viable alternative with good outcomes in the case of failed VP shunts.

**Ultrasound guidance for distal insertion of ventriculo-atrial shunt catheters: technical note.** Sheth, Sameer A; McGirt, Matthew; Woodworth, Graeme; Wang, Paul; Rigamonti, Daniele. *Neurological Research*, 2009 Apr, 31(3):280-2; David Geffen School of Medicine at the University of California, Los Angeles Los Angeles, CA.

The utilization of ultrasound guidance for distal VA shunt catheter insertion may increase comfort with this procedure and ultimately decrease complication rate and operative time.

**Lumboperitoneal shunt placement using computed tomography and fluoroscopy in conscious patients.** Nakajima, Madoka; Bando, Kuniaki; Miyajima, Masakazu; Arai, Hajime. *Journal of Neurosurgery*, 2009 Sep, 111(3):618-22; Department of Neurosurgery, Juntendo University, Tokyo, Japan.

This procedure is less invasive than conventional lumboperitoneal shunt insertion and could be performed as an outpatient surgery for treatment of idiopathic normal-pressure hydrocephalus.

**Posthemorrhagic hydrocephalus in newborns: clinical characteristics and role of ventriculoperitoneal shunts.** Lee, Inn-Chi; Lee, Hong-Shen; Su, Pen-Hua; Liao, Wen-Jui; Hu, Jui-Ming; Chen, Jia-Yun. *Pediatr Neonatol*, 2009 Feb, 50(1):26-32; Department of Pediatrics, Chung-Shan Medical University Hospital, Taichung, Taiwan.

Patients who were shunt-dependent had worse neurodevelopmental outcomes and greater mortality than those without shunts. The results appeared to depend on how far the hydrocephalus had progressed and on the degree of IVH, but the necessity of VP shunts requires re-evaluation before they are implanted.

**Prediction of ventriculoperitoneal shunt dependency in patients with aneurysmal subarachnoid hemorrhage.** Chan, Michael; Alaraj, Ali; Calderon, Mateo; Herrera, Sebastian Ramon; Gao, Weihua; Ruland, Sean; Roitberg, Ben Zion. *Journal of Neurosurgery*,

2009 Jan, 110(1):44-9; Department of Neurosurgery, University of Illinois at Chicago, IL.

A failure risk index (FRI) score created by discriminant function analysis can predict whether or not a permanent shunt is required, even if separate factors are not in agreement with each other or show a weak correlation when considered separately. An increased FRI score was strongly and linearly correlated with the risk of EVD challenge failure. A prospective study is necessary to validate the FRI.

**Shortening of ventricular shunt catheter associated with cranial growth: effect of the frontal and parieto-occipital access route on long-term shunt patency.** Nakahara, Kuniaki; Shimizu, Satoru; Utsuki, Satoshi; Suzuki, Sachio; Oka, Hidehiro; Yamada, Masaru; Kan, Shinichi; Fujii, Kiyotaka. *Child's Nervous System: ChNS: official journal of the International Society for Pediatric Neurosurgery*, 2009 Jan, 25(1):91-4; Department of Neurosurgery and Radiology, Kitasato University School of Medicine, Kanagawa, Japan.

This study documents that insertion of the ventricular catheter via the frontal route in children resulted in a higher incidence of shortening due to greater displacement of the burr hole adjacent to the coronal suture. Therefore, we recommend that the parieto-occipital route be used to maintain long-term shunt function.

**Shunt implantation in a special sub-group of post-traumatic hydrocephalus—patients have normal intracranial pressure without clinical representations of hydrocephalus.** Wen, L; Wan, S; Zhan, R Y; Li, G; Gong, J B; Liu, W G; Yang, X F. *Brain Injury: BI*, 2009 Jan, 23(1):61-4; Department of Neurosurgery, First Affiliated Hospital, College of Medicine, Zhejiang University, PR China.

Although the effect was not definitively established, many patients in the sub-group of post-traumatic hydrocephalus (PTH) patients described here would benefit from shunt placement, especially when they simultaneously have large cranial defects after surgical decompression and underwent cranioplasties after shunt placement. Additionally, younger patients and those with less severe hydrocephalus before shunt placement may expect a better outcome after shunt placement.

(Continued on page 14.)

## HIGHLIGHTS IN HYDROCEPHALUS RESEARCH (continued)

## OTHER

**A contemporary definition and classification of hydrocephalus.** *Rekate, Harold L. Seminars in Pediatric Neurology, 2009 Mar, 16(1):9-15; Department of Pediatric Neurosurgery, Barrow Neurological Institute, Phoenix, AZ.*

This review proposes the following definition for hydrocephalus: hydrocephalus is an active distension of the ventricular system of the brain related to inadequate passage of CSF from its point of production within the ventricular system, to its point of absorption into the systemic circulation. Based on this definition (potential points of flow restriction) and on the view of the CSF system as a hydraulic circuit, a classification system is proposed. The acceptance of this proposed definition and classification schema would allow clinicians and basic scientists to communicate effectively, to share information and results, and to develop testable hypotheses.

**Evaluation of radionuclide cerebrospinal fluid scintigraphy as a guide in the management of patients with hydrocephalus.** *Feng, Fang; Fu, Hong Liang; Li, Jia Ning; Zhou, Ren Jian; Gui, Zhen Hui; Wu, Jing Chuan; Wang, Hui. Clinical Imaging, 2009 Mar-Apr, 33(2):85-9; Department of Nuclear Medicine,*

*Xin Hua Hospital, Shanghai Jiao Tong University School of Medicine, Shanghai, China.*

RCFS can definitely differentiate obstructive hydrocephalus from communicating hydrocephalus and had significance as a guide in the treatment of patients with hydrocephalus.

**Frequency of sustained intracranial pressure elevation during treatment of severe intraventricular hemorrhage.** *Ziai, Wendy C; Torbey, Michel T; Naff, Neal J; Williams, Michael A; Bullock, Ross; Marmarou, Anthony; Tuhim, Stanley; Schmutzhard, Eric; Pfäusler, Bettina; Hanley, Daniel F. Cerebrovascular Diseases (Basel, Switzerland), 2009, 27(4):403-10; Department of Neurology, Johns Hopkins University School of Medicine, Baltimore, MD.*

In the intensive care unit, initial ICP measured with an EVD was uncommonly elevated (1/11 patients) in this group of severe IVH patients despite acute obstructive hydrocephalus. Frequent monitoring reveals ICP elevation >20 mm Hg in 14% of observations during use of EVD. ICP elevation, though it can occur, is not routinely associated with external ventricular drain (EVD) closure for thrombolytic treatment with UK.

**Headaches in patients with shunts.** *Rekate, Harold L; Kranz, Dory. Seminars in Pediatric Neurology, 2009 Mar, 16(1):27-30; Barrow Neurologic Institute, University of Arizona, College of Medicine, Phoenix, AZ.*

It is likely that this population has a higher incidence of severe headaches than normal populations. The cost of management of headaches in this population is very high, and the patients are at risk throughout life. Early treatment decisions have a significant effect on later quality of life. Strategies that lead to normalization of cerebrospinal fluid dynamics, and life without shunt dependency are justified if they can be shown to improve later quality of life.

**Intraventricular fibrinolysis and lumbar drainage for ventricular hemorrhage.** *Staykov, Dimitre; Huttner, Hagen B; Struffert, Tobias; Ganslandt, Oliver; Doerfler, Arnd; Schwab, Stefan; Bardutzky, Juergen. Stroke; a Journal of Cerebral Circulation, 2009 Oct, 40(10):3275-80; Department of Neurology, University of Erlangen, Germany.*

In patients with secondary intraventricular hemorrhage and posthemorrhagic hydrocephalus, the combined treatment approach of IVF and early LD is safe and feasible, avoids EVD exchange, and may markedly reduce the need for shunt surgery. ❖

## WHAT OUR MEDICAL ADVISORY BOARD IS SAYING ABOUT THE RESEARCH INITIATIVE

*"The Mentored Young Investigator awards are meant to encourage young investigators to pursue research in hydrocephalus. We have had an excellent response to the first request for proposals, including some investigators previously unknown in the hydrocephalus community. We are hopeful that this will stimulate young scientists to stay involved in hydrocephalus research. This program is off to an exciting and encouraging start."*

Marion L. Walker, MD

*"The Hydrocephalus Association has correctly judged how desperately those of us who work with hydrocephalus and those of us who live with*

*hydrocephalus need some new ideas. The Mentored Young Investigator grants program has rubbed the lamp, and new ideas have appeared. I am hugely chuffed by the privilege of working with such a visionary organization."*

Joe Piatt, Jr., MD

*"For most of us, one of the most important events in our lives relates to the identification of a role model who supports and directs us to the path that we will follow. The Hydrocephalus Young Investigator award is a unique opportunity to cement this link between an energetic young thinker with an established role model and investigator."*

Harold Rekate, MD

*"Great process – some surprising new ideas in the applications. Congratulations."*

John Kestle, MD

*"The Mentored Young Investigator grants fill a critical void in advancing hydrocephalus research and attracting promising new investigators to the field. The Hydrocephalus Association should be congratulated wholeheartedly on this effort, which surely will have a major impact on promoting better treatments for this disorder."*

James P. (Pat) McAllister II, PhD

❖

## EXPECT THE BEST FOR YOUR CHILD: High expectations have rich rewards

By Carolyn Anderson\*

Having high expectations is not an easy path to follow when raising a child with a disability. It requires challenging yourself, your child and others to do more than assume that a disability limits a child. But choosing the path of high expectations is worthwhile, because it improves a child's life.

Learn to challenge your expectations. Parents have dreams and hopes for their children even before they are born or adopted. When we discover, sometime suddenly, sometimes slowly, that our child has a disability, our dreams and hopes may have to change. We don't have to expect less, but we may need to expect something different than what we had imagined. As one mother said, "I don't make assumptions now. I am more conscious of my hopes and dreams for all my children."

Parents can choose how they react to the "world of disability." At PACER, we see many different parent reactions. Reactions may be affected by one's culture, family values, personality, education, economic status, learning style, health or self-esteem. But these factors need not define what we do. We can make choices. We can't control the circumstances that affect our lives, but we can control how we react to those circumstances.

For example, I was a very shy person until I became the parent of a child with disabilities. I decided to overcome my shy-

ness so that I could better advocate for my child. This has not been easy, as shyness is part of my personality. But I made a decision that speaking up on behalf of my child was important enough for me to make this fundamental change. People who know me now have no idea what a shy, reserved person I used to be!

So why did I think I had to speak up for my child? Like most parents, I knew nothing about my child's disability. Once the disability was diagnosed, I read everything I could find and talked to everyone who seemed to know anything about it. I learned that there were conflicting views on how to deal with this disability. One method of educating and rearing a child with this disability was popular with the school system. After considering that method and my own vision for my son, I decided that it was not appropriate for him. I would need to advocate for something different, if I wanted my child to achieve the dreams I had for him.

I decided to challenge myself to speak up, rather than sit back and be quiet. It wasn't easy and it took a number of years before I was comfortable in my new role. But it was worthwhile. My son has done more than I had ever envisioned.

Virginia Richardson, PACER's director of parent training, wanted her child with a cognitive disability to be a reader, so she expected the school to teach reading. There were reading goals on every educational plan. She read to her child, encouraged her to read at home, made sure she saw others read and gave her

books on topics that interested her. She framed her vision. Reading does not usually just happen; this parent used strategies to help make it happen. Her child learned to read newspapers for pleasure and information.

While there is no guarantee that a vision will be realized, parents are responsible for making an effort. Every child's life is enriched by working toward goals. Stay committed to your dreams for your child, work with others and keep in tune with your child's changing needs.

Maintaining high expectations can be difficult but worthwhile. This is what some parents have told us:

- "It's been the biggest challenge of my life and I know we're not through. It's been a challenge to be the best advocate I can be for my child and still keep myself sane!"
- "I can honestly say I don't stay up late at night worrying about my fears anymore. If my expectations have changed in any way, they have only become bigger, wider and more grandiose."
- "My son is going to teach us a lot more in life than we will ever be able to teach him." ❖

\*Carolyn Anderson is an advocate for the PACER Center, an organization dedicated to enhancing opportunities for children and young adults with disabilities. This article is excerpted from the PACER booklet, "High Expectations." For more information, visit: [www.pacer.org](http://www.pacer.org).

### WALK 2009 Locations



Birmingham, AL  
Phoenix, AZ  
Fresno, CA  
Oroville, CA  
San Francisco, CA  
Denver, CO  
Tampa, FL  
Chicago, IL  
Boston, MA  
Cambridge, MA  
Baltimore, MD  
Detroit, MI

St. Louis, MO  
Long Branch, NJ  
Washington Township, NJ  
Albuquerque, NM  
Albany, NY  
Long Island, NY  
Graham, NC  
Cleveland, OH  
Philadelphia, PA  
San Antonio, TX  
Salt Lake City, UT

## WE CAME, WE WALKED, WE WON!

*Sarah Oxford, Regional Program Manager*

Last year marked an exceptional year for HA WALK. Despite the tumultuous economy, our community united across the nation by walking, riding and wheeling together to spread awareness and raise funds for HA programs and research.

**Thank you for advocating for the hydrocephalus community.**

Though the growing numbers are exciting and the launch of the new research

initiative motivates more communities to join WALK, it is important that we remember our roots. In 1993, Evan and Pip Marks led the first hydrocephalus WALK in San Francisco. With 23 family members and friends, they crossed the Bay Bridge, the 4.46 mile-long span that connects San Francisco to Oakland. The WALK's goal was to unite the hydrocephalus community in San Francisco and to raise funds for HA programs to support other families. It was a joyous occasion and year after year, they have continued to add onto their founding success.

Sixteen years later, following in the footsteps of Pip and Evan, Denise Bechard,

chair of the fourth annual Detroit WALK, explains why she got involved with WALK: "When dealing with a family member that has a chronic condition, such as hydrocephalus, it is easy to get overwhelmed, frustrated and to have a feeling of helplessness. After a long hospital stay with Jenn [daughter], I needed to do something proactive to make a difference for her, and all those that suffer with this condition. I couldn't just sit and allow this condition to have the 'last say' in our lives, nor have it control our outlook or our feelings. We needed a positive focus. The WALK was a way for us to take control of our lives and this condition."

Awareness and community-building heads the list when WALK chairs discuss why they organize the events. Long Island WALK chair Mia Padron said, "I do this

*Over 5,500 people attended 24 WALKs in 18 states  
(AL, AZ, CA, CO, FL, IL, MA, MD, MI, OH,  
NC, MO, MA, NJ, NM, NY, TX, UT)  
and raised over \$450,000!*



*Birmingham, AL*

*Photos courtesy of Kim Sharit Photography*



*San Francisco, CA*



*Fresno, CA*



*Phoenix, AZ*



*Denver, CO*

**WE CAME, WE WALKED, WE WON!** *(continued)*

for Tyler [child], to make sure we get that awareness out there, to get everyone bonding and forming relationships. We're not in this alone; we're WALKing together!"

Many HA WALK chairs agreed that the best part of organizing a WALK is uniting people living with hydrocephalus, who have never met someone else with the condition. Sherry Reising and Stacey Buckner, co-chairs for the Chicago WALK experienced that this year when a man doing his daily exercise participated for the first time and met other people with hydrocephalus. Many WALK chairs have had similar experiences. As important as national awareness is, personal awareness as well as a sense of belonging to a community are priceless.

Thank you to Pip and Evan and to all WALK chairs and participants who together are making a difference.

Mia, Denise and Jennifer also shared some of their personal journeys as WALK chairs.

*"I love it, my children love it and it's great. We're helping people feel not alone. If I can, I'll be there because we're in this together. This is our life. We're there for each other and we have to become like a family and that's what I feel with my [HA WALK] team. We're a team and a family. It's wonderful."*

*Mia Padron, Long Island, NY WALK Chair*

*"It was the beginning of a journey that has provided a sense of hope and healing for hydrocephalus patients and their families. What started as two individuals in Michigan trying to raise awareness and funds for hydrocephalus, has turned into hundreds coming together every August to spread a message of HOPE. Together we have made a difference."*

*Denise Bechard, Detroit, WALK Co-Chair*

*"I found that through my hospital stays and surgeries, the WALK was one of the positive factors that kept me motivated. Having something to focus on that would ultimately help others with hydrocephalus became my goal. Seeing the smiles on the hydrocephalus children and adults has been the one single vision I see repeatedly in my head that inspires me on a daily basis. Watching a person being educated by a shunt rep and finally understanding what they have in their brain; the clowns that made children laugh; the joy on a boy's face in a wheelchair when all the candy from the piñata landed in his lap; seeing a cloud of white t-shirts while hundreds of people crossed the finish line; these are just a few things that I replay in my head every time I am headed back to surgery. Even in the midst of the most trying times with hydrocephalus, I have a reason to be thankful, because I am taking part in a much bigger plan, a plan to help end the difficulties and struggles that come with this condition."*

*Jennifer Bechard, Detroit, WALK Co-Chair*



Oroville, CA



Boca Raton, FL



Albany, NY



Boston, MA



Chicago, IL



Tampa, FL

WE CAME, WE WALKED, WE WON! (continued)



Cambridge, MA



Detroit, MI



St. Louis, MO



Cleveland, OH



Washington Township, NJ



Graham, NC



Baltimore, MD – courtesy of Scott Berlin Photography



Long Branch, NJ



Albuquerque, NM



Philadelphia, PA



Long Island, NY



San Antonio, TX



Salt Lake City, UT

CCC INITIATIVE

*Thara Jinadasa, Development Associate*

The Campus Community Co-Coordinator program is an initiative to raise awareness of hydrocephalus among college students. Currently in its pilot phase, we would like to introduce our 2009-2010 CCC volunteers and highlight their achievements.

NEEL IYER

Hi, my name is Neel Iyer. I am a third year integrative biology and business administration double major and public policy minor at UC Berkeley! I'm from Orange County, Calif., so I love going to the beach and being out in the sun.



I became involved with HA as a CCC because I believed in their mission to help find a cure for a condition that affects so many, but is often overlooked. I believe that there is so much we can do, especially at UC Berkeley. I really want to inform the student body and get people involved with HA. One of my goals is to create an on-campus organization that can work with HA to plan events and raise money to fight hydrocephalus. I'm excited for the future and can't wait to continue working with the HA team on executing all of these ideas. Go Bears!

FLU SHOTS: IT'S NOT TOO LATE . . .

*Karima Roumila, MPH, Outreach Coordinator*

The government's Center for Disease Control and Prevention (CDC) recommends vaccinations against both seasonal and H1N1 flu (swine flu). If you've avoided the flu so far, don't assume you'll be flu-free for the rest of the season. People at higher risk for flu complications include children under 5, seniors over 65, pregnant women and people with

ANNIE SCALMANINI

I hail from the East Bay, so going to Stanford is the perfect distance from home because I still get to see my family at the occasional football game! My older sister is finishing a master's degree at Stanford, and my twin brother is at Santa Clara, which is great because I get to hang out with my awesome siblings pretty often. Besides that, I love any and everything that has to do with music or water (I'm a total aquatic nut – water polo, swimming, skiing, wakeboarding, surfing, floating, even aqua jogging).



When I first found out about the CCC initiative, I was mostly excited by the fact that it was a new program with a lot of room for creativity. As I learned more about the position, I was drawn to the idea that it would be up to me to figure out innovative, fun ways to develop the role of the Campus Community Coordinator and set the tone for future CCCs.

My favorite aspect of the role is the emphasis on education and outreach for hydrocephalus. My top priority is to make students aware of and informed about hydrocephalus. ❖

CCC'S FIRST STEP: TRIVIA NIGHT

*Annie Scalmanini, CCC*

When I was thinking of fun events to host that would generate publicity for hydrocephalus, it occurred to me that a friend had organized a popular trivia night twice a month. Since his event consistently had a good turnout, I asked him if he would partner with me for a trivia night to highlight hydrocephalus, and he agreed.

We advertised the event around campus and included basic information about hydrocephalus to help participants prepare for the special trivia night (let's be honest – all Stanford students love an excuse to study!). The "test run" was a huge hit; participants who had taken the time to read about hydrocephalus answered the questions correctly, and won Hydrocephalus Association t-shirts!

It was encouraging to see how easy it was to spread knowledge about hydrocephalus and how students actively participated when given the resources.

**Kids Corner**

Answer:

Oh! The Places You'll Go!

You'll be on your way up!

You'll be seeing great sights!

You'll join the high fliers who soar to high heights.

Kid, you'll move mountains!

Today is your day!

Your mountain is waiting.

So ... get on your way!

~ Dr. Seuss

Oh! The Places You'll Go!

## A FEW WORDS ABOUT PEOPLE FIRST LANGUAGE

by Kathie Snow

Visit [www.disabilityisnatural.com](http://www.disabilityisnatural.com) to see the original, full-length article.

People with disabilities constitute our nation's largest minority group. It's also the most inclusive: all ages, genders, religions, ethnicities, sexual orientations, and socioeconomic levels are represented.

Yet the only thing people with disabilities have in common is being on the receiving end of societal misunderstanding, prejudice, and discrimination. And this largest minority group is the only one that *anyone can join, at any time*: at birth, in the split second of an accident, through illness, or during the aging process. If and when it happens to *you*, how will you want to be described?

**Words matter!** Old and inaccurate descriptors perpetuate negative stereotypes and reinforce an incredibly powerful attitudinal barrier—the *greatest obstacle facing individuals with disabilities*. A disability is, first and foremost, *a medical diagnosis*, and when we define people by their diagnoses, we devalue and disrespect them as individuals. Do *you* want to be known primarily by your psoriasis, gynecological history, or the warts on your behind? Using medical diagnoses incorrectly—as a measure of a person's abilities or potential—*can ruin people's lives*.

**Embrace a new paradigm:** "Disability is a natural part of the human experience..." (U.S. *Developmental Disabilities/Bill of Rights Act*). Yes, *dis-*

*ability is natural*, and it can be *redefined* as a "body part that works differently." A person with spina bifida has legs that work differently, a person with Down syndrome learns differently, and so forth.

People can no more be *defined* by their medical diagnoses than others can be defined by gender, ethnicity, religion, or other traits!

A diagnosis may also become a *sociopolitical passport* for services, entitlements, or legal protections. Thus, the *only places* where the use of a diagnosis is relevant are medical, educational, legal, or similar settings.

**People First Language** puts the person *before* the disability, and describes what a person *has*, not who a person *is*. Are you "cancerous" or do you have cancer? Is a person "handicapped/disabled" or does she "have a disability"? Using a diagnosis as a defining characteristic reflects

prejudice, and also robs the person of the opportunity to define himself.

Let's reframe "problems" into "needs." Instead of, "He has behavior problems," we can say, "He needs behavior supports." Instead of, "She has reading problems," we can say, "She needs large print." "Low-functioning" or "high-functioning" are pejorative and harmful. Machines "function;" people live! And let's eliminate the "special needs" descriptor—it generates pity and low expectations!

A person's self-image is tied to the words used about him. People First Language reflects good manners, not "political correctness," and it was started by individuals who said, "*We are not our disabilities!*" We can create a new paradigm of disability and change the world in the process. Using People First Language is right—*just do it, now!* ❖

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*The difference between the right word and the almost right word is the difference between lightning and the lightning bug.*  
Mark Twain

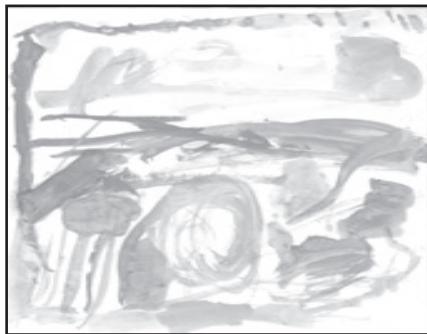
Say:	Instead of:
Children/adults with disabilities.	Handicapped, disabled, special needs.
He has a cognitive disability.	He's mentally retarded.
She has autism.	She's autistic.
He has Down syndrome.	He's Down's/mongoloid.
She has a learning disability.	She's learning disabled.
He has a physical disability.	He's a quadriplegic/crippled.
She uses a wheelchair.	She's confined to/wheelchair bound.
He receives special ed services.	He's in special ed; a special ed kid.
People without disabilities.	Normal or healthy people.
Communicates with her eyes/device/etc.	Is non-verbal.
Congenital disability/Brain injury	Birth defect/Brain damaged
Accessible parking, hotel room, etc.	Handicapped parking, hotel room, etc.

**Pip Marks, HA Director of Support & Education asks you to:**  
**Say:** He/She has hydrocephalus  
**Instead of:** He/She is a . . .hydrocephalic, hydro(anything), waterhead (yes, we hear these words at the office), etc.

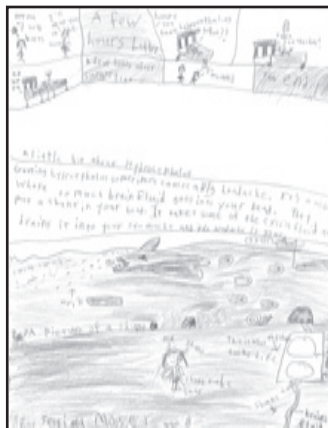
## HA GREETING CARDS

Bonnie Hom, MPH, Youth & Community Coordinator

The HA greeting cards feature the work of talented young artists affected by hydrocephalus. The cards are available for purchase and all proceeds go toward a fund for individuals and families who need financial assistance to attend our HA Conference in Cleveland from June 17-20, 2010.



Abstract flow



About hydrocephalus



Helping people

The 12-card set is an assortment of three unique, blank note cards and comes with 12 white envelopes. Note card dimensions are 4 ½ x 5 ½ inches (when folded). Envelope dimensions are 4 ¾ x 5 ¾ inches. The cards are white with matte finish. See these cards in color at our website: [www.hydroassoc.org](http://www.hydroassoc.org).

Price: \$15 (includes shipping)

You may fax, e-mail, call in or mail your order. ❖

## SCHOLARSHIPS AVAILABLE

Bonnie Hom, MPH, Youth & Community Coordinator

We are very pleased to offer eight scholarships to young adults with hydrocephalus. The scholarships are \$500 each and will be awarded in June. If you would like to apply, please e-mail Bonnie at [bonnie@hydroassoc.org](mailto:bonnie@hydroassoc.org), or call our office: 888-598-3789. Depending on your preference, we will mail or e-mail you the application with instructions.

### ELIGIBILITY REQUIREMENTS:

- Applicants must be 17 or older and have hydrocephalus.
- Scholarship funds must be used for educational purposes, such as during a four-year or junior college, a high school postgraduate year to prepare for college, a technical or trade school, an accredited employment-training program or a postgraduate program.
- The scholarship may be used for tuition, books, housing or expenses directly related to education.
- The deadline for completed applications and recommendation forms is April 1. Applications received after this

date, or incomplete applications will not be considered

### SCHOLARSHIPS OFFERED:

#### GERARD SWARTZ FUDGE MEMORIAL SCHOLARSHIP

This fund was established in 1994 by the Fudge family. Their son, Gerard, had hydrocephalus and a brain tumor. He died in 1992 at the age of 22, during his time at college. This scholarship honors his zest for life and his kind and gentle spirit. Two scholarships are awarded each year from this fund.

#### MORRIS L. AND REBECCA ZISKIND MEMORIAL SCHOLARSHIP

This fund was established in 2001 by Rebecca Ziskind and her family in memory of her husband, Dr. Morris Ziskind, who had normal pressure hydrocephalus. After Rebecca Ziskind's death in 2005, their three surviving children and their spouses—Carrie and Dee Norton, Jerome and Rosemary Ziskind, and Janet and Charles Tarino—graciously funded one more scholarship in loving memory of their parents. Two scholarships are now awarded from this fund.

#### ANTHONY ABBENE SCHOLARSHIP

This fund was established in 2002 by Anthony Abbene's extended family. Anthony is a teenager with hydrocephalus. This fund awards two scholarships in honor of Anthony to help others with hydrocephalus with their education.

#### JUSTIN SCOT ALSTON MEMORIAL SCHOLARSHIP

Gloria M. Alston established this scholarship in loving memory of her son, Justin Scot Alston, who died in 2004. Justin received a Hydrocephalus Association scholarship in 2002 and will be remembered for his tremendous upbeat attitude and for all that he accomplished during his short life.

#### MARIO J. TOCCO HYDROCEPHALUS FOUNDATION SCHOLARSHIP

This scholarship was endowed in 2007 by Greg Tocco, executive director of the Hydrocephalus Foundation, Inc., of Saugus, Mass., and his family in honor and memory of Greg's grandfather, Mario J. Tocco. ❖

## News Notes

### RARE DISEASE DAY RAISES AWARENESS

Rare Disease Day is a global initiative that educates and raises awareness about rare diseases as a public health concern. The Hydrocephalus Association has added its support to this cause.

Nearly 1 in 10 Americans and millions of others around the world have rare diseases. Many of these people have no treatment or inadequate medical care and services. Stories about real people who have rare diseases are an important educational tool.

To help people across the nation understand what it's like to have a rare disease, the National Organization for Rare Disorders (NORD) will be collecting patient stories for possible future publication.

For more information about NORD and rare disease day, visit: [www.rarediseaseday.us](http://www.rarediseaseday.us)

### LEARN MORE ABOUT LEARNING DISABILITIES

The State of Learning Disabilities 2009 is a report on the status of children, adolescents and adults with learning disabilities (LD). Written by the National Center for Learning Disabilities (NCLD), the report challenges common myths about LD and provides benchmark data to compare and contrast how people with LD are faring in school and work.

NCLD offers this publication to policy makers, education professionals, media, parents and others to share key LD data and expand awareness about what LD is and whom the condition impacts.

To download a copy of this report, go to: <http://www.nclld.org/stateofld>

### SPINA BIFIDA GENETICS RESEARCH PROJECT

The Spina Bifida Association is urging mothers of children with the condition to enroll in a research program. The **Spina Bifida Genetics Research Project** is studying variations in genes involved with folic acid metabolism. If the study results are positive, it may be possible to develop a test to identify women at risk of having a baby with spina bifida, who can be treated with high dose folic acid before conception.

More than 800 participants from the U.S. and abroad have already enrolled. In an effort to meet the study's objectives,

the Spina Bifida Genetics Research Project is trying to increase awareness at clinics that treat patients with the condition. Study participants complete an online enrollment survey and are sent at-home saliva collection kits.

Contact the Spina Bifida Genetics Research Project by e-mail at [support@sbgenetics.org](mailto:support@sbgenetics.org), or by phone at **650-212-0822**. For additional information, go to the study website: [www.sbgenetics.org](http://www.sbgenetics.org). Your help will make a big difference.

## Kid's Corner!

Bonnie Hom, MPH, Youth & Community Coordinator

### Igpay Atinlay – Pig Latin

As a tribute to all kids and kids-at-heart, this edition of Kid's Corner features a poem by a very special author. You may recognize the poem, after you've deciphered the Pig Latin, of course. In the spirit of the New Year, we, the staff at the Hydrocephalus Association, wish you success and joy in the many accomplishments you'll achieve this year and beyond.

To translate from Pig Latin to English, remove the -ay in every word and move the last letter to the beginning. For example: "ello-hay" is "hello" and "ey-they" is "they."

Ohyay! eThay acesPlay Youyay'llay oGay!

Youyay'llay ebay onyay youryay ayway upyay!  
 Youyay'llay ebay eeingsay eatgray ightssay!  
 Youyay'llay oinjay ethay ighhay iersflay owhay  
 oarsay otay ighhay eightshay.  
 idKay, youyay'llay ovemay ountainsmay!

odayTay isyay youryay ayday!  
 Youryay ountainmay isyay aitingway.  
 oSay ... etgay onyay youryay ayway!

~Dray. eussSay  
 Ohyay! eThay acesPlay Youyay'llay oGay!

# Hydrocephalus Association WINTER 2010 MEMBERSHIP FORM

RENEWAL     NEW

Name: \_\_\_\_\_ Telephone: \_\_\_\_\_

Address: \_\_\_\_\_

Email: \_\_\_\_\_

Name of person with hydrocephalus: \_\_\_\_\_ Birth date: \_\_\_\_\_ Age at diagnosis: \_\_\_\_\_

His/her relationship to you:  self    child    parent    spouse    friend/other relative    N/A (professional member)

Count me in as a member for 2010. Enclosed is my unrestricted donation of:

\$30     \$50     \$100     Other \$ \_\_\_\_\_

**How would you like to receive your quarterly newsletter?**

*Opt to receive your newsletter via email — this will allow the Association to put a portion of the \$30,000 annual printing and postage costs to other programs.*

Please send my newsletter via email to: \_\_\_\_\_

I still prefer to receive a printed copy of the newsletter via the US mail.

Charge my:  VISA     MasterCard     Discover    Amount Charged \$ \_\_\_\_\_

Card No. \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_    Exp. Date \_\_\_\_ / \_\_\_\_    VIN # \_\_\_\_\_

Print Name \_\_\_\_\_

Signature \_\_\_\_\_

Please remove my name from your mailing list.

I cannot afford a donation at this time but I would like to be counted as a member.

**Please check all that apply:**

I am on SSI or Disability.     My medical bills have exhausted my finances.     My income is below \$30,000 per year.

*Please return this form with check, money order or completed credit card information to:*

Hydrocephalus Association ■ 870 Market Street ■ Suite 705 ■ San Francisco, CA 94102  
Tel. 415-732-7040 ■ Toll Free 888-598-3789 ■ Fax 415-732-7044 ■ Email: info@hydroassoc.org



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The Hydrocephalus Association is a national nonprofit organization whose mission is to eliminate the challenges of hydrocephalus by stimulating innovative research and providing support, education and advocacy for individuals, families and professionals dealing with hydrocephalus. Pathways is published quarterly. Thomas G. Smith is the editor. Articles included in the Pathways are for the reader's information and do not signify endorsement by the Association. We welcome letters and articles from our readers but reserve the right to edit any material submitted for publication. Information and articles from the Pathways may be reprinted provided a full citation of source is given.

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#### Hydrocephalus Association

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#### HYDROCEPHALUS ASSOCIATION RESOURCES AND FACT SHEETS

The following resources are available free to our members:

*About Hydrocephalus—A Book for Families* (in English or Spanish)

*About Normal Pressure Hydrocephalus (Adult-Onset)*

*Prenatal Hydrocephalus—A Book for Parents*

*Hydrocephalus Diagnosed in Young to Middle-Aged Adults*

*A Teacher's Guide to Hydrocephalus*

*Health-Care Transition Guide for Teens and Young Adults*

*Directory of Pediatric Neurosurgeons*

*Directory of Neurosurgeons for Adults*

*Directory of Congenital Neurosurgeons for Adults*

*Directory of Neuropsychologists*

#### Fact Sheets

Primary Care Needs of Children with Hydrocephalus

Learning Disabilities in Children with Hydrocephalus

Hospitalization Tips

Headaches and Hydrocephalus

Social Skills Development in Children with Hydrocephalus

Eye Problems Associated with Hydrocephalus

Survival Skills for the Family Unit

Durable Power of Attorney for Health Care Decisions

Endoscopic Third Ventriculostomy

Cerebrospinal Fluid Shunt Systems for Management of Hydrocephalus

Nonverbal Learning Disorder Syndrome

How to Be an Assertive Member of the Treatment Team

Second Opinions

College & Hydrocephalus

Financial Aid and Scholarships

Understanding Your Child's Education Needs/IEP Resource Packets