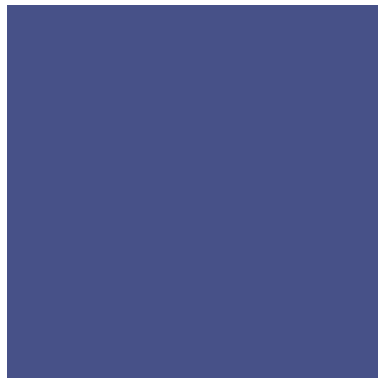


## Neuroradiology 2017



2<sup>nd</sup> International Conference on

## NEUROSCIENCE, NEUROIMAGING & INTERVENTIONAL RADIOLOGY

October 30 to November 01, 2017 | San Antonio, USA

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# Scientific Tracks & Abstracts

Day 1

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# NEUROSCIENCE, NEUROIMAGING & INTERVENTIONAL RADIOLOGY

October 30 to November 01, 2017 | San Antonio, USA

## MRI to investigate the complexity of the CSF flows and its interactions with the cerebral blood flows

**Olivier Baledent**

Responsable De L'Unité De Traitement De L'Image Médicale, France

The rapid amplitude change of the cerebral systolic arterial input flow increases the brain volume. Then CSF is quickly displaced out of the cranium toward the spinal canal; ICP increase is therefore limited. Nevertheless, this first CSF response is also limited and must be supplemented with the cerebral blood venous outflow. The venous contribution is slower than the CSF but at the end drains from the cranium all the blood input volume. Finally, due to the narrow aqueduct of Sylvius, a small CSF ventricular flows out of the fourth ventricle. Cerebral hydrodynamics knowledge has benefited considerably from the introduction of phase-contrast magnetic resonance imaging (PCMRI), the unique technique to investigate the small but rapid CSF oscillations. Using post-processing software, key parameters of flow can be easily calculated. In ten minutes, CSF flow is quantified in the spinal subarachnoid spaces, the pontine cistern, the foramina of Magendi and the aqueduct of Sylvius. Blood flow is quantified in the internal carotid and the vertebral arteries, straight and sagittal sinus, jugular and epidural veins. These flows data can be functional information's complementary to the morphological imaging to better investigate the cranio-spinal system in case of patients presented with hydrocephalus, chiari malformation, syringomyelia, cerebral hemorrhage, intracranial hyper or hypo tension. The objective of this presentation is to describe the power and the limit of such clinical 2D PCMRI protocol concerning CSF and blood flow investigations and present what we have found in different healthy and pathological populations.

### Biography

Olivier Baledent did his PhD in the area of Biophysics & Radiology and is currently working as an Assistant Professor in Amiens 'University Hospital in France. He is heading the Medical Image Processing Department and BioFlowImage ([www.tidam.fr](http://www.tidam.fr)) research team. After a Master's degree in Informatics in Amiens, he passed a Post-graduate diploma in the field of Image Processing in Lyon. He passed his PhD in 2001 at Jules Verne University. The thesis subject was already about CSF flow imaging using MRI technique. Now inside Amiens 'University Hospital, with clinicians he continues to develop CSF research and applies non-invasive hydrodynamic approach in clinical practice. He is also Biophysics' Teacher at the Medical School of Amiens.

Olivier.Baledent@chu-amiens.fr

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## The distribution of spontaneous intradural cerebral artery dissection angiographically with the symptomatology

**Aminur Rahman**

National Institute of Neuroscience and Hospital, Bangladesh

**Aim:** Aim of this study was to analyze the distribution of spontaneous intradural cerebral artery dissection angiographically with the symptomatology of admitted patients to our hospital.

**Materials & Methods:** We analyzed retrospectively collected data of the stroke patients' with 4-vessels angiogram in our institute from January 2013 to June 2014. Out of 164 of cerebral dissections in angiographic pattern we found only 16 patients of intradural dissecting aneurysms that were included in this study. The male-female ratio was 37.5: 62.5 and the mean age was  $47.56 \pm 13.19$  years. According to the angiographic finding depicting the location of the dissection plane in the arterial wall, we categorized to steno-occlusive, aneurysmal, combined (steno-occlusive and aneurysmal) pattern. In each dissection pattern, we evaluated presenting symptoms and presence of subarachnoid hemorrhage (SAH), infarction, intracerebral hemorrhage (ICH) or combined.

**Results:** The most common symptomatic presentation was headache (75%), followed by neck pain (50%), motor weakness of limb(s) (43.8%) and loss of consciousness (LOC) (37.5%). The most common angiographic pattern was aneurysmal patterns (68.75%) followed by steno-occlusive (18.75%) and combined (12.5%) patterns. Aneurysmal pattern was most frequently related to SAH (7/11, 63.63%) in contrast to steno-occlusive pattern was only related to infarction (3/3, 100%). The most frequent dissections were in the intradural vertebral arteries (IV) and posterior cerebral artery (PCA), presented with SAH 80% (4/5) and 33.33% (1/3) respectively. Infarction was common abnormality in patients with the intradural carotid arteries (IC) 33.33% (1/3), superior cerebellar artery (SCA) 33.33% (1/3) and basilar artery (BA) 33.33% (1/3) each whereas ICH was common abnormality in patients with the posterior inferior cerebellar artery (PICA) 50% (1/2).

**Conclusion:** The most common symptomatology of intradural cerebral artery dissection are headache and neck pain followed by motor weakness of limbs and LOC. SAH with aneurysmal pattern, in the posterior circulation especially in the IV is the most frequent diagnosis which requires combined analysis of angiographic pattern and clinical presentations of stroke.

### Biography

Aminur Rahman is currently working as Assistant Professor in the Department of Neurology, Sir Solimullah Medical College, Mitford Road, Dhaka, Bangladesh.

draminur@yahoo.com

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## Functional and structural imaging in pediatric anoxic brain injury

**Peter T Fox**

UT Health San Antonio, USA

Drowning is a leading cause of accidental injury and death in young children. Anoxic brain injury (ABI) is a common consequence of drowning and can cause severe neurological morbidity in survivors. Assessment of functional status and prognostication in drowning victims can be extremely challenging, both acutely and chronically. Structural neuroimaging modalities (CT and MRI) have been of limited clinical value. Here, we tested the utility of resting-state functional MRI (RS-fMRI) for assessing brain functional integrity in this population. Eleven children with chronic, spastic quadriplegia due to drowning-induced ABI were investigated. All were comatose immediately after the injury and gradually regained consciousness, but with varying ability to communicate their cognitive state. Eleven neurotypical children matched for age and gender formed the control group. Resting-state fMRI and co-registered T1-weighted anatomical MRI were acquired at night during drug-aided sleep. Network integrity was quantified by independent components analysis (ICA), at both group- and per-subject levels. Functional-status assessments based on in-home observations were provided by families and caregivers. Motor ICNs were grossly compromised in ABI patients both group-wise and individually, concordant with their prominent motor deficits. Striking preservations of perceptual and cognitive ICNs were observed, and the degree of network preservation correlated ( $\rho=0.74$ ) with the per-subject functional status assessments. Collectively, our findings indicate that RS-fMRI has promise for assessing brain functional integrity in ABI and, potentially, in other disorders. Further, our observations suggest that the severe motor deficits observed in this population can mask relatively intact perceptual and cognitive capabilities.

### Biography

Peter T Fox, earned his Medical Degree from Georgetown University School of Medicine, interned at the Duke University School of Medicine and completed his residency and fellowship at Washington University in St. Louis. He was a Senior Staff Scientist at Johns Hopkins University's Mind/Brain Institute before joining the Health Science Center in 1991 to create the RIC. He has appointments in Radiology, Neurology, Psychiatry and Physiology.

fox@uthscsa.edu

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## Advanced MR imaging of the visual pathway

**Bundhit Tantiwongkosi**

University of Texas Health San Antonio, USA

**Objectives:** The vision is a highly complex sense, which derives from not only the orbit and globes but also deep within the intracranial compartment. MRI, through its variety of sequences, offers a dynamic array of structural and functional imaging tools to investigate and characterize this system. Our goal is to describe several advanced MRI sequences, and to explore their potential clinical applications as well as areas for further development.

**Learning Points:** MRI imaging of the visual pathway will be reviewed, with a focus on the following sequences: Structural and functional retinal MRI may be utilized in the assessment of diabetic retinopathy as well as glaucoma; Optic nerve MR, with diffusion weighted imaging (DWI) and magnetization transfer ratio (MTR), which demonstrate potential clinical applications in acute ischemia and monitoring demyelination, respectively; high resolution MRI of the lateral geniculate nucleus (LGN) offers the ability to delineate pathology affecting this vital thalamic nucleus. Further improvements in in-plane resolution may augment correlations with clinical deficits through retinotopic mapping. Optic radiation diffusion tensor imaging (DTI), including the utilization of tractography in pre-operative/therapeutic planning for tumors and other lesions. Characterization of visual association areas in the occipital and temporal lobes with functional MRI (fMRI) and DTI was done. Upstream visual pathway insults may have downstream effects, including cortical reorganization, which has implications on the associated clinical outcomes.

**Discussion:** Advanced MRI techniques offer the ability to characterize pathology involving the visual pathway with a level a detail that extends beyond the scope of both clinical examinations and conventional MR imaging. Familiarity with these sequences will allow the radiologist to offer additional insights to referring clinicians, which is likely to positively impact patient management

### Biography

Bundhit Tantiwongkosi has completed his MD from Mahidol University, Thailand, Diagnostic Radiology Residency at Northeastern Ohio Universities, USA and Neuroradiology Fellowship at University of California, Los Angeles (ULCA). He is currently an Assistant Professor of Radiology, Neuroradiology Division at University of Texas San Antonio. He has published more than 18 papers in peer-reviewed journals and has been serving as an Editorial Board Member of Journal of Ear, Nose and Throat Disorders, Central Nervous System Tumors: Clinics in Oncology and Clinic in Surgery.

Tantiwongkos@uthscsa.edu

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## Structural brain networks and behavioral measures of attention in adolescents who were born prematurely

Robert Juan Trevino, Olga Tymofiyeva, Trevor Flynn, Justin Yuan, James A Barkovich and Duan Xu  
University of California San Francisco, USA

One in 10 births leads to a child being born prematurely and who, therefore enters the world with a higher risk of several health problems as well as early death. Those that survive often have severe neurodevelopmental problems, attentional problems being among the most consistently reported cognitive impairments related to prematurity. To develop effective interventions, it is essential to better understand the neural correlates of attentional problems in prematurely born children. Diffusion tensor imaging allows to non-invasively map structural brain networks by utilizing of the white matter microstructure. The purpose of this study was to investigate the correlation between the brain connectivity and attention deficits in children that were born prematurely. Based on previous research, in children with attention-deficit/hyperactivity disorder (ADHD), the hypothesis of this study detailed that the structural connectivity in middle frontal gyrus (MFG) will be weakened in adolescents with attention deficits. The study included 24 adolescents (age 10-14, average age 12.5 years) who were born prematurely and who underwent MRI imaging and cognitive assessments. Of the 24 subjects, 12 have been determined to have attention deficits. On average, the group with attention deficits had a lower node strength of the right and left MFG hemispheres compared to the group without attention deficits. The independent sample t-test was marginally non-significant ( $p=0.08$ ) in the right hemisphere and less significant in the left hemisphere ( $p=0.18$ ). The results of this study indicate that attentional problems in adolescents who were born prematurely may be associated with a weaker structural connectivity of the frontal gyrus, a brain region known to be involved in attentional processes. Our study is the first one to examine the neural correlates of attention deficits in adolescents who are known to have been born preterm. This knowledge could lead to a better understanding of the mechanisms that play a role in development of attentional deficits in children born prematurely.

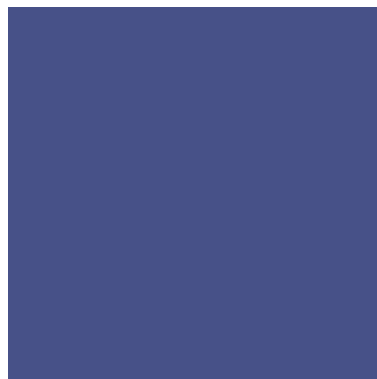
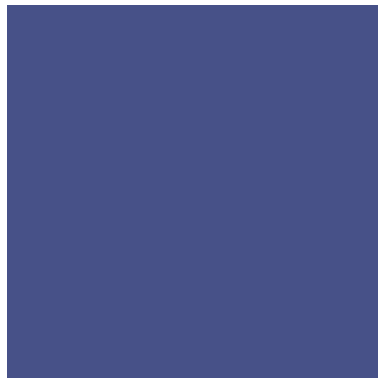
### Biography

Robert Juan Trevino is a Biomedical Engineering Undergradutate from the University of Texas at San Antonio going into his final year. He is an MARC\*U\*STAR and Amgen Scholar and was able to work in the lab of Duan Xu at the Biomedical Imaging Department at the University of California, San Francisco.

robert.trevino@utsa.edu

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# Scientific Tracks & Abstracts

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October 30 to November 01, 2017 | San Antonio, USA

## Neuroradiological and neurosurgical management of arteriovenous malformations of the foramen magnum

**Raimund Firsching**

Universitaetsklinik Fuer Neurochirurgie, Germany

**Introduction:** Vascular malformations within the foramen magnum and upper cervical canal are rare. Diagnosis is cumbersome and neurosurgical treatment is hazardous. We report on 6 cases.

**Methods:** Age ranged from 37 to 77 years, three male and two female patients. Diagnosis at the time of referral included normal pressure hydrocephalus (one case), subarachnoid haemorrhage (two cases) and spinal stenosis (two cases). Imaging techniques included magnetic resonance (MR) imaging, MR angiography and highly selective segmental cervical angiography with micro catheters. Surgery was performed with electroneurophysiological monitoring.

**Results:** Angiography revealed three arteriovenous fistulae within the foramen magnum, a giant vertebral artery aneurysm within the foramen magnum and two patients with an intradural arteriovenous malformation at the C2 level. The fistulae and the aneurysm were occluded using microclips. The edema of the cervical myelon of the patients with the fistulae resolved with marked recovery of gait. The hydrocephalus of the patient with the giant vertebral aneurysm also resolved with good recovery. The arteriovenous malformations at the C2 level were coagulated. One of these patients subsequently needed a ventriculoperitoneal shunt. The other suffered some transient weakness of the ipsilateral arm.

**Conclusion:** In all patients suspicion of a vascular malformation was raised after an initially misleading diagnosis. The decisive hint came from scrupulous evaluation of MR imaging data but diagnosis was only confirmed with selective arteriography. For proper identification of the malformation and planning of the surgical procedure a highly selective segmental spinal arteriography appears mandatory.

### Biography

Raimund Firsching LRCP (LOND.) MRCS (ENGL.) was born Dec. 12th 1953 born in Bochum, West Germany. 1972 beginning studies at medical school of the University of Bonn, 1979 graduation from medical school Bonn, dissertation. 1980, conjoint exam in London, Queen Square, on the register of the General Medical Council, United Kingdom. 1981 beginning neurosurgical training at the University of Cologne, 1986 research fellow at the University of Texas, Health Science Center at San Antonio, Texas, USA, division of neurosurgery, chief: Dr. Story 1987 board certified neurosurgeon at the University of Cologne, Germany, 1988 habilitation for the field of neurosurgery, admitted to the Medical Faculty of the University of Cologne. 1992 – 1994 Vice chairman of the Department of Neurosurgery at the Ruhruniversitaet in Bochum. 1995 until now Neurosurgeon-in-Chief and Professor at the Universitaetsklinik fuer Neurochirurgie Magdeburg. 1997 until 2013 nominated honorary judge of the state professional court of Magdeburg, capital of the state of Saxony Anhalt, Germany. 2017 congress president of the Deutsche Gesellschaft fuer Neurochirurgie at the national convention of neurosurgery in Magdeburg. Married to Dr. Ibsen-Firsching, a pediatrician, since 1981, 3 children.

raimund.firsching@med.ovgu.de

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## Neuroradiological images of five selected intracranial tumors encountered in our practice

**Uduma Felix U**

University of Uyo, Nigeria

**Introduction:** There are diverse intracranial tumors and many of them are known to have some salient diagnostic features in neuro imaging.

**Aim:** The aim of this study is to emphasizing some neuroradiological pictorial diagnostic features of certain intracranial tumors.

**Image Presentations:** Case-1: Brain MRI of a 60 year old woman who presented with headache and tongue weakness showed that the clivus has been replaced by a T1W isointense and T2W hyperintense soft tissue mass with heterogenous enhancement. A diagnosis of chordoma was made. Case-2: A 15 year old male presented with headache and abnormal gait. Brain MRI showed T1W isointense solid infratentorial mass in the right cerebellar peduncle with a hypointense necrotic centre. This mass compresses and displaces the fourth ventricle to the left. Only the solid component enhanced (Medulloblastoma). Case-3: A 51 year old male presented with right unilateral sensori-neural hearing loss and disequilibrium. Brain MRI showed extracanalicular right cerebellopontine angle soft tissue T1W isointense , T2W hyperintense and enhancing mass (acoustic neuroma). Case-4: A 55 year old female presented with persistent headache. Brain MRI showed a convexity T1W hypointense and T2W hyperintense frontal parafalcine soft tissue mass without surrounding oedema (Meningioma). Case-5: A 52 year old male presented with occassional loss of consciousness and severe headache. Brain CT showed extensive right cerebral edema with effacement of ipsilateral lateral ventricle. Enhanced CT image revealed a ring enhancing lesion in the right fronto-parietal cerebral lobes with surrounding hypodense cytotoxic oedema. (glioma multiforme).

**Conclusion:** We have carefully selected five intracranial tumors of diverse locations to highlight the import of neuroimaging in diagnosis. These tumors are intracranial chordoma (a parasellar tumor), medulloblastoma (infratentorial tumor), acoustic neuroma (cerebello-pontine angle tumor), meningioma (a predominantly convexity tumor) and glioma multiforme (supratentorial tumor).

### Biography

Uduma Felix U, MB.BCh, FWACS, FICS is a senior Lecturer in Department Of Radiology, in Faculty Of Clinical Sciences, College Of Health Sciences, University of Uyo, Nigeria. He is the Head of Department of Radiology in University of Nigeria. He is a former Adjunct Lecturer in Madonna University, Nigeria and also a former Consultant Radiologist, Polyclinic Bonanjo, Douala, Cameroon. Dr. Uduma is a member of Medical Advisory Board in University of Uyo teaching hospital, Nigeria. He is also an associate Editor of many journals including West African Journal of Radiology. He has published not less than 30 articles.

felixuduma@yahoo.com

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## Role of contrast enhanced ultrasound guidance in core needle biopsy for diagnosis of cervical tuberculous mycobacterial lymphadenitis

**Dan Zhao**

Hangzhou Red Cross Hospital, China

To investigate the role of core-needle biopsy (CNB) guided by contrast-enhanced ultrasound (CEUS) played in the diagnosis for cervical tuberculous mycobacterial lymphadenitis (TML). One hundred and seventy one lymph nodes in 171 patients with pathological confirmation of TML were retrospectively enrolled. All had undergone CNB before the final surgery. The patients were assigned to either conventional ultrasound guided CNB group (n=87) or CEUS guided CNB group (n=84). The comparison of two groups on diagnostic efficacy in terms of sensitivity was statistically made. Subgroup analyses on lymph node size were performed furthermore. Among the 171 patients, one hundred and forty one patients were directly diagnosed to be TML in CNB, which were consisted by 77 patients in CEUS- guided CNB group and 64 patients in conventional ultrasound guided CNB group. The sensitivities were 91.7% (77/84) and 73.6% (64/87), respectively ( $p<0.05$ ). As to subgroup analyses, differences among sensitivities caused by the two guiding methods were significant in medium size group (i.e. diameter was 2.0-3.0 cm) and large size group (i.e. diameter was larger than 3.0 cm), 93.1% for CEUS group vs. 74.2% for conventional ultrasound group ( $p<0.05$ ) and 85.7% for CEUS group vs. 57.1% for conventional ultrasound group ( $p<0.05$ ), respectively. However, no significant difference was found in small size group (i.e. diameter was smaller than 2.0 cm) (96.3% for CEUS group vs. 92.9% for conventional ultrasound group,  $p=0.57$ ). Comparing with conventional ultrasound guided CNB, further benefits could be gained through CEUS guided CNB in TML diagnosis, especially for those whose diameter was larger than 2.0 cm.

### Biography

Dan Zhao has completed his Bachelor's degree from Zhejiang University School of Medicine in 2005. And then he has been working as an Ultrasound Physician in Hangzhou Red Cross Hospital. Now, he is a graduate student of Zhejiang University School of Medicine and will complete his Master's degree in June 2019. He is major in Medical Imaging and Nuclear Medicine.

zjzhaodan@163.com

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## Virtual touch tissue imaging and quantification: to aid conventional ultrasound in malignancy prediction for complex cystic and solid breast lesions

**Ying Zhang**

Ningbo Medical Center Lihuli Hospital, China

This study aimed at the usefulness of conventional ultrasound (US) and US elastography, especially the latest virtual touch tissue imaging and quantification (VTIQ), in malignancy prediction for complex cystic and solid breast lesions. Eighty-nine complex cystic and solid breast lesions were subject to conventional US and US elastography, including strain elastography (SE), virtual touch tissue imaging (VTI) and VTIQ. Among the 89 lesions, thirty-four (38.2%) lesions were malignant and 55 (61.8%) lesions were benign. Sixteen variables were subject to multivariate logistic regression analysis. Pattern 4b in VTI (odds ratio, OR:15.278), not circumscribed margin of lesion (OR:12.346), SWS mean > 4.6 m/s in VTIQ (OR:11.896), and age elder than 50 years (OR:6.303) were identified to be independent predictors for malignancy. In receivers operating characteristic (ROC) curve analyses, associated areas under the ROC curve (Az) for conventional US could be significantly elevated, from 0.649 to 0.918, by combining with US elastography ( $p < 0.0001$ ). The combined diagnostic method was able to improve the specificity (32.7% vs. 87.3%,  $p < 0.0001$ ) without sacrificing the sensitivity (97.1% vs. 85.3%,  $p = 0.075$ ). Both conventional US and US elastography contribute substantially to malignancy prediction in complex cystic and solid lesions. The diagnostic efficacy of conventional US in terms of Az and specificity could be significantly improved by combining with US elastography.

### Biography

Ying Zhang has completed her Bachelor's degree from Wenzhou Medical University in 2009. And then she has been working as an Ultrasound Physician in Ningbo Medical Center Lihuli Hospital. Now, she is a Graduate student of Tongji University School of Medicine and will complete her Master's degree in June 2018. She is major in Medical Imaging and Nuclear Medicine.

yingscho@umich.edu

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## Ozonucleolysis in cervical disc

**Umair Rashid**

Punjab Institute of Neuro Sciences, Pakistan

**Background & Purpose:** Direct injection of oxygen-ozone in the cervical discs has proved to be the effective alternative to surgery in patients with cervical disc herniation in many countries around the world. We report our experience with ozonucleolysis with patients affected by pain in cervical region (Brachalgia) due to disc herniation including post-operative recurrence or disc prolapse.

**Methods:** 4000 patients were treated with single session of oxygen ozone therapy from 2005-2016. All the patients had CT or MRI evidence of cervical disc prolapse with clinical signs of cervical nerve root compression. The procedure was performed under angio fluoroscopy using 22/23 G spinal needle without any form of anesthesia. All the patients received intra discal injection of oxygen ozone mixture at an ozone concentration 30 µgm/ml. Among 4000 patients, 3000 were males and 1000 were females between the ages of 20-70 yrs. Therapeutic outcome was assessed 5 months after treatment by using modified MacNab method.

**Results:** A satisfactory therapeutic outcome was obtained. 60% of the patients showed complete recovery with resolution of symptoms. 20% of the patients complained of occasional episodic neck pain and arms pain with no limitation of occupational activity. 5% of cases showed insufficient improvement. 5% of cases had no improvement and went for surgery. 10% of cases never turned up after the first visit.

**Conclusion:** Intradiscal and periganglionic injection of ozone for herniated cervical disc has revolutionized percutaneous approach to nerve root diseases making it safer, cheaper and easier to repeat than treatments currently in use.

## Biography

Umair Rashid, first Pakistani obtained high qualification in Intervention Neuropathology by European Board of Neuropathology (ECIINR). He is one of the pioneers in establishing First Brain Stroke Centre in the Country at Lahore General Hospital/ Post-graduate Medical Institute, Lahore. He has also recently introduced latest noninvasive, non-surgical treatment of Backache, Disc Lesions, with Oxygen Ozone Therapy in the Country. He already performed 19000 cases including Cervical & Lumber Spine Discs.

dr\_umairch@yahoo.com

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## Cerebral venous dynamics change as potential indication of cerebral aneurysmal rupture

**Kwo-Whei Lee**Chang-Hua Christian Hospital, Taiwan  
Taipei Medical University, Taiwan

**Introduction:** Many inconsistent etiologies of cerebral aneurysmal rupture including a wide spectrum of factors have been reported. Our recent observation discloses the potential new factor of cerebral aneurysm rupture with cerebral venous pressure gradient.

**Materials and Methods:** We retrospectively reviewed 25 cases treated with coil embolization with or without cerebral aneurysmal rupture. Seven males and 18 females were recruited in this study. The age ranging from 49 to 71 and average being 59. Quantitative color-coded cerebral angiography was performed during coil therapeutic procedures to measure cerebral venous circulation.

**Result and Conclusion:** Ruptured cases had shorter and symmetrical cerebral venous circulation time ( $P < 0.05$ ). In addition, an asymmetrical venous outflow pattern was critical for aneurysmal rupture as seen in case 1. Non-ruptured cases tended to have slower and asymmetrical cerebral venous circulation compared with rupture cases as seen case 2. Symmetrical and shorter cerebral venous circulation in the epislateral dysplasia venous outlet may be a potential new factor for cerebral aneurysm rupture. An asymmetrical venous outflow pattern was critical for managing cerebral aneurysm and determines aneurysmal rupture.

**Illustrative Case: Case 1:** A 50 year old male presented with acute anterior communicating saccular aneurysm ruptured and treated by endovascular coiling immediately post Dyna CT study. He discharged without any sequelae but still just mild headache. The venous phase showed atresia of left dural venous sinus, right dural venous sinus is dominated venous drainage but there is symmetrical venous flow. Post-Postcoiling showed the arterial flow had no change but delayed venous flow. This symmetrical venous flow might indicate increasing venous pressure gradient.

**Case2:** A 64 year old female had asymptomatic non-ruptured Rt distal internal carotid small wide neck saccular aneurysm  
Result and Conclusion: Cerebral venous circulation time among rupture and non-rupture patients:

Non-rupture: Right  $\Delta$ CCT:11.32+/-88    Left  $\Delta$ CCT:12.49+/-42Rupture:    Right  $\Delta$ CCT:11.12+/-1.87    Left  $\Delta$ CCT:11.54+/-2.22

Ruptured cases had shorter and symmetrical cerebral venous circulation time ( $P < 0.05$ ). In addition, an asymmetrical venous outflow pattern was critical for aneurysmal rupture as seen in case 1. Non-ruptured cases tended to have slower and asymmetrical cerebral venous circulation compared with rupture cases as seen case 2. Symmetrical and shorter cerebral venous circulation in the epislateral dysplasia venous outlet may be a potential new factor for cerebral aneurysm rupture. An asymmetrical venous outflow pattern was critical for managing cerebral aneurysm and determine aneurysmal rupture.

### Biography

Kwo-Whei Lee is currently working in Department of Medical Imaging, Vascular and Genomic Research Center, Changhua Christian Hospital; Taipei, Taiwan. He is also engaged in Imaging Research Center, Taipei Medical University; Taipei, Taiwan

ftsai@uci.edu  
ftsai@tmu.edu.tw

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## Is upper limb rehabilitation effective after tetraplegia? Responses with a meta-analysis considering classical and innovative strategies

**Sébastien Mateo**

Université de Lyon, France

Ecole Normale Supérieure de Lyon, France

Cervical spinal cord injury (SCI) results in tetraplegia. SCI individuals experience dramatic somatosensory and motor deficits with related impairment corresponding to the SCI level and completeness. This severe disease concerns 40 cases per million in the USA representing approximately 12,000 new cases each year. This is associated with significant costs depending on the SCI severity ranging from 0.3 to 1 million USD for the first year (NSCISC 2012). Reaching highest autonomy as possible in daily life is conditioned by regaining upper limb function, in particular grasping capabilities. This constitutes a major concern for SCI individuals, in particular because it essentially affects young people (mean age at injury 41 years). Correspondingly, rehabilitation aims to improve hand function to promote autonomy after tetraplegia. Here, we will focus on non-invasive rehabilitation strategies usable in clinical setting. Thereby, invasive strategies including surgery fall beyond the scope of this presentation. We will separate i) “classic” rehabilitation based on a bottom-up approach relying on strengthening, use of Functional Electrical Stimulation or robotics and ii) “innovative” and more recent strategies targeting neural plasticity and aiming to restore the loop between afferent information and efferent commands. It includes top-down approach namely motor imagery alone or coupled with brain computer interfaces, virtual reality and neuromodulation mediated by transcranial direct current or magnetic stimulations (tDCS or rTMS). To date, effectiveness of upper limb rehabilitation remained narrative. We thus performed a meta-analysis of both series case studies and randomized controlled trials to address whether rehabilitation of upper limb is effective to i) reduce deficits or ii) increase hand function, and iii) alter independence. Secondly, we will sort the rehabilitation effectiveness accordingly to the classical bottom-up or innovative top-down, and neuromodulation strategies. Finally, we will conclude the presentation by formulating recommendations for rehabilitation that can be used to improve hand function after tetraplegia.

### Biography

Sébastien Mateo is currently working in Université de Lyon, Université Lyon , INSERM U1028; CNRS UMR5292; Lyon Neuroscience Research Center, ImpAct Team, F-69676 Lyon, France.

sebastien.mateo@chu-lyon.fr

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