NEURORADIOLOGY

**SE 09 NR-01**
The diagnostic value of postcontrast susceptibility-weighted imaging in the assessment of intracranial brain neoplasm at 3T
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**PURPOSE:** To estimate the diagnostic value of postcontrast susceptibility-weighted imaging (CESWI) in the assessment of intracranial brain neoplasm at 3 tesla.

**MATERIALS AND METHODS:** 28 brain neoplasm patients (19 with metastases, and 9 with glioblastomas) were enrolled in this study. We evaluated the visibility of the tumor margins and of the internal architecture of the tumors on pre and postcontrast T1 weighted images (CET1) and, pre and postcontrast SWIs, and we rated the grade of intratumoral susceptibility signals (ITSS) on SWI and CESWI.

**RESULTS:**
- The CET1 was statistically superior to the T1, SWI and the CESWI was statistically superior to the T1, SWI with regard to the visibility of the tumor margins and the internal architecture of the glioblastomas.
- The CET1, SWI and CESWIs were statistically superior to the T1 with regard to the visibility of the tumor margins and the internal architecture of the brain metastases. And the CESWI was statistically superior to the SWI and CET1 with regard to the visibility of the internal architecture of the brain metastases (p < 0.05, Wilcoxon signed rank test).
- Statistically significant differentiation was achieved between brain metastases and glioblastomas using the grading of the visibility of the tumor margins and the internal architecture of the tumors in the SWI, CESWI and CET1 scans (p < 0.05, Mann-Whitney test).

**CONCLUSION:** Our results showed that the CESWI clearly visualized the characteristics and the architecture of brain neoplasm. The CESWI can be alternative image to the CET1.

**SE 09 NR-02**
Differentiation of glioblastoma multiforme and single brain metastasis by the distribution pattern of intratumoral susceptibility sign derived from susceptibility-weighted imaging
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**PURPOSE:** To determine whether the distribution pattern of intratumoral susceptibility sign (ITSS) derived from susceptibility-weighted imaging (SWI) could differentiate glioblastoma multiforme (GBM) and single brain metastasis.

**MATERIALS AND METHODS:** 28 intracranial brain neoplasm patients (M:F = 23:5; age, 69.0 ± 7.4 years [mean ± SD], 10 with nonsmall cell lung cancer (NSCLC) metastases, 9 with renal cell cancer (RCC) metastases, and 9 with glioblastomas WHO IV), underwent examinations that included SWI in addition to conventional magnetic resonance (MR) sequences on a 3T, were enrolled in this study. Two radiologists investigated the distribution patterns of ITSS of the tumors and applied an ITSS grading system based on the degree of the ITSS. Then, we compared the grade of the visibility of ITSS in the central portion of tumors (CITSS) and in the tumor capsular area (PITSS) on SWI in consensus.

**RESULTS:** The mean visibility scores of the CITSS in GBM were significantly higher than NSCLC and RCC...
brain metastases. The mean visibility scores of the PITSS in GBM were significantly lower than NSCLC and RCC brain metastases (p < 0.05, Mann-Whitney test).

**CONCLUSION:** The findings of our study show that differentiation was achieved between GBM and the brain metastases using the ITSS distribution pattern of the brain tumors.

Fig. 1. Graphical illustration of the relative mean score of the visibility the ITSS in the central portion of the different tumor histological groups (A: Glioblastoma multiforme, B: Non small cell lung cancer metastasis, C: Renal cell cancer metastasis).

Fig. 2. Graphical illustration of the relative mean score of the visibility of the ITSS in the tumor capsular area of the different tumor histological groups (A: Glioblastoma multiforme, B: Non small cell lung cancer metastasis, C: Renal cell cancer metastasis).

Fig. 3. Graphical illustration of the ratio of score of the visibility of the ITSS in the central portion of the tumor versus tumor capsular area of the different tumor histological groups (A: Glioblastoma multiforme, B: Non small cell lung cancer metastasis, C: Renal cell cancer metastasis).

Fig. 4. 82 year old male patient with Glioblastoma Multiforme. A: Postcontrast T1 shows intratumoral heterogeneity (arrow). Strong enhancement sharply delineates the margins of the lesion (excellent degree). B: SWI precontrast shows Grade 4 CITSS indicates more than 10 dot-like linear low intensity structures (arrow head) and Grade 2 PITSS.
**Fig. 5.** 84 year old male patient with NSCLC brain metastasis.

**Fig. 5.** 84 year old male patient with non small cell lung cancer brain metastasis. A: Postcontrast T1 shows an interse enhancement, except in a small area, with good degree tumor margin delineation (arrow). B: SWI precontrast shows Grade 1 CITSS indicates no dot-like or linear low intensity structures (arrow head and Grade 4 PITSS).

**Fig. 6.** 66 year old male patient with RCC brain metastasis.

**Fig. 6.** 66 year old male patient with renal cell cancer brain metastasis. A: Postcontrast T1 shows strong enhancement sharply delineates the margins of the lesion (excellent degree). B: SWI precontrast shows Grade 2 CITSS indicates 1-5 dot0like or linear low intensity structures (arrow head) and Grade 4 PITSS.

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**SE 09 NR-03**

The implications of insulin like growth factor 1 receptor in type 2 diabetes-related injuries of brain structure and function

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**PURPOSE:** Patients with type 2 diabetes (T2D) showed significantly increased risk for various neurological and psychiatric disorders, such as major depression and dementia, which result from injuries of brain structure and function. Previous epidemiological and molecular investigations have highlighted the importance of insulin like growth factor 1 receptor (IGF1R) in maintaining normal brain function. However, the corresponding in vivo neurobiology of IGF1R was poorly understood. The present study aimed to reveal the associations between IGF1R and brain structure and neuronal function in T2D patients via genetic-imaging approach.

**MATERIALS AND METHODS:** A total of 168 patients with T2D were enrolled in the study, and every participant went through clinical evaluations, structural and functional magnetic resonance imaging (MRI) scans. High-throughput sequencing of IGF1R gene was utilized, and 23 single nucleotide polymorphism (SNP) entered the further genetic-imaging analysis after quality control. The associations with IGF1R polymorphisms and brain structure and function were investigated.

**RESULTS:** In terms of brain structure, both rs17847195 ($\beta = -0.44$, FDR-corrected $p = 0.023$) and rs2684788 ($\beta = -0.38$, FDR-corrected $p = 0.039$) showed significantly associations with total brain volume. Furthermore, rs1815009 had significantly influence on volume of entorhinal cortex ($\beta = -0.36$, FDR-corrected $p = 0.043$). Regarding the neural activity, interactions were detected with rs2016347 and neural activity within right precuneus ($\beta = -0.58$, FDR-corrected $p = 0.013$). Moreover, rs1815009 also modified the neural activity within left medial prefrontal cortex ($\beta = -0.49$, FDR-corrected $p = 0.019$).

**CONCLUSION:** The genetic-imaging approach expanded our understanding for the mechanisms underlying the implications of IGF1R in T2D-related injuries of brain structure and function, and alleviating the dysfunction of IGF1R may be a promising approach to relieving neurological and psychiatric disorders for patients with T2D.
SE 09 NR-04
Clinical experience of synthetic MRI as routine protocol in the daily practice: a single-center pilot study
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PURPOSE: Synthetic magnetic resonance imaging (MRI) is a quantitative imaging technique that measures inherent T1-relaxation, T2-relaxation, and proton density. These inherent tissue properties allow synthesis of various imaging sequences from a single acquisition. Clinical use of synthetic MR imaging has been described in the previous studies. However, use of synthetic MRI for routine examination has not been previously reported. The purpose of this study is to assess the diagnostic image quality of synthetic MRI as routine protocol in the daily clinical practice.

MATERIALS AND METHODS: We retrospectively reviewed a total 89 patients who underwent routine brain MRI using synthetic imaging acquisition. Image quality assessments were performed on synthetic T1-weighted, T2-weighted, FLAIR and phase-sensitive inversion recovery (PSIR) images by two independent readers.

RESULTS: Synthetic MR images were evaluated using a 4-point assessment scale, overall image quality and anatomical delineation of all sequences were good with more than 3 points. Synthetic T2-weighted FLAIR images was sufficient, but it had lower assessment scales than those of other synthetic sequences. Interobserver agreement for evaluating image quality of all synthetic sequences was good to excellent.

CONCLUSION: Synthetic MRI can be acceptable for clinical use as routine protocol with short scan time, even though the image quality of FLAIR was perceived to be relatively inferior than those of other sequences.

SE 09 NR-05
Initial clinical experience with dual-layer detector spectral CT in patients with acute intracerebral hemorrhage: a single-center pilot study
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PURPOSE: We investigated the clinical usefulness of dual-layer detector spectral computed tomography (CT) in acute intracerebral hemorrhage (ICH) evaluation.

MATERIALS AND METHODS: We retrospectively reviewed patients with acute ICH who underwent CT angiography on a dual-layer detector spectral CT scanner. A spectral data analysis was performed to detect contrast enhancement in or adjacent to acute ICH by using spectral image reconstructions including monoenergetic, virtual noncontrast, and iodine overlay fusion images. We also acquired a spectral plot to assess material differentiation within lesions.

RESULTS: Among the 30 patients, the most common cause of acute ICH was chronic hypertension (18/30, 60%) followed by trauma (5/30, 16.7%), brain tumor (3/30, 10%), moyamoya disease (2/30, 6.7%), and hemorrhagic diathesis from anticoagulation therapy (2/30, 6.7%). The CT angiographic spot sign within the acute ICH was detected in four patients (4/30, 13.3%). All three tumors were metastatic and included lung cancer (n = 2) and hepatocellular carcinoma (n = 1). The ICHs of metastatic tumors showed conspicuous delineation of an enhancing tumor portion in the spectral analysis. Spectral analyses allowed the discrimination of acute hemorrhage and iodine with enhanced lesion visualization.

CONCLUSION: Dual-layer detector spectral CT can be useful for evaluating acute ICH in clinical practice.

SE 09 NR-06
Geometric approach to carotid vascular variations according to age in Korean population
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PURPOSE: Carotid anatomy and geometry may play a role in the pathogenesis of internal carotid artery (ICA) stenosis, but their effects are unknown. We evaluated the changes of carotid artery anatomy and geometry according to age in Korean population.
MATERIALS AND METHODS: This is a retrospective study of subjects with carotid contrast-enhanced MR angiography, 2014 to 2015. Seven age groups were employed by each 300 subjects. Carotid arteries were segmented using semiautomated methods to estimate measures of carotid anatomy and geometry. Measurements of carotid artery geometry were performed according to the recent article by Thomas and colleagues. All parameters such as ICA angle, bifurcation angle, and vessel volume and diameter were compared between several generations.

RESULTS: As age increases, vessel volume and diameter of common carotid artery, internal carotid artery, and carotid bifurcation were significantly positive correlation (p < 0.01). Also, ICA angle and bifurcation angle was significantly increased as age increase (p < 0.01). Medical location of ICA in over 60s was significantly higher than that of below 40s (12.5% vs. 0.03%, p < 0.0001).

CONCLUSION: Vessel volume and diameter of the carotid artery was increased as age increase. Also, the geometry of carotid artery may become widening and rotation as age increase.

SE 09 NR-07
Evaluation of cervical carotid plaque volume using 3D T1 black-blood MRI: comparison of manual and automated software measurements
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PURPOSE: To compare manual and automated measurements of plaque volume in cervical carotid atherosclerosis and to assess the feasibility and the clinical usefulness of the automated software for the measurement of plaque volume in clinical settings.

MATERIALS AND METHODS: Thirteen patients with high-signal plaque in the cervical carotid arteries (mean age, 76 years) were studied to compare manual and automated measurements of carotid plaques. We used 3T MRI (Ingenia, Philips Healthcare, Best, The Netherlands) with a d5 HeadNeckSpine coil for imaging. The imaging-sequence parameters of 3D T1 black-blood (BB) MRI were: T1-VISTA, TR/TE = 350/23, refocusing angle = 40°, matrix = 0.45 × 0.45 × 0.90 mm, and scan time = 4 min 23 s. With the automation software, T1 BB images were converted into isotropic voxels. A seed point was manually selected in the center of a carotid plaque. After the software performed smoothing and region-growing processes, plaque extraction images were obtained. The plaque volume was calculated based on these images. Regarding data analyses, plaque volume was independently measured by two “raters” using the manual method and the software. Analyses of data obtained by the manual and automated methods for plaque-volume measurement included assessment of reproducibility regarding inter-raters and intra-raters and assessment of validity. Spearman’s rank correlation and Bland-Altman analysis were used for statistical analyses. In addition, measurement time was assessed for the manual and automated methods.

RESULTS: Reproducibility of the manual method showed intraclass correlation coefficients (ICC) of 0.986 in intra-raters and ICC of 0.98 in inter-raters. Reproducibility of the automated method showed ICC of 1.00 in intra-raters and ICC of 0.999 in inter-raters. A Bland-Altman analysis of the data showed that validity of the automated method was significant (r = 0.945). Measurement time was much shorter with the automated method than that with the manual method (81.7 ± 7.8 vs. 189.5 ± 49.6 seconds, p < 0.01).

CONCLUSION: We have shown that the developed automated software for the measurement of carotid-plaque volume is feasible and reliable in clinical settings. The automated software could significantly reduce the measurement time and it appears to be of great value in clinical settings.

SE 09 NR-08
Intraobserver and interobserver variability in CT angiography and MR angiography measurements of the size of cerebral aneurysms
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PURPOSE: Accurate and reliable measurement of aneurysm size is important for treatment planning. The purpose of this study was to determine intraobserver and interobserver variability of CTA and MRA for measurement of the size of cerebral aneurysms.

MATERIALS AND METHODS: Thirty patients with 33 unruptured cerebral aneurysms (saccular, > 3 mm in their maximal dimension, with no daughter sacs or lobulations) who underwent 256-row multislice CTA, 3D TOF MRA at 3.0T, and 3DRA were retrospectively analyzed. Three independent observers measured the neck, height, and width of the aneurysms using the CTA and MRA images. Intraobserver and interobserver variability of CTA and MRA measurements were evaluated using the standardized difference and intraclass correlation coefficient, with 3DRA measurements as the reference standard. In addition,
the mean values of the measurements using CTA and MRA were compared with those using 3DRA. 

RESULTS: The overall intraobserver and interobserver standardized differences in CTA/MRA were 12.83-15.92%/13.48-17.45% and 14.08-17.00%/12.08-17.67%, respectively. The overall intraobserver and interobserver intraclass correlation coefficients of CTA/MRA were 0.88-0.98/0.84-0.96 and 0.86-0.98/0.85-0.95, respectively. Compared to the height and width measurements, measurements of the neck dimensions showed higher intraobserver and interobserver variability. The sizes of the cerebral aneurysms measured by CTA and MRA were 1.13-9.26% and 5.20-9.67% larger than those measured by 3DRA, respectively; however, these differences were not statistically significant. 

CONCLUSION: There were no noticeable differences between intraobserver and interobserver variability for both CTA and MRA-based measurements of the size of cerebral aneurysms.

SE 09 NR-09 
Perfusion abnormality in posterior inferior cerebellar artery termination of vertebral artery on arterial spin labeling and dynamic susceptibility contrast perfusion MRI 
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PURPOSE: A posterior inferior cerebellar artery (PICA) termination of vertebral artery has been regarded as a normal variation of vertebrobasilar circulation. However, the perfusion condition of PICA territory in the cerebellum has not been evaluated. This study aims to present the perfusion abnormality in PICA termination of vertebral artery (PICA-VA) on arterial spin labeling (ASL) and dynamic susceptibility contrast (DSC) perfusion MRI.

MATERIALS AND METHODS: Sixteen patients (M:F = 8:8; 49-90 years old) who conducted brain MRI including MR angiography, and ASL and DSC perfusion MR studies and are found to have PICA-VA, are evaluated in this study. PICA-VA are associated with ipsilateral hypoplastic vertebral artery in 14 patients, and bilateral fetal type posterior cerebral artery in 2 patients.

RESULTS: Hypoperfusion in PICA territory is detected on both ASL and time to peak (TTP) map of DSC perfusion MRI in 11 patients (68.7%), on only TTP perfusion MRI in 2 patients (12.5%), on only ASL perfusion MRI in 1 patient (6.3%) and not on both perfusion MRI in 2 patients (12.5%). Any clinical manifestations of vertebrobasilar insufficiency are not accompanied in 2 patients (12.5%). 

CONCLUSION: PICA-VA that is regarded as normal variation, considerably have hypoperfusion in PICA territory of cerebellum. PICA-VA could have the clinical significance, especially in vertebrobasilar insufficiency, so perfusion study such as ASL or DSC perfusion MRI may help to evaluate the clinical status of vertebrobasilar insufficiency.

SE 09 NR-10 
A rare complication of cranio-cervical trauma and the importance of the MRI 
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Cranio-cervical injury generally occur secondary to trauma. Maging findings are important for diagnosis. Because these patients may be unconscious. Pseudomeningocele appearance is important for diagnosis. Accompanying complications such as epidural hematoma can occur with cranio-cervical magnetic resonance imaging (MRI). MRI may be guided for guiding therapy and diagnosis. A 17-year-old female presented to the emergency clinic with due to traffic accidents. On the neurologic examination, there were weakness and paresthesia in both legs and arms. Because, he wasn’t alert and oriented but all vital signs were stable. Vitals on admission were: temperature, 36.8°C; blood pressure, 104/74 mmHg; pulse, 74 per minute; respiratory rate, 22 per minute. The brain and spinal MR imaging was perform. C6/7 level right foraminal nerve root couldn’t be demonstrated. CSF collection was observed in this level (Fig. 1). Cervical nerve was ruptured secondary to trauma.
**SE 09 NR-11**

A rare presentation: plexiform neurofibroma confused with subgaleal hematoma

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Neurofibromatosis is a genetic disease. Characteristic features of the neurofibromatosis include Lisch nodules, café au lait spots, neurofibromas, and plexiform neurofibroma. This is a case report of a plexiform neurofibroma of the skull presenting as a diffuse subgaleal lesion mimicking subgaleal hematoma. Although radiologic and clinical findings were consistent with subacute subgaleal hematoma, the biopsy diagnosis was a plexiform neurofibroma. To our knowledge, a similar case has never been reported.

A 31-year-old female patient with neurofibromatosis type-1 diagnosed in puberty was referred to our hospital complaining of occipital region swelling. The patient had a trauma story to the same region a few weeks ago. Physical examination revealed multiple subcutaneous neurofibromas and café-au-lait spots. Magnetic resonance imaging (MRI) showed a lesion resembling subgaleal hematoma in the occipital region. Because the lesion was hypointense in T1-weighted imaging and hyperintense in T2-Weighted imaging (Fig. 1). Therefore, subacute subgaleal hematoma due to trauma was considered primarily. The patient was discharged with suggestions. The patient reappeared with the same complaint a few weeks later. It was seen that the swelling in the occipital region of the patient was not regression. Contrast-enhanced MRI showed a lesion showing subgaleal hematoma in the occipital region. The lesion slightly restricted diffusion (Fig. 2A). Contrast-enhanced MRI showed a homogeneous contrast enhancement of the lesion (Fig. 2B). For this reason, the diagnosis of plexiform neurofibroma was considered. The diagnosis of plexiform neurofibroma was confirmed via pathology report.

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**SE 09 NR-12**

Uncommon causes of headache: neuroblastoma cranial involvement and imaging findings

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Neuroblastoma shows rare cranial involvement. Complaints may vary according to involvement place. But, Headache is rarely the first complain. Neuroblastoma can be confused with other diseases showing cranial involvement. Neuroblastoma may have the typical appearance. Hair brush appearance is important for neuroblastoma. 14-year-old male patient was admitted with complaint of headache. The patient had complaint of constantly headache for a long time. Due to increment of complaints last few hours, patient admitted to the emergency department. In addition, patient was previously operated for a neuroblastoma. Large head circumference was observed on physical examination. Laboratory tests were normal. The cranial computed tomography (CT) scan and magnetic resonance imaging (MRI) were performed on patient. Hyperdense lesions, which asymmetric involved bilateral cranial bones, were obtained at cranial CT. Hair brush appearance was observed at MRI (Fig. 1). Biopsy was performed by neurosurgery. According to the pathology findings patient was finally diagnosed with neuroblastoma metastases.
Electrophysiological processes on motor imagery mediates the association between impaired gray matter volume and cognition in MCI

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**PURPOSE:** Motor imagery is considered as an ideal window to observe neural processes of action representations. Behavioral evidence has indicated an alteration of action representation in amnestic mild cognitive impairment (aMCI). However, it still remains unclear on the neurophysiological processing mechanism of altered action representation and whether this mechanism links the abnormal biological basis of action representation with impaired cognition in aMCI. This study was to investigate the altered neurophysiological processing mechanism of action representation and to examine the relationships between this knowledge and the altered structural basis of motor imagery with impaired cognition in aMCI.

**MATERIALS AND METHODS:** A hand mental rotation paradigm was used to manipulate the processing of motor imagery while event-related brain potentials (ERPs) were recorded and gray matter (GM) voxel-based morphometry was performed in 20 aMCI and 29 healthy controls.

**RESULTS:** aMCI exhibited neuropsychological deficits with lower amplitudes in parietal cortex and higher amplitudes in frontal cortex. In addition, aMCI showed reduced GM volumes in cerebellum posterior lobe, insula and hippocampus/parahippocampal gyrus, and increased GM volumes in middle cingulate gyrus and superior frontal gyrus. Most importantly, increased ERP amplitude significantly mediated the association between increased GM and cognition.

**CONCLUSION:** This study provided a novel evidence for the electrophysiological processing mechanism on altered motor imagery in aMCI. It suggests that the relationships between this mechanism and structural basis of action representation with impaired cognition may help to design more specific mental training for learning motor skills to serve as a framework for future neurological rehabilitation for this disease.
CONCLUSION: We conclude that there have no relationship between brain MRI abnormalities and EEG abnormalities in children with epilepsy. Therefore, MRI and EEG should be used complementarily in diagnosis of epilepsy.

SE 09 NR-16
Believe it or not! Spinal cord intramedullary actinomycosis mimicking lymphoma
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INTRODUCTION: Actinomycosis is a rare infection caused by actinomyces spp, an anaerobic gram-positive bacterium. The term ‘mycosis’ is a misnomer which commonly coined to fungal infection. It is characterized by painful abscess formation in the mouth, breast, lungs, gastrointestinal and genitourinary systems. Primary involvement of central nervous system (CNS) is rare.

CASE REPORT: An 11-year-old girl with history of involvement of central nervous system (CNS) is rare. Secondly, Actinomyces infection is an indolent, chronic infection which mimics lymphoma. Therefore, misdiagnosis is common.

DISCUSSION: Actinomycosis is a chronic, indolent and slowly progressive infection, predisposed by poor dental hygiene, recent dental procedures or trauma breaching oral mucosa. It is usually due to adjacent spread of soft tissue infection but the infection may occur following trauma or it can be hematogenous spread. CNS Involvement include brain abscess, meningitis or meningoencephalitis, subdural empyema and epidural abscess. The neurological deficits include myelopathy or myeloradiculopathy due to compression from epidural lesions. Interestingly, cord involvement manifests as intramedullary lesion has yet to be reported. The lesion mimics lymphoma with cord expansion and leptomeningeal enhancement. Misdiagnosis is common. Due to its chronicity, the treatment of cord actinomycosis requires prolonged high-dose antimicrobial therapy.

CONCLUSION: Actinomycosis frequently mimics malignancy, tuberculosis, or nocardiosis, therefore poses a great challenge to the radiologists. The implications is clear that collaboration between radiologists, pathologists and clinician is of utmost importance in the presence of discordant clinical and radiological findings.

SE 09 NR-17
High resolution vessel wall MR imaging in the diagnosis and follow-up of intracranial vertebral artery dissection
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PURPOSE: Spontaneous, unruptured vertebral dissection (VAD) has increasingly been considered as a relatively common cause of stroke. The purpose of our study was to evaluate the value of high resolution (HR) vessel wall MR imaging in the diagnosis and follow-up of intracranial VADs.

MATERIALS AND METHODS: From March 2014 to April 2017, 15 patients with 16 intracranial VADs performed at least two HR vessel wall MRI for initial diagnosis and follow-up. All VAD was classified into three patterns; steno-occlusive, pearl and string, aneurysmal dilatation at initial MR angiography. Intramural hematoma, dissecting flap and vessel wall enhancement, degree of stenosis were observed in both initial and follow-up HR MR imaging.

RESULTS: Median follow-up was 4 months (3 to 19 months). It is observed in the order of aneurysmal dilatation (8, 53.3%), steno-occlusive lesion (5, 33.3%), and pearl and string (2, 13.3%) at initial HR MR imaging. Seven of eight VADs with aneurysmal dilatation revealed no significant interval change on follow-up HR imaging and only one VAD revealed decreased extent of intramural hematoma in affected vessel. Two VADs with fusiform dilatation performed double stent insertion during follow-up period. Four of five VADs with steno-occlusive pattern revealed recanalization of blood flow and decreased extent of intramural hematoma. Among the VAD with pearl and string, intramural hematoma decreased in one VAD and no significant interval change in another VAD.

CONCLUSION: HR vessel wall MR imaging can be helpful in initial diagnosis and follow-up of intracranial VAD.
Idiopathic intracranial hypertension (IIH), previously referred to as pseudotumor cerebri, is a syndrome of unknown etiology best described as increased intracranial pressure (ICP) in the absence of an identifiable cause. It predominantly affects obese women of childbearing age. Proposed mechanisms of pathophysiology for IIH revolve around altered CSF physiology, either through resistance to absorption and/or abnormal CSF pressure and pulsatility. Traditionally, the role of imaging in the evaluation of IIH has been to exclude secondary causes of increased ICP and papilledema including hydrocephalus, intracranial masses, chronic meningitis and dural sinus thrombosis. Several radiological findings have been described in the literature that may aid in establishing the diagnosis such as: flattening of the posterior aspect of the globe, protrusion and enhancement of the optic nerve head, increased perioptic CSF space, vertically increased tortuosity of the optic nerve, and the presence of an empty sella. In addition, MR venography can identify sinovenous stenosis as a potential cause of IIH which is controversial.

In this exhibition, we will review pathophysiology and imaging features of IIH.

**SE 09 NR-19**

**MR H1 spectroscopy for grading of primary intraaxial brain tumors: initial metabolic profiles**

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**PURPOSE:** To assess metabolites in intra-axial brain tumors in Mongolian patients referred for MRI evaluation.

**MATERIALS AND METHODS:** We prospectively selected patients with infiltrative intra-axial brain masses with faint heterogeneous/no contrast enhancement at their initial MRI examination at Mungun Guur Hospital, which is tertiary level private hospital and collaborates with Department of Neurosurgery at the Shastin Third Central Hospital in Mongolia. Upon received patient consent, we performed 1HMR spectroscopy studies using a 1.5T system (Phillips, The Netherlands) with a quadrature head coil. The routine imaging studies included multplanar T2-weighted fast spin-echo (4000/126/2) with an echo train length of eight sequences. The parameters used were 2000/144, 192 acquisitions, a spectral width of 1000 Hz, and 5133 data points for all patients. In all patients, MR spectra were obtained with a TE of 144 with additional TE 35. Metabolites such as N-acetylaspartate (NAA), Choline (Cho), Creatine (Cr), and Lactate (Lac) and Glutamine (Glx) were detected. Data were analyzed by Windows Excel.

**RESULTS:** Between September 2016 and January 2017, we investigated 6 patients aged 3-62, F:M = 4:3. The mean metabolite values were estimated as: NAA/Cr 1.27, NAA/Cr (h) 1.44, Cho-Cr 1.47, Cho/Cho (h) 1.83, NAA/Cho (h) 1.47, Cho/NAA 1.42, Cho/NAA 1.7 ppm. No lactate peaks were detected in the study sample.

**CONCLUSION:** Initial data of metabolites at MRS showed its usefulness in preoperative assessment of infiltrative intra-axial brain tumors, which provides additional information to tumor grading particularly in patients with irresistible tumors. Higher lactate/Cr ratio in infiltrative tumors predicts the higher grade of brain tumors.

**SE 09 NR-20**

**CT and MRI detection of pituitary invasive macroadenoma - Mongolian National Trauma Center**

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**BACKGROUND:** Pituitary adenomas are the most common tumors of the sellar region. MRI in Mongolia allowed noninvasive assessment of ionizing radiation. MRI have been increasingly useful for detecting the pituitary macro and micro adenoma. In last few years the number of cases for pituitary macro and micro adenomas have been increasing.

**KEY POINTS:** Invasive adenoma of pituitary gland. Patient is 47 years old male presented with headache of gradual onset slowly progressive. Patient was evaluated using plain and contrast computed tomography (CT) brain and magnetic resonance imaging (MRI).

**PURPOSE:** We aimed to use CT and dynamic MRI findings to detect pituitary invasive macro adenoma. Firstly used CT, but it only showed bone destruction. Dynamic MRI usually works on brain soft tissues much more clearly, especially pituitary gland.

**MATERIALS AND METHODS:** We retrospectively used head CT and dynamic MRI at National Trauma Center. Head CT examination without contrast, showed us that
bone destructive mass at sphenoid bone invaded to left portion of clivus, cavernous sinus. Noted arising from sella and invading into suprasellar region bone window shows widening of sella with clivus erosion. Mass seems to invade the optic chiasma anteriorly.

**Brain Dynamic** MRI examination with contrast media administration. There is low-intensity, heterogeneous mass involved the sella turcica, suprasellar cistern, left cavernous sinus, sphenoid sinus and clivus. The mass shows multiple small fluid levels and T1-hypointensities-suggestive of cystic degeneration. This mass shows heterointense enhancement.

**CONCLUSION:** Dynamic brain MRI plays crucial role in detection of pituitary invasive macro adenoma. When we use brain CT the adenoma doesn’t show up. It only shows the destruction of bone mass. The invasive nature of pituitary macroadenoma is well documented, but while invasion of the cavernous sinuses and carotid arteries and along the dura is common, invasion of the clivus is relatively rare. Furthermore, by using comparison of dynamic brain MRI and CT results we will have more effective way of reaching conclusion.

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**SE 09 NR-21**

**Determining the pathology of an intradural extramedullary spinal tumor from location on MR imaging**

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**PURPOSE:** Determining the pathology of an intradural extramedullary (IDEM) spinal tumor from location on MR imaging continues to be challenging. Our retrospective study attempts to determine if location dictates pathology in IDEM spinal cord tumors.

**MATERIALS AND METHODS:** We performed a retrospective review of 86 consecutive patients. The mean age was 49.9 years who presented with an intradural extramedullary spine tumor in the cervical and/ or thoracic regions and underwent resection between February 2015 and July 2016.

**RESULTS:** Axial location was predominantly lateral at 69%, compared to 12.5% anterior and 17.7% posterior. The axial location of IDEM was not significantly different when assessed at different levels (p = 0.32). Meningiomas were equally distributed along 4 quadrants with 19.5% anterior, 24.4% posterior, and 56.1% lateral (2 quadrants). The plausible reason there is a roughly equal distribution of tumors in all 4 quadrants is that meningiomas arise from arachnoid cap cells in the arachnoid layer of the meninges, and there is an equal distribution of meninges around the spinal cord. Schwannomas and neurofibromas are lateral in position towards the nerve roots with 83.8% and 88.2% respectively. The pathology of anterior IDEM tumors are predominantly meningiomas with 72.7%, and the rest 27.3% were schwannomas. From analyzing the preoperative films on these anterior schwannomas, it was noted that the patients had large growing tumors that started laterally and pushed the spinal cord posteriorly. Neurofibromas occur at a higher frequency rostrally: O-C3 (41.2%), C4-C7 (29.4%), T1-T4 (11.8%), T5-T8 (11.8%), and T9-T12 (5.9%).

**CONCLUSION:** Preoperative radiographic location from our series of 98 patients suggests a correlation between location and pathology. Meningiomas are shown to occur equally in all four axial quadrants of the spinal cord. Anterior tumors are more likely meningiomas compared to schwannomas with a rate of 3:1. Neurofibromas occur more frequently rostral and lateral but do not occur anteriorly.

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**SE 09 NR-22**

**Intracranial hemorrhage in CT scan - a pictorial review of different underlying pathologies and pitfalls in reporting**

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CT brain imaging is one of the most frequently prescribed and often the first line of investigation for suspected intracranial hemorrhage. A radiologist report would have added value if one were able to provide the possible underlying cause and guide the clinician in the next step of investigation and management. One can often identify the underlying cause by the pattern recognition and its unique features on CT scan. Therefore, a pictorial review of intracranial hemorrhage due to various underlying causes is presented. Demonstration of the underlying pathology by CT angiography, MRI or conventional angiography is also included whenever applicable.

The second purpose of this pictorial review is to shed lights on the pitfalls and mimics of intracranial hemorrhage. CT brain is frequently reported first by the radiology trainees, especially during on-call hours. Missing or over-calling intracranial hemorrhages has serious implication as the management changes significantly. Tips to avoid misinterpretation as well as the limitation of CT brain imaging are addressed.
SE 09 NR-23
Research in CT signs of meningioma

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PURPOSE: To study and identify computed tomography (CT) signs of Meningioma.

MATERIALS AND METHODS: We involved 24 subjects who diagnosed as Meningioma with using 64 slice multi-detector CT/64MD-CT (Philips Ingenuity) in cabinet of CT under the Radiology Department of the 3rd State Central Hospital of Mongolia during 2014-2017 and prepared specific card with using patient’s CT signs and analyzed them.

RESULTS: Considering CT signs of Meningioma by location: Parasagittal-12 (50.0% ± 7), Convexital-5 (20.8%), Wing of sphenoid bone-3 (12.5%), Sella turcica-2 (8.3%), Third ventricle-2 (8.3%); by structure: homogenous-18 (75.0%), heterogenous-6 (25.0%); by density: irregular hyperdensity-5 (20.8%), irregular hypodensity-1 (4.2%), regular hyperdensity-18 (75.0%); by borders: clear-19 (79.2%), not clear-5 (20.8%), regular-20 (83.3%), irregular-4 (16.7%), by differences in density of lesion after contrast dye injection: not changed-1 (4.2%), irregularly enhanced-4 (16.7%), regularly enhanced-19 (79.2%), by cerebral edema: partial-18 (75.0%), widespread-3 (12.5%), diffuse-2 (8.3%), deviated-9 (37.5%); by lateral ventricle: normal-2 (8.3%), regularly widened-13 (54.2%), irregularly widened-6 (25.0%), irregularly narrowed-3 (12.5%) respectively.

CONCLUSION: We found CT signs of Meningioma dominantly observed in parasagittal plane including homogenous and regular hyperdensity, clear and regular borders, density increased in arterial phase, partial cerebral edema and regular widening of lateral ventricle.

SE 09 NR-24
Contrast-enhanced MR imaging of brain tumors: comparison with T1-Cube and 3D fast spoiled gradient recall acquisition in steady state sequences

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PURPOSE: T1-Cube is a relatively new 3D FSE-based MR imaging sequence that uses a variable flip angle to acquire gap-free volume scans. We compared the gadolinium enhancement characteristics of a heterogeneous population of brain tumors imaged by T1-Cube and 3D FSPGR at 3-tesla MR imaging with time-dependent changes.

MATERIALS AND METHODS: A totally 91 lesions from 52 patients with brain tumors (17 patients with metastasis [51 lesions], 17 with high grade glioma [HGG, 19 lesions], 7 with primary central nervous system [CNS] lymphoma [10 lesions], and 11 with meningioma), the two sequences in 3T MRI (Discovery 750, GE Healthcare, Milwaukee, WI, USA) were examined after administration of contrast agent (Gd-DTPA, 0.1 mmol/kg). Fifty-one (metastasis 32, HGG 11, meningioma 5, PCNSL 3) of the 91 lesions (56.04%) were depicted with T1-Cube first, and 40 (metastasis 19, HGG 8, meningioma 6, PCNSL 7) lesions (43.96%), with 3D FSPGR first. We measured the contrast-to-noise ratio (CNR) which is the signal intensity (SI) of a tumor and normalized by SI of the white matter for each sequence on the pre and post contrast 3D FSPGR and post contrast T1-Cube images. Two neuroradiologists measured ROIs twice separately.

RESULTS: The mean CNR was significantly higher on T1-Cube images than 3D FSPGR images for the total tumor population (p < 0.0001) and the histologic types, i.e., metastasis (p < 0.001) and HGG (p < 0.05). By the analysis concerning with sequence order, the first T1-Cube: mean CNR was slightly larger (p < 0.0001) and the first 3D FSPGR: mean CNR significantly higher (p < 0.014) on T1-Cube images than on 3D FSPGR images. The difference in mean CNR was both of larger (p < 0.05) and smaller (p < 0.011) tumors in the metastatic group.

DISCUSSION: Previous studies, reported that the CNR of brain metastasis on SPACE was significantly higher than that for MPRAGE at 3T MRI. In this study, we acquired T1-Cube images before and after 3D FSPGR images because a longer delay after injection of contrast agent results in greater enhancement, so 3D FSPGR images would be expected to exhibit greater enhancement than T1-Cube images. However, the overall mean CNR value and most tumor subtype mean
CNR values were higher on T1-Cube images with both order sequences. **CONCLUSION:** Gd enhancement of the same heterogeneous population of tumors was higher using T1-Cube than 3D FSPGR, and suggest the superiority of T1-Cube to 3D FSPGR for the detection of metastatic brain lesions.

**SE 09 NR-25**
Cerebral venous sinus thrombosis: “dense clot” and “dense cord” signs in plain CT brain
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**PURPOSE:** Cerebral venous sinus thrombosis (CVST) is an important neurovascular disorder that has variable presentation and clinical sequelae. It is commonly missed in plain computed tomography (CT) brain. Subarachnoid hemorrhage (SAH) is recognized as a potential complication of CVST. We present a case report of a 40-year-old lady, admitted to emergency department with symptoms of stroke. This case study emphasizes the CT features of “dense clot” sign and importance of early detection of cerebral venous and brain parenchymal changes related to thrombosis in plain CT brain.

**MATERIALS AND METHODS:** Case report and literature review.

**RESULTS:** A 40-year-old female with underlying hypertension, presented with headache, sudden onset of body weakness and slurred speech. On examination, she was alert with hypotonia and loss of power of right upper and lower limbs. Blood pressure was within normal range. All blood parameters were normal. Plain CT showed “dense clot” sign, indicating hyperdensity within the superior sagittal sinus. This is a classical direct sign of cerebral venous thrombosis. Contrast enhanced CT brain confirmed filling defects along the superior sagittal sinus, suggestive of thrombus formation. Repeated plain CT brain after 24 hours showed “dense cord” sign at the right cortical vein and left parietal infarction with hemorrhagic transformation.

**CONCLUSION:** This case report highlighted the importance of CT features of cerebral venous sinus thrombosis in plain CT brain. By knowing the features of cerebral venous thrombosis including “dense clot” and “dense cord” signs, radiologists can help the early diagnosis and prevent complications.

Plain CT showed “dense clot” sign, indicating hyperdensity within the superior sagittal sinus.

Contrast enhanced CT brain showed filling defects along the superior sagittal sinus suggestive of thrombus formation.

**SE 09 NR-26**
Distinction between mixed post-RT necrosis and recurred tumor on perfusion MRI with pathological correlation
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**PURPOSE:** There are three spectrums after radiation therapy of brain tumor: type 1 (entirely post-RT recurred tumor), type 2 (entirely post-RT necrosis), and type 3 (mixed post-RT recurred tumor and necrosis). Type 1 and type 2 are well known, but features of type 3 on perfusion MRI correlated with pathology have rarely been reported. The purpose of this exhibition is to differentiate three groups based on perfusion MR, correlated with pathology.

**CONTENTS ORGANIZATION:** We retrospectively reviewed clinical findings and MR images (including conventional MR sequences, perfusion MR, and MR spectroscopy) in the patients with post-RT recurred tumor and/or post-RT necrosis correlated with pathology. Among them, we trisected them into three groups: type 1 (entirely post-RT recurred tumor), type 2 (entirely post-RT necrosis), and type 3 (mixed post-RT recurred tumor and necrosis). We found the noticeable imaging feature between the patients with post-RT recurred tumor and/
or post-RT necrosis.

**TEACHING POINTS:** It is difficult to differentiate between radiation necrosis and recurred tumor after radiation therapy because they have similar conventional MR imaging features. Perfusion MRI with MRS can be useful tool to differentiate between them.

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**SE 09 NR-27**

**Features of uncommon acute infectious meningoencephalitis (AIE) on DWI**

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**PURPOSE:** The MRI features of acute infectious meningoencephalitis such as herpes simplex virus are well known. However, uncommon causes of acute infectious meningoencephalitis such as mycoplasma, tsutsugamushi are rarely reported. The purpose of this exhibition is to introduce various causes of uncommon acute infectious meningoencephalitis (AIE) and show distinct image MRI features focusing on DWI.

**CONTENTS ORGANIZATION:** Clinical findings and MR images on DWI in the patients with uncommon acute infectious meningoencephalitis. Selection of serologically or clinically proven infectious meningoencephalitis. Classified them according to causes.

- Viral encephalitis
  - Hand, Foot and Mouth disease (Coxsackievirus A16)
  - HIV encephalitis (Human Immunodeficiency virus)
  - Progressive multifocal leukoencephalopathy (JC virus)
  - Japanese encephalitis (Japanese encephalitis virus)
- Non-viral encephalitis
  - Mycoplasma
  - Tsutsugamushi
  - Mucormycosis
  - Nocardia
  - Listeria

**TEACHING POINTS:**
1. There are many uncommon causes of acute infectious meningoencephalitis.
2. They have relatively distinguishing DWI features correlated with clinical findings.
3. It is important to detect and interpret DWI images about uncommon acute infectious meningoencephalitis and it can be useful for differential diagnosis.

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**SE 09 NR-28**

**Pilocytic astrocytoma: variable imaging manifestation and differential diagnosis**

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**TEACHING POINTS**
- To review clinical issues of pilocytic astrocytoma
- To review the characteristic imaging findings of pilocytic astrocytoma according to the patient's age and the tumor location
- To discuss the differential diagnosis of pilocytic astrocytoma according to the location

**TABLE OF CONTENTS/OUTLINE**
- Clinical issues of pilocytic astrocytoma
- Review of variable radiologic manifestation of pilocytic astrocytoma
  - Cerebellum
  - Brainstem
  - Spinal cord
  - Chiasmatic/hypothalamic
  - Cerebral hemisphere
  - Ventricle
- Relevance differential diagnosis in each location
- Summary

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**SE 09 NR-29**

**Congenital anomalies of the ophthalmic artery and anterior cerebral artery origins: a pictorial review**

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**TEACHING POINTS:**
1. Extremely rarely, the OA arises from the A1 segment of the ACA. It has been presumed to be resulted from failure of the caudal migration of the primitive ventral OA.
2. OA arising from the cavernous segment of the ICA reportedly constitutes 0.42% of OAs. It has been presumed to result from the persistent dorsal OA.
3. An infraoptic course of the ACA is a rare anomaly. The embryogenesis of this anomaly is unclear.
4. Recognition and reporting of OA and ACA of anomalous origin are important to avoid complications during surgery of the suprasellar and parasellar regions.

Case 1. Ophthalmic artery (OA) arising from the anterior cerebral artery (ACA).
Case 2. Ophthalmic artery arising from the cavernous segment of the internal carotid artery (ICA).
Case 3. Infraoptic anterior cerebral artery (ACA).

**DISCUSSION:**
1. Development of normal OA and its variations
2. Clinical relevance in patients with OA and ACA variations

**CONCLUSION:** Although the clinical significance of an OA and ACA of anomalous origin is limited, its recognition and reporting during interpretation of MR angiography are important to avoid complications during surgery of the suprasellar and parasellar regions.

**Fig. 1.** Ophthalmic artery (OA) arising from the anterior cerebral artery (ACA). (A) On MRA maximum-intensity projection (MIP) image, a faint left OA is visualized, but there is no right OA around the carotid siphon (arrows). (B, C) AP and lateral projection of selective angiography of the right internal carotid artery. The right OA (arrowhead) arises from the right ACA (arrow).

**SE 09 NR-30**
Absence of left common carotid artery with common origin between left external carotid artery and right common carotid artery

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**INTRODUCTION:** The absence of left common carotid artery is rare vascular anomaly and generally coexisted with independent origins of the internal carotid artery (ICA) and external carotid artery (ECA). In MR angiographic findings of our case, the left ECA and right common carotid artery (CCA) had a common origin from the aorta. To the best of our knowledge, this rare anomaly has not been reported.

**CASE PRESENTATION:** A 39-year-old woman was admitted to have a right total hip arthroplasty for her secondary osteoarthritis. During preoperative evaluation, her MR angiography incidentally showed absence of left CCA with common origin between left ECA and right CCA. Because of an absence of left CCA, left ICA was originated from aortic arch directly. There were also an aberrant right subclavian artery and a low bifurcation of right CCA.

**DISCUSSION:** We reported a rare case of absence of left CCA with common origin between left ECA and right CCA. It is closely related with abnormal embryonic developmental process of carotid arteries and aortic arches. Although there is no definite clinical symptom or sign caused by this anomaly have been described, this vascular anomaly can be related with developmental anomaly including aortic arch. It is important that the doctors know the vascular anomalies of the patient correctly for understanding associated neurological symptoms and should be cautious about considering invasive endovascular procedures or surgeries with related vascular systems. In our case the common origin between left ECA and right CCA is noteworthy that makes this case even rarer.

**Fig. 1.** TOF neck MR angiography shows common origin between the right CCA and the left ECA (white arrowhead) and the left ICA originated from aortic arch directly (black arrowhead). It suggests absence of the left CCA. Additionally, a low bifurcation of the right CCA (white asterisk) and aberrant right subclavian artery (white arrow) are also demonstrated.
SE 09 NR-31
Imaging of intracranial lesions mimicking brain tumors
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PURPOSE: To review the imaging findings of intracranial lesions can mimic brain tumors and differentiate them from brain tumors.

CONTENTS: Many nonneoplastic intracranial lesions can radiologically and clinically mimic brain tumors. These tumor-like lesions include CNS infections, tumefactive demyelinating lesions, toxic, metabolic disorders, and vascular disorders. In patient with treated tumor, pseudo-progression and radionecrosis must be differentiated from the tumor. They causing concern until the correct diagnosis becomes clear and may lead to delay in medical treatment or result in unnecessary surgery. Occasionally, some of these lesions cannot be differentiated from the tumor and patients undergo biopsy. But some clinical and radiological patterns can be helpful to differentiate them from the tumor. In this educational exhibition, we will review clinical manifestation and imaging findings of intracranial lesions can mimic brain tumors.

CONCLUSION: A variety of nonneoplastic intracranial lesions can mimic brain tumors. Radiologists should be familiar with these entities to reach an exact diagnosis and initiate rapid and appropriate treatment.

SE 09 NR-32
Research of CT results of neurinoma
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PURPOSE: To research and determine computer tomography (CT) results of neurinoma and processes diagnosis criteria of CT.

MATERIALS AND METHODS: We processed special research card on test results of CT of the 38 patients who were examined and diagnosed as neurinoma in department of ultra sound diagnosis of imaging diagnosis department in the Central Third Clinical Hospital named after P.N. Shastin and Achtan Clinical Hospital from 2014 to 2017 and made conclusion.

RESULTS: In consideration to CT results of neurinoma, focus located in pons in 13 (92.8% ± 7.1), focus in node of trimeginus nerve in 1 (7.1% ± 7.1), homogeneity of structure in 12 (85.7% ± 9.7), change of structural homogeneity in 2 (14.3% ± 9.7), uneven increase of density in 3 (21.4% ± 11.4), even reduction of density in 6 (42.9 ± 13.7), even increase of density in 5 (35.7% ± 13.3), clear margin 11 (78.6% ± 11.4), unclear margin in 3 (21.4% ± 11.4), even margin and border in 12 (85.7% ± 9.7), uneven border in 2 (14.3% ± 9.7). After injection of contrast substance, increase of focal change in 4 (28.6% ± 12.5), even increase of density in 10 (71.4% ± 12.5), partial edema of brain and skull in 9 (64.3% ± 13.3), multiple - focused edema of brain and skull in 3 (21.4% ± 11.4), spread edema of brain and skull in 1 (7.1% ± 7.1), edema around ventricle in 1 (7.1% ± 7.1), no tilting of midbrain in 11 (78.6% ± 11.4), tilting of midbrain in 3 (21.4% ± 11.4), normal condition of lateral ventricles in 2 (14.3% ± 9.7), even dilatation of lateral ventricles in 5 (35.7% ± 13.3), uneven dilatation of lateral ventricles in 6 (42.9% ± 13.7) and small uneven dimension of lateral ventricles in 1 (7.1% ± 7.1).

CONCLUSION: In neurinoma, the following signs are prevalent. Herein: focus in pons and corner of cerebellum, even homogeneity, clear border, after contrast substance, increase of focal density and partial edema of brain and skull. We determined following main criteria of CT. Herein: location, shape, number, structure, density, margin and border of focal change, ventricle system, location of midbrain, edema around focal change, density of focal change after injection of contrast substance.
SE 09 NR-33
Giant cerebral cavernous malformation - a case report
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BACKGROUND: Cerebral cavernous malformations (CMs) also known as cavernoma are benign vascular hamartoma which composed of closely opposed immature blood vessels with no normal intervening neural tissues within. Most CMs are small in size but some can be huge and mimic a brain tumor causing diagnostic challenge. These huge CMs are termed giant cavernous malformations. The definition for giant CMs are arbitrary with Kan et al. defining it as CMs with diameter of more than 4 cm. We thereby report a rare case of giant CM which we believe is the first reported case to date in Malaysian populations.

CASE PRESENTATION: A 16 year old lady, presented to our tertiary hospital with generalized tonic-clonic seizure which was aborted only after Intravenous (IV) Midazolam. She had these seizure episodes since 2 years ago and was diagnosed as having epilepsy in a rural clinic in Sarawak. No neuroimaging was done during the initial presentation because of social and logistic issues. Antiepileptic was started since then and she was seizure-free until this current presentation. Computed tomography (CT) Brain done showed a large hyperdense intra-axial lesion at left frontal lobe with surrounding perilesional edema. MRI brain showed a left frontal lesion (size, 4.6 x 4.1 x 4.1 cm) with hypointense hemosiderin rim and central mixed signal intensities resembling 'popcorn' appearance on T2WI. It showed areas of hyperintensities on T1WI and there was minimal enhancement post gadolinium. On susceptibility weighted imaging (SWI), it demonstrated typical susceptibility effect. Overall features were suggestive of cavernous malformation. Subsequently, she underwent left frontal craniotomy and excision of the lesion. Histopathological examination (HPE) confirmed the findings of cavernous malformation. She recovered well post-operative and has no seizure episodes to date.

CONCLUSION: Giant CMs are rare vascular malformations of the brain. Despite its large size, there is usually good clinical outcome following surgical resection as shown in our case.

SE 09 NR-34
Efficacy of the 3D T2 weighted driven equilibrium radiofrequency reset pulse compared with the time-of-flight MR angiography for trigeminal neuralgia with surgical correlation
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PURPOSE: To demonstrate the efficacy of 3D T2 weighted driven equilibrium radiofrequency reset pulse (DRIVE) as preoperative evaluation compared with time-of-flight MR angiography (TOF MRA) for evaluating the neurovascular contact in patients with trigeminal neuralgia (TN).

MATERIALS AND METHODS: One hundred fifty six patients with TN who underwent preoperative magnetic resonance (MR) imaging between August 2012 and December 2016 were retrospectively reviewed. MR images using axial 3D T2W-DRIVE and axial TOF MRA. The presence of vascular contact and the type of vessel were reviewed to compare the diagnostic accuracy between the two sequences. All patients underwent microvascular decompression (MVD) and preoperative MR imaging findings were compared with the surgical findings.

RESULTS: One hundred twenty nine patients (M:F = 37:92; mean age, 57.9 years) were enrolled in this study and they were surgically confirmed a vascular contact with trigeminal nerve and 117 patients (91%) had consistent results between surgery and MR imaging findings. Among them, diagnostic concordance of neurovascular contact when using axial 3D T2W-DRIVE was 100% (117/117) and provided superior contrast between the cranial nerves, small vessel and
cerebrospinal fluid (CSF) in the cerebellopontine angle (CPA). However, when axial TOF MRA was used, the diagnostic concordance with the surgical findings was lower than axial 3D T2W-DRIVE, which was 80% (94/117). Preoperative 3D T2W-DRIVE demonstrated exactly the neurovascular relationship in patients with TN and identified the offending vessels in all patients undergoing MVD compared with TOF MRA. When diagnosing TN patients using MRI, there is a limitation to evaluate with TOF MRA alone.

**CONCLUSION:** 3D T2W-DRIVE can accurately delineate abnormal neurovascular relationship in the CPA, and is an important preoperative examination for surgical management of TN patients.

**SE 09 NR-35**

Cases of stroke types during CT procedure

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**BACKGROUND:** Head computed tomography (CT) is non-invasive, painless imaging diagnostic method with advantages of detailed pictures that could reveal intracranial hematoma, facial and cranial bone fractures in short period. We aimed to study cases of strokes diagnosed with CT that could positively influence on prognosis of stroke patient who requires urgent treatment especially in traumatic stroke.

**PURPOSE:** To study and identify cases of stroke with using CT.

**MATERIALS AND METHODS:** We used retrospective study method and analyzed CT scan records, imaging database of National Trauma and Orthopedic Research Center of Mongolia (NTORC) with age, gender, stroke types, deviation of central components, cranial and facial bone fracture between October 2016 to May 2017. Also we analyzed data with using specific tool.

**RESULTS:** We involved 746 patients who had head injury and brought into National Trauma and Orthopedic Research Center of Mongolia (NTORC) with age, gender, stroke types, deviation of central components, cranial and facial bone fracture between October 2016 to May 2017. We analyzed non-contrast CT test interpretations of patients with age of 2 months to 93, mean age of 32.4. According to patient’s gender differences, males were 460 (61.7%) and females 286 (38.3%) respectively. There were totally 133 (17.8%) cases of brain hematoma such as epidural hematoma 32 (4.3%), subdural hematoma 29 (3.9%), subarachnoid hematoma 77 (10.3%), deviation of central component 27 (3.6%), facial bone fracture 118 (15.8%), soft tissue injury 174 (23.3%). Most of the cases or 556 (74.5%) cases accounted without cerebral and facial bone injuries.

**CONCLUSION:** Non-contrast head CT wouldn’t commonly performed in stroke patients, however if there weren’t emergent cases to save patient’s life that requires urgent diagnosing and treatment. But in case of CT scan, physicians would consider indications of physical examination, anamnesis to save money economically, cover the patient and reduce radiation load to patient.

**SE 09 NR-36**

Comparative evaluation of the polynomial and spline fitting methods to the B0 correction on human brain CEST MRI data

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**BACKGROUND AND PURPOSE:** In analyzing full Z spectrum images, the B0 correction is one of the most important parts. Until now, researchers have used the B0 correction in different ways, and there are no studies comparing B0 correction methods to analyze CEST MRI data obtained from the human brain. Therefore, this study is to compare the difference of MTR asymmetry values evaluated by two different fitting methods for the B0 correction.

**MATERIALS AND METHODS:** Twenty-nine subjects were undergone CEST MRI scans to obtain full Z spectrum data using two different 3T MRI systems with two different CEST sequences: twelve subjects (2 males and 10 females, ages 55 to 83 years) using a 3D segmented EPI sequence (Achieva 3T, Philips) and 17 subjects (4 males and 13 females, ages 38-92 years) using a 3D GRASE sequence (Ingenia 3T, Philips). 3D T1-weighted (T1W) image was also acquired for the post-processing of the CEST MRI data. To calculate the magnetization transfer ratio (MTR) asymmetry value for each voxel, both the 14th polynomial and spline fitting methods were applied in each full Z spectrum. Voxel-based with paired t-test and region-of-interest (ROI) with the Wilcoxon rank sum test analyses were performed to compare the MTR asymmetry values obtained from both fitting methods. The ROIs were defined at the corpus callosum, the left and right hippocampi, and the left and right precuneus.

**RESULTS:** The result of the voxel-based analysis shows that the MTR asymmetry values at amide, amine, and hydroxyl offset frequencies were not significantly different between the two fitting methods for two sequences. For the ROI analysis, although the MTR asymmetry values obtained from the 3D segmented EPI were not significantly different between the two fitting methods
for amide, amine, and hydroxyl offset frequencies, the MTR asymmetry values at the right hippocampus for the GRASE sequence were significantly different between the two fitting methods at the amine offset frequency (p = 0.0448).

CONCLUSION: The B0 correction method may have the effect on the MTR asymmetry values in some brain areas.

SE 09 NR-37
Assessment of the contribution of cerebrospinal fluid in the MTR asymmetry signal
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BACKGROUND: As human brains age, the volume of gray matter decreases and the cells get filled with CSF at the dead part. This may alter the magnetization transfer ratio (MTR) asymmetry value obtained from chemical exchange saturation transfer (CEST) MRI data.

PURPOSE: To evaluate whether the MTR asymmetry value differs when the full Z spectrum is analyzed with and without cerebrospinal fluid (CSF) signals on CEST MRI data.

MATERIALS AND METHODS: Full Z spectrum CEST MRI was obtained using a 3T MRI in 10 elderly subjects. The mean age was 72.3 years. The age range was from 55 to 83 years old and all are female. CEST MRI data were acquired with a three-dimensional (3D) gradient-echo (FFE) echo planer imaging (EPI) sequence with 30 dynamic scans at a frequency offset range of -5 ppm to 5 ppm with a constant 0.3 ppm interval. Furthermore, 3D T1-weighted (3DT1W) images were acquired with 1mm isotropic voxel size to use the post-processing of the full Z spectrum images. The MTR asymmetry maps were calculated with and without masking the CSF signal after the B0 correction using the 14th polynomial fitting method. Voxel-based analysis using paired t-test was performed to evaluate the difference of the MTR asymmetry values between with and without masking CSF at amide (3.43 ppm), amine (3 ppm) and hydroxyl (0.86 ppm) frequency offsets. In addition, region-of-interest (ROI)-based analysis was also performed. The ROIs were defined at the corpus callosum, insula, hippocampus, precuneus, temporal Superior, gray matter, and white matter. The MTR asymmetry values at amide (3.43 ppm), amine (3 ppm) and hydroxyl (0.86 ppm) offset frequencies were compared.

RESULTS: Although the MTR asymmetry maps look different with and without masking the CSF signals, the result of the voxel-based analysis showed that there is no significant difference of the MTR asymmetry value at amide, amine, and hydroxyl offset frequencies. Furthermore, the result of the ROI-based analysis also showed that there is no significant difference of the MTR asymmetry value at amide, amine, and hydroxyl offset frequencies for all ROIs.

CONCLUSION: The MTR asymmetry values were not influenced by the CSF signal and, therefore, the suppression of the CSF signal during the acquisition of full Z spectrum data may not be an important issue.

SE 09 NR-38
The pearls and pitfalls in arterial spin-labeling (ASL)-MRI in various intracranial pathologic condition
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TEACHING POINTS:
1. To review basic background and techniques of ASL-MRI
2. To illustrate the clinical applications of ASL-MRI imaging in CNS disease
3. To discuss the merits and limitations of different methods of perfusion MR imaging (ASL, DSC and DCE-MRI) in various CNS disease

CONTENTS:
1. Explanation of background and technique of dynamic contrast enhanced MR imaging (DCE), dynamic susceptibility contrast perfusion MR imaging (DSC) and arterial spin labeling (ASL) of CNS
2. Evaluation of different perfusion MR parameters and maps
3. Variable appearance of ASL-MRI in CNS disease
   1) Congenital disease
   2) Trauma
   3) Vascular disease - stroke
   4) Neoplasm
   5) Degenerative/metabolic disorder
   6) Infection
   7) Other miscellaneous conditions
4. Merits and limitations of different methods for perfusion MRI
   Concordant vs. discordant finding between ASL-MRI and DSC/DCE-MRI
5. Future directions and summary.
PURPOSE: To diagnose and develop diagnostic criteria for stages of cerebral abscess with computed tomography (CT).

MATERIALS AND METHODS: We involved 21 subjects who diagnosed as cerebral abscess and approved by 64 slice multidetector CT/64MD-CT (Philips Ingenuity) in Department of Radiology under the Reference and Information Center of Radiology named after Purew. R (State honored Doctor, Physician of Mongolian People, Honored Professor) in State Third Central Hospital which named after P.N. Shastin (honored with red flag medal of labor) during 2014-2017 and prepared specific card for our research based on the CT signs and analyzed them. We considered stages of abscess by initial and encapsulation stages.

RESULTS: According to CT signs of cerebral abscess, shape of the abscess at first stage was circular/ring 75%, oval 25%, at the capsule formation stage- circular 41.2%, oval 35.3%, irregular shaped 23.5% respectively. Hypo-dense attenuation changes observed 100% in initial stage and 82.4% in capsule formation stage, initial stage lesion borders clear-irregular 75%, in capsule formation stage lesion borders clear 70.6%, lesion borders clear in 76.5%, first stage after injecting contrast dye was 100% of lesion border regularly increased, capsule formation stage 82.4% around the lesion border has increased circular density respectively.

CONCLUSION: We developed differential diagnostic criteria to identify initial and capsule formation stage of cerebral abscess differences based on CT signs of cerebral abscess.
SE 09 NR-40
Imaging spectrum of common and uncommon diseases involving fornix
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BACKGROUND: The fornix is a critical white matter tract bundle that comprises limbic system and has a significant role in cognitive functioning. Though it is well delineated on neuroimaging, the fornix is usually overlooked on daily routine practice. A careful evaluation of fornix will provide further understanding for patients with cognitive problems.

PURPOSE:
1. To illustrate imaging anatomy and function of fornix and limbic system
2. To learn clinical significance of fornix involvement detected on imaging
3. To review common and uncommon diseases involving fornix with MR imaging

TABLE OF CONTENTS/OUTLINE:
1. Imaging anatomy of fornix and limbic system
2. Neurocircuit and function of fornix
3. Various diseases entities involving fornix
   1) Congenital abnormalities
   2) Tumors
   3) Mesial temporal sclerosis
   4) Infection
   5) Metabolic syndrome
   6) Trauma and surgery
   7) Infarction
   8) Degenerative and inflammatory processes

CONCLUSION: Good understanding of disease spectrum involving fornix and their imaging findings will help clinical assessment of cognitive function and explanation of clinical symptoms of amnesia. Radiologists should be concerned with fornix as well as other components of limbic system, especially for evaluation of patients with memory impairment.

SE 09 NR-42
New collateral and perfusion imaging derived from time-resolved dynamic contrast-enhanced MRA: initial clinical experience in acute ischemic stroke
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Neurological outcome and final infarct volume largely depend on severity and duration of ischemia in the setting of acute ischemic stroke with a large vessel occlusion. Collateral flow and perfusion imaging are important biomarkers influencing severity of ischemia, extent of penumbra, recanalization rate, hemorrhagic transformation and clinical outcome, and are used to predict potential benefit from reperfusion therapy. Although current imaging techniques including CT and MRI can provide reliable assessment of collaterals, perfusion status and site of occlusion, They still have several limitations and disadvantages in terms of imaging time, radiation, contrast use, and motion artifact. Recently, we developed a new fast collateral and perfusion imaging derived from dynamic signals of time-resolved contrast-enhanced MRA with low contrast dose. In this presentation, we 1) introduce a new imaging method based on 4D-MRA for evaluation of collaterals and perfusion, as well as vessel information at a time, 2) describe our initial clinical experience of a new imaging approach in acute ischemic stroke patients with a large vessel occlusion, and 3) discuss its clinical usefulness and therapeutic implications.

SE 09 NR-41
Spinal ependymoma complicated by superficial siderosis: a case report
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Superficial siderosis of the central nervous system is a syndrome caused by deposition of hemosiderin in the subpial layers of the central nervous system, occurring as a result of recurrent asymptomatic or symptomatic bleeding in the subarachnoid space. We report a rare case of superficial siderosis in a 63-year-old man who presented with bilateral hip pain. The diagnosis of spinal ependymoma on MRI spine studies led to further investigations with detection of superficial siderosis of brain. Our report underlies the importance of early diagnosis and surgical management with imaging examination of the full neuroaxis to identify the source of bleeding, to halt disease progression and improve prognosis.
SE 09 NR-43
Non-traumatic intra-cranial hemorrhages: investigations of underlying causes using CT and MR imaging
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CONTEXT: Intracranial hemorrhage (ICH) is broadly divided into two categories traumatic versus non-traumatic. Non-traumatic intracranial hemorrhage (NT-ICH) is leading cause of death and disability, accounting for at least 10% of stroke involving either brain parenchyma, subarachnoid spaces or both. We will review varied etiologies of NT-ICH with emphasis on causes of Intra-parenchymal hematomas such as hypertension, cerebral amyloid angiopathy, aneurysms, vascular malformations, vasculitis, tumor related and hemorrhagic infarcts (both venous and arterial) as well as causes of subarachnoid NT-ICH will be discussed. A sound knowledge of diverse causes of the non-traumatic intra-cranial hemorrhages and their varied imaging appearances is important to facilitate accurate diagnosis and to guide appropriate emergent patient treatment.

LEARNING OBJECTIVES: The goal of this educational exhibit is to identify, review and discuss important causes of non-traumatic intra-cranial hemorrhages with broad over view of the varied CT and MR imaging appearances.

SE 09 NR-45
MP RAGE and SNAP imaging can increase the detection rate of intraplaque hemorrhage: evaluation of the diagnostic performance
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PURPOSE: To assess the diagnostic performance of simultaneous non-contrast angiography and intraplaque hemorrhage (SNAP) and magnetization-prepared rapid acquisition gradient-echo (MP RAGE) imaging in detecting intraplaque hemorrhage (IPH).

MATERIALS AND METHODS: We retrospectively evaluated total 84 carotid arteries in 42 patients who underwent plaque magnetic resonance (MR) imaging including T1- and T2-weighted sequences, time of flight (TOF) MR angiography (MRA), SNAP and MP RAGE sequences between November 2011 and May 2017. To evaluate diagnostic performance of SNAP and MP RAGE sequences, two independent radiologists (reader 1, reader 2) assessed MR images retrospectively. At first, two readers were asked to review T1, T2 and TOF MRA images. They assessed whether there was any carotid plaque and if present, determined the presence of IPH. For visual assessment of IPH, readers noted the appearance of IPH as “distinct” or “less distinct”. Secondly, they reviewed both traditional (T1, T2, and TOF MRA) sequences and SNAP imaging. At last, both traditional and MP RAGE images were evaluated. As a standard of reference, another radiologist re-assessed these images. In a statistical analysis, sensitivity and specificity were calculated to identify the diagnostic performance of SNAP and MP RAGE. Interreader agreement was evaluated with Cohen’s kappa statistics.

RESULTS: For reader 1, sensitivity and specificity for detection of IPH using traditional sequences yielded 76.5% and 100%, respectively. When MP RAGE images were added to traditional sequences, sensitivity and specificity resulted in 79.4% and 100%. When SNAP sequences were added, results showed more increase in sensitivity and specificity (94.1% and 100%). Similarly, for reader 2, sensitivity and specificity with traditional sequences yielded 85.3% and 100%. With additional MP RAGE images, results showed 85.3% and 100% of sensitivity and specificity. When using SNAP images, diagnostic performance increased to 94.1% sensitivity and 100% specificity. Interreader agreement for traditional sequences, MPRAGE, and SNAP imaging all resulted in almost perfect agreement (κ > 0.8).

CONCLUSION: When used with conventional MR imaging sequences, MP-RAGE and SNAP imaging can increase the diagnostic performance of IPH detection. Furthermore, SNAP imaging can show IPH more distinctly.

SE 09 NR-46
De-mystifying the cavernous sinus: a case based pictorial review
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LEARNING OBJECTIVES: To familiarize the reader with the normal anatomy and imaging features of the cavernous sinus. Understand important differentiating clinical and radiological features of cavernous sinus pathologies through a comprehensive pictorial review.

BACKGROUND: The term cavernous sinus was coined by J. B. Winslow in the 18th century as its sponge-like appearance was thought to resemble the cavernous body of the penis. The term “cavernous sinus” is really a misnomer, as it is neither a dural sinus nor is it a cavernous structure. It is instead a complex lacunar...
framework venous plexuses surrounded by two layers of dura, containing the carotid artery, multiple cranial nerves and sympathetic fibers. Our knowledge of the cavernous sinus has come a long way since it was first described. Broad categories of diseases can involve the cavernous sinus. The clinical and imaging features of many cavernous sinus pathologies overlap and are often non-specific. Furthermore, cavernous sinus lesions can be subtle and easily misinterpreted if special attention is not paid to this region.

DISCUSSION: We review the anatomy and important relations of the cavernous sinus. Emphasis is placed on recognizing the usual appearance of the cavernous sinus, deviating from which, pathology should be suspected. We present a pictorial review of a wide range of cases of cavernous sinus pathologies from our institution, ranging from infectious (septic thrombosis, tuberculosis, invasive fungal infection), inflammatory, vascular (carotico-cavernous fistula) and neoplastic (both benign and malignant) conditions. Important differentiating clinical and radiological features are highlighted. Clinical images, where available, are included. We share our experience, highlighting key imaging features where relevant to show how familiarity with the imaging appearances of the broad variety of disorders that can affect the cavernous sinus can aid in the diagnosis and management of these conditions.

SE 09 NR-47
The role of 3D heavily T2-weighted MR myelography in the detection and evaluation of treatment response in the patients with CSF leak
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PURPOSE: It is important to determine active or inactive CSF leak in patients with intracranial hypotension for therapeutic success. The purpose of this study was to examine the role of 3D heavily T2-weighted MR myelography (MRM) for the detection of CSF leak and evaluation of treatment outcomes of CSF leak.

MATERIALS AND METHODS: This retrospective study included 21 patients with symptomatic intracranial hypotension who had abnormal initial CSF leak on 3D heavily T2-weighted MRM between June 2010 and April 2016. All patients received follow-up MRM after targeted epidural blood patch (EBP) or conservative treatment. We evaluated the cause of CSF leak, presence of abnormal CSF collection, location of CSF leak, presence of symptomatic relief, and post-treatment change of CSF leak.

RESULTS: Thirteen patients had spontaneous spinal CSF leak, and other 8 patients had causative factor of CSF leak - iatrogenic, excessive physical activity, and etc. The leak sites were thoracic spine (12 lesions), lumbar spine (9 lesions), and cervicothoracic junction (5 lesions). In 4 patients, leak sites were diffuse (more than 4 vertebral levels of the spine). All patients had symptomatic improvement after treatment (immediate - 3 days after EBP and 4 days after conservative treatment, respectively). Outcomes of EBP (n = 20) or conservative treatment (n = 1) by using follow-up MRM were as follows: cessation in 18 patients, and recurrence in 3 patients.

CONCLUSION: Our results suggest that noninvasive 3D heavily T2-weighted MRM may play an important role in the evaluation of CSF leak and treatment response.

SE 09 NR-49
Abnormal radiological features and associated clinical features of posterior reversible encephalopathy syndrome
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Posterior reversible encephalopathy syndrome (PRES) can be easily diagnosed if it present characteristic radiological feature of vasogenic edema in the parietal and occipital lobes. However, some PRES has been reported to be diagnosed with several atypical image findings. We illustrated cases of PRES with varying distributions of vasogenic edema, and cases with atypical imaging findings, such as variations of hemorrhage and restricted diffusion. And we presented clinical features such as incidence, causative disease and outcome, associated each finding by literature review. Being accustomed with these ‘atypical finding of PRES’ and understanding of its clinical feature were helpful to prevent misdiagnosis of other diseases in abnormal cases and select early diagnosis and treatment directions.

SE 09 NR-50
Various appearance of brain abscess: focused on atypical cases
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PURPOSE: To review various CT and MR image findings of brain abscess including typical and atypical feature. To familiarize radiologists with spectrum of the
Scientific Exhibitions

various image findings of brain abscesses.

CONTENTS ORGANIZATION: This review will show case-based image findings about typical and atypical appearance of brain abscesses. Representative cases will include abnormal high density in CT thus mimicking ICH, no definite diffusion restriction in DWI, multiple abscesses which is two or more different image findings in one study, mimicking venous infarction located in thalamus, progression from persistent tension pneumocephalus to abscess, mimicking tumor due to atypical image finding of abscess wall.

SUMMARY: Brain abscess can show various image findings, which can be mimicked with other disease. In this review, we look at various atypical cases and it can help us to make an early diagnosis and treatment decision of brain abscess.

SE 09 NR-51
Volume of white matter hyperintensities/leukoaraiosis in Mongolian patients who are neurological complain- contribution of age, vascular risk factors
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PURPOSE: Aging is associated with appearance of white matter hyperintensities (WMH) on MRI scans. Vascular risk which increase with age, may contribute to white matter deterioration and proliferation of WMH.

MATERIALS AND METHODS: Participants were customers /46/ of Private Hospital who wants MRI scans due to some neurological complain and disease. We investigated vascular risk are associated with WMH volume in Healthy and unhealthy adults (46 patients, 34-81 years of age)
Age min-34 max-81
Systolic BP(mm Hg) min-140 max-206
Diastolic BP(mm Hg) min-60.0 max-130
Age related brain atrophy-26
Acute ischemic infarction-12
Male-20 female-26

RESULTS: We examined association of WMH volume with age, sex, hypertension, related to vascular risk. We found that Larger WMH volume was associated with advanced age, Hypertension, 45 age above-44 patients.
Punctuate Leukoaraiosis-8
Confluent Leukoaraiosis-38
Notably The WMH more consist frontal and parietal lobes.
Bilateral fronto-parietal Lobe WMH-42
We observed age related anh hypertension-related increase of about 91.2% in WMH volume with both

being prominent in the fronto-parietal lobe.
Hypertension is also associated with reduced vasoreactivity, independent of WMH and stroke, and the relationship is the strongest in the frontal and parietal region and is driven maily by elevated systolic blood pressure.
Patients main complain were Headache, Nausea, Dizziness who are neurological and vascular disease/Cardiovascular disease, Chronic gliotic ischemic changes/ can contribute to brain abnormalities.

SE 09 NR-52
Leak sign on dynamic-susceptibility-contrast MRI in acute intracerebral hemorrhage
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BACKGROUND: A CT angiography spot sign (CTA-spot) is an important predictor of early expansion of intracerebral hemorrhage (ICH-Ex). Dynamic-susceptibility-contrast magnetic resonance imaging (DSC-MRI) can track the real-time leaking of contrast agent and may have the potential to indicate the sign of active bleeding like as a CTA-spot.

MATERIALS AND METHODS: From September 2014 to February 2017, non-contrast CT, CTA and DSC-MRI examinations were performed in seven patients with acute ICH. We investigated the time from symptom onset to the first contrast-enhanced imaging. We evaluated the time course of the contrast leak within the ICH at the source image of the DSC-MRI, and the volume change of ICH between non-contrast CT and DSC-MRI. We compared the number of slices showing CTA-spot and DSC-MRI leak.

RESULTS: The CTA-spot and DSC-MRI leak-sign were present in four patients, and two patients among those showed ICH-Ex. The time from the symptom onset to CTA or DSC-MRI was shorter for those with DSC-MRI leak and CTA-spot than for 3 patients without CTA-spot or DSC-MRI leak (70-130 minutes versus 135-270 minutes). The leak-sign began earlier, lasted longer, and spread to the more slices in the patients with ICH-Ex than those without ICH-Ex. The number of slices of the DSC-MRI leak and the number of the CTA-spot was well correlated.

CONCLUSION: CTA-spot or DSC-MRI leak sign was observed in patients with shorter duration from symptom onset to contrast-enhanced imaging. There was ICH-EX in patients with severe contrast leakage on DSC-MRI and CTA.
First report of multinodular and vacuolating neuronal tumor in Korea: a case report
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Multinodular and vacuolating neuronal tumor (MVNT) of brain is a distinctive neuronal tumor recently classified in 2016 World Health Organization (WHO) Classification of Tumors of the Central Nervous System following the first documentation in 2013. Here, we present the first Korean case of MVNT with neuroimaging findings. A 38-year-old man with a history of depression for 18 months underwent magnetic resonance imaging (MRI) examination. On MRI, multiple small clustered nodules with T1-hypointensity and increased T2 and fluid-attenuated inversion recovery (FLAIR) signal were centered in the subcortical white matter of the right superior frontal gyrus, extending to the corpus callosum body. These lesions did not exhibit gadolinium enhancement, perilesional edema, or gyral swelling. There were no diffusion restriction or perfusion abnormality within the lesions on diffusion-weighted imaging (DWI) and perfusion MRI. A presumptive diagnosis of low grade glioma was made. However, after surgical resection, the pathology specimen was confirmed as MVNT. The major radiological differential diagnoses of MVNT include diffuse low-grade astrocytoma, dysembryoplastic neuroepithelial tumor, and ganglioglioma. We believe MRI features reported in this case may facilitate the preoperative diagnosis and proper treatment planning.

Role of brain MRI in evaluation of neurological manifestations in HIV patients
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INTRODUCTION: HIV is neurotropic virus and crosses the blood brain barrier at an early stages in the disease. Thus, CNS is the major target of HIV with approximately two-third of the patients developing CNS involvement during course of their disease. The spectrum of disease can be broadly classified into primary effect of HIV, opportunistic infections, neoplasms and vascular diseases.

AIMS AND OBJECTIVES: To evaluate neurological complaints in HIV patient using MRI and to diagnose and characterize different patterns of appearance of various CNS lesions in HIV positive patient with CD4 count correlation.

MATERIALS AND METHODS:
No. of patients --- 45
Place of study --- Dept. of Radiodiagnosis, GMCH, Nagpur
Duration of study --- 1 year
MRI machine --- 1.5T Philips MR Achieva, brain coil
Protocol --- T1, T2, FLAIR C++ T1W, DWI, FFE, TOF sequences, venous 3d PCA

TYPE OF STUDY: Retrospective study in neurological manifestation of various pathologies in HIV patients.

RESULTS AND OBSERVATION: Differentiation of various pathologies was found to be possible on the basis of MRI, out of which most common was found to be opportunistic infections.

CONCLUSION: In the above study correlation was possible between neurological manifestations, causative organism, various pathological process and cd4 counts.

Effect of apolipoprotein E epsilon4 on novelty mismatch negativity and P3a in amnestic mild cognitive impairment
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PURPOSE: The apolipoprotein E epsilon4 (ApoE e4) allele is considered the strongest genetic susceptibility factor for the conversion of amnestic mild cognitive impairment (aMCI) to Alzheimer’s disease (AD). A passive oddball experimental paradigm can
simultaneously elicit mismatch negativity (MMN) and P3 subcomponent (P3a). Previous studies showed that healthy individuals with the e4 allele had longer P3 latencies than those with no e4 allele and that there were no differences in MMN and P3 indices between ApoE e4 carriers and non-carriers in mildly cognitively impaired patients. This study investigated the effect of ApoE e4 on novelty MMN and P3a in healthy controls (HC) and aMCI.

**MATERIALS AND METHODS:** Thirty-five aMCI subjects and forty-three HC were stratified by ApoE e4 carrier status (ApoE e4 carriers and non-carriers). MMN and P3a components were investigated during an auditory novelty oddball task. To predict aMCI, the area under the curve (AUC) for receiver operating characteristic analysis was calculated for the predictors achieved by binary logistic regression.

**RESULTS:** There were no significant differences in novelty MMN potentials among the four ApoE groups. Compared with ApoE e4 non-carriers, the novelty P3a amplitude was significantly decreased for ApoE e4 carriers in the HC. Compared with HC ApoE e4 carriers, novelty P3a latency was significantly delayed in the aMCI ApoE e4 carriers. P3a latencies were negatively correlated with attention function in ApoE e4 carriers. In addition, the best prediction accuracy AUC = 0.929 was achieved by a logistic regression model using P3a latency, visuospatial function, and episodic memory as predictors.

**CONCLUSION:** HC ApoE e4 carriers presented with a deficit in the attention orienting response and aMCI ApoE e4 carriers presented with a more serious deficit in attention orienting responses compared with non-carriers. Moreover, aMCI can be predicted by the combination of electrophysiological biomarker and cognitive performance. These findings suggest that ApoE e4 carriers may be more susceptible to AD pathology, and that P3a latency may be a potential biomarker for aMCI ApoE e4 carriers.
group being present in (66.3%). Our study shows infection (29.8%) as the most common etiology followed by anoxia and hypoxic ischemic encephalopathy. Malformations of cortical development (14.3%). Phakomatoses and vascular (5.9%). Mesial temporal sclerosis (57.1%) was the most common pathology seen in isolated temporal lobe epilepsy. Demyelinating diseases and neoplasm constituted 3.6% patients each.

CONCLUSION: MRI plays a significant role in evaluation of pediatric patients presenting with epilepsy and it is the first imaging modality of choice with proper MRI seizure protocol to establish the correct diagnosis, plan the management according to diagnosis as well as helps in prognosis.

SE 09 NR-59
MR imaging appearances of tuberculosis of the central nervous system
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PURPOSE: Tuberculosis of the central nervous system is a common and routinely encountered entity in India. Our aim was to evaluate the MR Neuroimaging features of tuberculosis so as to form guidelines for their imaging recognition and differentiation from tumoral, vascular and other entities that needs a different line of treatment therapy.

MATERIALS AND METHODS: MRI studies of 40 patients with suspected tuberculosis of the brain and spine was reviewed over the periods of 6 months and the neuroimaging findings were correlated with CSF/biochemical/histopathological/microbiological analysis. Study was conducted in 1.5 T MRI machine with conventional imaging. Additional contrast enhanced, diffusion weighted, and spectroscopic evaluation was done whenever indicated. Imaging patterns were compared with the existing literature and discussed.

RESULTS: Tubercular infection of the brain was seen as tubercular meningitis (60%), tuberculoma (55%), tubercular abscess (20%), tubercular cerebritis (15%) and pachymeningeal tuberculosis (5%). Rare cases included tuberculosis presenting as optic nerve involvement, giant tuberculomas which were confused with glioma, solitary cerebellar tubercular abscess, tuberculosis presenting as infratemporal fossa mass with pachymeningitis and en plaque meningeal tuberculosis. In spinal column involvement, patients with tuberculous spondylitis had a significantly higher incidence of thoracic involvement (50%), contiguous involvement of three or more vertebra (30%), skip lesions (35%), vertebral intrasosseous abscess (42.5%), and thin smooth wall (60%) abscess.

CONCLUSION: Visualization of typical lesion patterns not only allows a rapid diagnosis and subsequent therapeutic decisions but also is indispensable in monitoring therapeutic response. Particularly in the Indian setup, certain atypical imaging tuberculosis must be kept in mind in order to avoid a diagnostic dilemma and delay appropriate therapy.

SE 09 NR-60
Seizure disorder: utility of MRI
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PURPOSE: To identify the etiology of seizure and study the MRI findings in patients with seizure disorder in Indian population.

MATERIALS AND METHODS: MRI brain studies of 75 patients with seizure disorder was reviewed over the period of 1 year from May 2016 to April 2017 and neuroimaging findings were correlated with the CSF/biochemical/histopathological/microbiological analysis. Study was conducted on 1.5T MRI machine utilizing T1w/T2w Axial, FLAIR coronal, Diffusion and T1w IR coronal/axial sequence in all patients and post contrast sequence when needed. Patients having history of head trauma and febrile seizures were excluded from the study.

RESULTS: Out of 75 patients, MRI of 49 (65%) patients showed abnormalities while 26 (35%) patients showed normal MRI study. Among the different etiology CNS infection was seen in 26 (34.6%) patients, neoplasms in 13 (17.3%) patients and developmental anomalies 5 (6.6%) patients, vascular malformation in 3 (4%) patients and Rasmussen encephalitis in 2 (2.6%) patients. Most patients were presented with complex partial seizures 45 (60%) cases and generalized seizures in 30 (40%) cases. In patients presenting with focal seizures there was very high rate of abnormality detection (75.5%) on MRI, while patients presenting with generalized seizures had relatively lower rate of abnormality detection (50%) on MRI.

CONCLUSION: MRI plays a pivotal role in the evaluation of patients with seizure disorder. Employing appropriate imaging protocols and reviewing images in a systematic manner makes it possible to identify subtle lesions, location and extent of lesions on MRI. Hence, MRI is a superior neuroimaging modality with higher sensitivity and specificity.
SE 09 NR-61
Morphometric analysis of vertebral artery in relation to foramen transversarium in Indian population
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PURPOSE: To evaluate the relationship of vertebral artery size, location, origin in relation to foramen transversarium in the lower cervical spine by multidetector CT (MDCT) angiography measurements in Indian population.

MATERIALS AND METHODS: This was retrospective study of MDCT neck angiography performed during the period of January 2016 to December 2016. Total 48 patients were studied, average age of patient was 45.31 years (range, 30 to 55 years). Vertebral artery diameter (VAD), the shortest distance between the vertebral artery and the border of transverse foramen medial (M), lateral (L), anterior (A) and posterior (P) were studied. The shortest distance between the vertebral artery and pedicle (PE) was also analyzed. The means and their standard deviations (SD) were calculated in both the sexes and T tests were performed to look for significant sexual difference.

RESULTS: The diameter of the vertebral artery was largest at the level of C7 vertebra on right side (3.6 ± 0.5) and at the level of C6 vertebral artery on left side (3.5 ± 0.7). The diameter of vertebral artery was overall smaller in women than in men. Statistically significant difference between women and men were seen at the levels of C4, C5 and C7. The (L) was greater than other parameters (M, A, P) at the same level in all the measurements. The (PE) was greatest at C6 level and shortest at C5.

CONCLUSION: Understanding the variation in morphometric analysis of vertebral artery in relation to foramen transversarium provides useful guide before pedicle screw fixation due to variation in measurements at all levels. The highest potential risk of vertebral artery injury during cervical pedicle screw fixation may be at C5, then at C4 and safest at C7.

SE 09 NR-62
An itinerary to 3T CSF flowmetry in patients with normal pressure hydrocephalus (NPH): estimation and prognostication
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AIMS AND OBJECTIVES: The objective of the study is to assess the role of CSF flowmetry imaging in. The primary aim of the study is to evaluate the diagnostic value of CSF flowmetry by measuring the absolute stroke volume to detect normal pressure hydrocephalus (NPH). The secondary aim of the study is to evaluate the diagnostic efficacy in selecting the patient who would respond favorably to the ventriculoperitoneal shunt.

MATERIALS AND METHODS: The study was done at the Department of Radiodiagnosis, GIC-PGIR, Samved Hospital, Ahmedabad.

Study population: Adult patients who had a clinical suspicion of NPH with features of ataxia, dementia and urinary incontinence were referred for CSF flowmetry evaluation to the Department of Radiology. Also, there was a control group which included adult subjects without any clinical or significant MRI changes.

Sample size and sample technique: The study included 30 suspected NPH patients referred to the Department, who fulfilled the inclusion and exclusion criteria of the study. Another 20 subjects formed a control group.

Study Type: Prospective controlled analytical study.

RESULTS AND CONCLUSION: Our study shows the significant difference in ASV (Absolute Stroke Volume) measured by CSF flowmetry in patients with clinical suspicion of NPH in comparison with control group. It also showed that despite evident clinical features, ASV may lie within the normal range (< 42 µl/sec) if morphological changes are not present on MRI evaluation. According to our study, cut off value to diagnose NPH on the basis of CSF flowmetry is > 42 µl/sec. It is significantly higher when morphological changes are associated with clinical features.
SE 09 NR-63
Usefulness of imaging analysis on pre-and post-contrast 3D FLAIR and contrast-enhanced 3D T1 weighted images of MRI cranial nerve or MRI orbit in Miller Fisher syndrome
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PURPOSE: To evaluate the diagnostic performance and usefulness of pre-and post-contrast 3D Flair and contrast-enhanced 3D T1 weighted images of MR cranial nerve or MR orbit in Anti GQ 1b IgG Antibody syndrome.

MATERIALS AND METHODS: From June 2010 to March 2017, 16 who had positive on anti GQ-1b IgG antibody, were included in this study. All patients were diagnosed Miller Fisher syndrome (MFS) according to clinical features and Anti GQ 1b IgG Antibody result. Therefore 16 MFS patients were enrolled in this study. And then age and sex matched control group were included to evaluate the interobserver reliability of the MR by using kappa statistics and intraclass correlation coefficient (ICC). Of 32 patients, 33 MR images were analyzed as follows; 1) hyperintense signal change or thickening on pre contrast 3D Flair image 2) enhancement on post contrast 3D Flair and/or contrast-enhanced 3D T1 weighted images. And then sensitivity, specificity, accuracy were calculated.

RESULTS: Of the 16 MFS patients, 15 patient (93.8%) had ophthalmoplegia/diplopia. 10 (62.5%) case showed and 6 (37.5%) showed areflexia/hyporeflexia. Other cranial symptoms appeared; 5 facial palsy, 5 dysarthria, 2 hearing disturbance, 1 visual disturbance, 1 tongue deviation. 1 patient had recurring. So, 17 images of 16 MFS patients were analyzed. Of 17 images of MFS patients, 10 images showed hypersignal intensity and 13 showed enhancement and then most common nerve of abnormal enhancement or high signal intensity change were oculomotor nerve (76.5%). Among 33 images, 1 false positive and 3false negative with sensitivity of 93.3% and specificity of 83.3% showed. In ROC curve analysis, the area under the curve (Az) was 0.883 (95% CI: 0.724 to 0.968). For the distinction among the two individuals, the ICC ranged from 0.661 to 0.807, indicating substantial to nearly perfect reproducibility.

CONCLUSION: Additional use of pre-and post-contrast 3D Flair and contrast-enhanced 3D T1 weighted MRI could help to characterize and diagnosis of MFS.

SE 09 NR-64
PET-MRI fusion in dementia - a key to unraveling mysteries?
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AIMS AND OBJECTIVES: To demonstrate PET-MRI appearances in various types of dementia and its impact on management. To outline the advantages of PET-MR fusion over PET scan or MRI alone, and its clinical impact.

MATERIALS AND METHODS: This study was conducted at Gujarat Imaging Centre Post Graduate Institute of Radiology, Ahmedabad over a span of 12 months. A total of 30 patients were included in the study referred for the PET-MR examination of brain. In this study a total of 30 patients were analyzed by PET images, Cortex-ID, MRI images and software co registered PET-MR images. PET images were obtained in a dedicated PET-CT machine and then MRI of brain was separately performed on a 3T MRI machine. Both the data were fused by matching the corresponding sections of brain on CT and MR images, using fusion software such that a co-registered PET-MR brain image is obtained. Cortex - ID was generated from PET data using special software.

RESULTS: In our study 6 patients were diagnosed with Alzheimer disease (AD), 4 with fronto-temporal dementia (FTD), 3 patients as Creutzfeld Jacob disease (CJD), 3 patients with Parkinson's plus syndrome (PPS), 5 patients with vascular dementia (VD), 2 patient as Normal pressure hydrocephalus (NPH) and 6 patients did not have any morphologic or metabolic abnormality on PET-MR, 1 patient with paraneoplastic cerebellar degeneration. Out of the 24 patients with positive findings of dementia 8 patients had no significant morphological abnormality on MRI and were diagnosed by PET-MR fusion.

CONCLUSION: PET-MRI presents a significant leap forward in imaging capabilities bringing the exceptional soft tissue contrast and high specificity of MRI together with PET’s excellent sensitivity in assessing physiological and metabolic state for dementia studies and is an excellent tool for imaging as it provides functional metabolic evaluation. PET-MR fusion has information at least equivalent to individual modalities, and in most cases provided additional information. Hence, it is concluded that PET-MR registration can open new doors in understanding the pathologies and progression of dementia.
**SE 09 NR-65**

**Perfusion abnormality during periictal period in patients with seizure: evaluation with arterial spin labeling perfusion MR imaging**

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**PURPOSE:** With arterial spin labeling (ASL) perfusion MR imaging, we evaluated cerebral perfusion abnormality during the periictal period in patients with seizure.

**MATERIALS AND METHODS:** From a retrospective search of recent 12 months data base of our institution, we found 27 patients who undertook ASL-perfusion studies because of seizure or seizure-like symptoms. The inclusion criteria were 1) history of seizure, 2) MR examination taken within 24 hours from the seizure onset, and 3) localized perfusion abnormality on ASL or seizure-related cerebral cortical lesion on FLAIR or DWI. We evaluated the presence and location of perfusion abnormality on ASL and signal abnormality on FLAIR, DWI and SWI, respectively.

**RESULTS:** Mean time between symptom onset and MR examinations was 5 hours 54 minutes. In all patients (n = 27), a localized increase of perfusion was demonstrated on ASL-perfusion imaging. On FLAIR imaging, 20 patients (74.1%) showed hyperintensity in the corresponding area of perfusion abnormality. In 19 patients (70.4%), DWI showed hyperintensity of the lesion which showed a reduction of the ADC. Seven patients (25.9%) showed a focal parenchymal area with pseudo-narrowed cortical veins on SWI, associated with focal hyperperfusion.

**CONCLUSION:** Periictal ASL-perfusion imaging was characterized by localized hyperperfusion which was more commonly demonstrated than signal intensity abnormality on FLAIR or DWI.

**SE 09 NR-66**

**Impaired default mode network on resting-state functional MR imaging in patients with traumatic anosmia**

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**PURPOSE:** Posttraumatic anosmia is not an uncommon disease as it has been estimated to occur in 5% to 14.5% of patients with head trauma. Recently introducing functional magnetic resonance (MR) imaging holds a promise for identifying objectively measure of olfactory function as for anosmia. However, resting-state functional MR imaging which have been considered to represent important functional architecture for understanding the cognitive functions and can be altered in various neurologic and psychiatric disorders has never been explored in evaluation of traumatic anosmia patients. Therefore, in this study we aim to investigate the functional connectivity of brain, especially the default mode network (DMN) of in patients with traumatic anosmia using resting-state functional MR imaging.

**MATERIALS AND METHODS:** Medical research ethic committee approval and written informed consent were obtained. Fourteen patients with traumatic anosmia and 13 health control subjects underwent resting-state functional MR imaging using a 3T MRI scanner. Region-of-interest (ROI) to ROI based analysis was used to process the resting state data using the CONN toolbox. For the DMN, the reference time series was selected from a 10mm spherical ROI in the posterior cingulate cortex, bilateral lateral parietal cortex and medial prefrontal cortex. The F-test was used to calculate the multivariate connectivity strength for each seed and seed/network-level threshold with an age as a covariate.

**RESULTS:** The patients with traumatic anosmia demonstrated decreased DMN connectivity in the posterior cingulate cortex, bilateral lateral parietal cortex and medial prefrontal cortex. The left lateral parietal cortex of the patients with traumatic anosmia showed significant resting-state connectivity with the only 4 following regions: left posterior superior temporal gyrus, superior lateral occipital cortex, right amygdala and right cerebrum, while the left lateral parietal cortex of healthy controls showed resting-state connectivity in 10 anatomical regions such as left superior lateral occipital cortex, left posterior supramarginal gyrus, left superior frontal gyrus, right cerebrum, grey matter, left posterior parahippocampal gyrus and left amygdala.
**SE 09 NR-67**
Metal artifact reduction algorithm for orthopedic implants for brain CT angiography in patients with intracranial metallic implants
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PURPOSE: To evaluate the usefulness of a metal artifact reduction algorithm for orthopedic prostheses (O-MAR) for brain CT angiography in patients with aneurysm clips and coils.

MATERIALS AND METHODS: The Institutional Review Board approved this retrospective study. The study cohort consisted of 34 consecutive patients with 47 intracranial metallic implants (43 aneurysm clips and 4 coils) who underwent a brain CT angiography. The CT images acquired with and without O-MAR were compared both quantitatively and qualitatively. For quantitative analysis, regions-of-interest were drawn in the same location upon each image with and without O-MAR, and image noises in the vicinity of metallic implants were compared. For qualitative analysis, image quality improvement and presence of new streak artifact were assessed.

RESULTS: Image noise was significantly reduced in the surrounding brain parenchyma (p < 0.01). Improvement of implant-induced streak artifact was noted in eight objects (17.0%). However, streak artifact was aggravated in 11 objects (23.4%), and adjacent vessel depiction was worsened in eight objects (17.0%). In addition, new O-MAR-related streak artifacts were found in 31 objects (66.0%).

CONCLUSION: Use of O-MAR in patients with metallic implants significantly reduces image noise. However, its usefulness in interpretation of brain CT angiography seems to be limited.

**SE 09 NR-68**
Application of 3D fast spin-echo T1 black-blood imaging for the detection of leptomeningeal carcinomatosis
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PURPOSE: To evaluate whether 3D fast spin-echo T1 black-blood imaging can improve the diagnostic performance for the leptomeningeal carcinomatosis (LC), which was compared with contrast-enhanced (CE) MP-RAGE and SE T1WI.

MATERIALS AND METHODS: Institutional Review Board approved this retrospective study, with a waiver of informed consent. From January 2014 to October 2016, 1758 patients underwent MR imaging studies, including CE MP-RAGE and SE T1WI, and black blood imaging. Among them, LC (n = 78) and normal patients (n = 41) were enrolled. The patients were diagnosed as LC in 1 of 2 ways: (1) a CSF cytology positive for malignant cells, which was repeated up to three times or (2) MRI scans showing LC on both initial and 2-3 month follow-up studies in patients with suspicious cytology or biochemical test. A senior neuroradiologist reviewed the images from each sequence individually and separately and assigned a diagnostic rating (positive, indeterminate, or negative) and grading of LC. We scored leptomeningeal enhancement on MR, which was made on a 0-5 scale. For each of the cerebral hemispheres, the presence of the leptomeningeal enhancement was scored as 0 (absence), 1 (in one lobe) or 2 (> 1 lobe). For the infratentorial area, it was scored as 0 (absence) or 1 (presence). The Karnofsky Performance Scale (KPS) were compared between groups with different grade using ANOVA. Also, intraclass correlation coefficient (ICC) was used to assess interobserver agreement.

RESULTS: Black blood imaging (76 of 78 LC patients, 97.43%) showed significantly a higher sensitivity than CE MP-RAGE T1WI (50 of 78, 64.1%) and CE SE T1WI (52 of 78, 66.67%) (p < 0.00001). In terms of specificities, we did not find significant difference among CE MP-RAGE T1WI (28 of 31 normal patients, 90.32%), CE SE T1WI (28 of 31, 90.32%) and black blood imaging (30 of 31, 96.77%) (p > 0.05). The LC grade based on black blood imaging showed significant associations with the KPS (p < 0.05). In addition, black blood imaging (0.9636, 95% CI [0.9516-0.9734]) revealed slightly higher ICC than CE MP-RAGE T1WI (0.9626, 95% CI [0.9502-0.9727]) and CE SE T1WI (0.9342, 95% CI [0.9124-0.9519]).

CONCLUSION: Black blood imaging could improve the diagnostic performance for the LC, especially sensitivity, compared with CE MP-RAGE and SE T1WI, and has also higher interobserver agreement.
**SE 09 NR-69**

Parenchymal hyperdensity on CT after mechanical intra-arterial thrombectomy in acute ischemic stroke: factors to predict clinical outcome and symptomatic hemorrhage

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**PURPOSE:** The evaluate the clinical consequences of parenchymal hyperdensity on the post-procedural CT and identify imaging factors to predict symptomatic hemorrhage.

**MATERIALS AND METHODS:** We reviewed the clinical and imaging records of all acute ischemic stroke patients who underwent mechanical thrombectomy by using retrievable stents between December 2010 and December 2016. The immediate post-procedural CT scan was evaluated for the presence of hyperdense lesion. The average area and attenuation of the hyperdense lesion were measured. Follow-up images were evaluated for the persistency of hyperdensity and 90-day modified Rankin scores of the patients were evaluated for clinical outcome. The incidence of hemorrhage, symptomatic hemorrhage and clinical outcomes were compared between the patients with hyperdense lesion and the patients without hyperdense lesion. The imaging and clinical factors which predict symptomatic hemorrhage were evaluated.

**RESULTS:** Of the 78 patients studied, 56 (71.8%) had hyperdense lesion on immediate post-procedural CT scan. The hyperdense lesion group had a higher incidence of hemorrhage (52.1% vs. 27.3%, p < 0.001), symptomatic hemorrhage (26.8% vs. 0%, p = 0.007) and poor outcomes (73.2% vs. 45.5%, p = 0.02) than the control group. The area of the hyperdense lesion and perilesional edema were the significant independent factors to predict symptomatic hemorrhage (p = 0.007 and 0.002).

**CONCLUSION:** Hyperdensity on CT scans obtained after intra-arterial thrombectomy is associated with hemorrhagic complications and clinical outcome. The wide area of hyperdense lesion and perilesional edema predict symptomatic hemorrhage.

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**SE 09 NR-70**

The interactions with insulin receptor substrate 1 and cognition for patients with type 2 diabetes: *in vivo* evidence from gene association analysis

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**BACKGROUND AND AIMS:** The dysregulations of insulin receptor substrate 1 (IRS-1) have been demonstrated to play vital roles in the interactions with brain insulin resistance and Alzheimer’s disease by series of cellular and molecular investigations. However, little is known concerning its *in vivo* neurobiology underlying cognitive impairment. The present study aimed to clarify the associations between IRS-1 and brain function via genetic-imaging approach.

**MATERIALS:** 80 subjects with mild cognitive impairment (MCI) and 80 healthy controls (HCs) were employed. Every participants are patients with type 2 diabetes, and they went through the evaluation of cognition, scan of functional magnetic resonance imaging (MRI) and sequencing of the whole exome of IRS-1 gene. Haplotypes of IRS-1 were constructed to evaluate the integrations of multi-single nucleotide polymorphisms (SNPs). We explored the cognitive significance of IRS-1 haplotypes and corresponding influences on brain functional network.

**RESULTS:** Two blocks of IRS-1 were detected. None of the haplotypes showed significantly different distributions between HCs and MCIs (P > 0.05), but the cognitive significance of block 1 was highlighted by the haplotype-based analyses (β = 0.39, raw P = 0.001, corrected P = 0.015). The further genetic-imaging analysis was performed to explore the effects of block 1 on brain default mode network. Regions related to the interactive effects of block 1 and disease statues were in frontal and temporal cortex. The behavioral relevance of the network was further indicated, as the functional connectivity within superior temporal cortex partially determine the cognitive performance for MCIs (β = 0.54, P = 0.005).

**CONCLUSION:** The haplotype-based genetic-imaging analysis expanded our understanding for the mechanisms underlying the diabetes-related cognitive impairments, and relieving the dysfunctions of IRS-1 may be an effective method to alleviate the injuries of cognition related to both Alzheimer’s disease and type 2 diabetes.
OBJECTIVE: Both geriatric depression and mild cognitive impairment confer an increased risk for developing dementia. The mechanisms underlying the development of the cognitive impairments in geriatric depression patients are still controversial. The present study aimed to explore the associations of cognitive decline with vascular risk, white matter hyperintensities (WMH) burden and hippocampus atrophy in both remitted geriatric depression (RGD) subjects and amnestic mild cognitive impairment (aMCI) subjects.

METHODS: Forty-one RGD subjects, 51 aMCI subjects and 64 cognitively normal elderly subjects underwent multimodal MRI scans and neuropsychological tests at both baseline and a 35-month follow-up. According to the changing patterns (declining or stable) of global cognitive function during the follow-up period, each group was further divided into a declining subgroup and a stable subgroup. The Framingham 10-year cardiovascular risk was assessed for each subject. WMH lesions and bilateral hippocampus were segmented and quantified using FLAIR images and/or T1 images.

RESULTS: RGD declining group displayed higher vascular risk and greater WMH volume than RGD stable group, whereas no such difference was shown in aMCI subjects or control subjects. Furthermore, greater increases of the WHM volume correlated with greater decreases of global cognitive function in RGD declining group, and greater decreases of the left hippocampus volume were associated with greater decreases of global cognitive function in aMCI declining group.

CONCLUSION: The cognitive decline in RGD patients is associated with the vascular pathology, whereas the cognitive decline in aMCI patients is associated with the neurodegeneration.
Evaluation of paranasal sinus abnormalities by multidetector CT in correlation with functional endoscopic sinus surgery and histopathology

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PURPOSE: Pathologies of paranasal sinus follow a wide spectrum. They can be simple inflammatory conditions or might include some malignancy. Conventional imaging methods have a limited role. Mostly correct diagnosis of paranasal pathologies is made during surgical procedure or after histopathological assessment. However, evolution of computed tomography (CT) has to a certain extent been successful in assessment of paranasal abnormalities. Evolution of multidetector CT (MDCT) is a step forward in that direction. The present study is directed to evaluate the role of MDCT in detection of PNS abnormalities.

MATERIALS AND METHODS: After obtaining approval from Institutional Ethical Committee, a total of 71 patients suspected of paranasal pathology and supposed to undergo functional endoscopic sinus surgery (FESS) underwent imaging of their paranasal sinus on a 384 slice MDCT. The scans were read independently by three observers for the presence of sinonasal opacification, artifacts, clarity of osseous structures and soft tissues. The final diagnosis was made when agreement was made by two or more observers.

RESULTS: MDCT established inflammation as the most common etiology (n = 56/71; 78.9%) followed by neoplastic lesions (n = 14/71; 19.7%). There was 1 (1.4%) case in whom congenital/developmental abnormality was established. Among 56 cases with inflammatory etiology, sinusitis (other than fungal) was established in 21 (37.5%), sinusitis with polyps in 19 (33.9%), sinusitis with polyplis in 14 (25%) while 2 (3.6%) case had mucocele. On FESS/histopathology, neoplastic lesions were confirmed in all the 14 cases - of these 9 (64.3%) were benign and 5 (35.7%) were malignant. Among benign cases nasopharyngeal angiofibroma was most common (n = 3/9; 33.3%), fibrous dysplasia and inverted papilloma were confirmed in 2 (22.2%) cases each while 1 (11.1%) case each was confirmed as neurofibroma and squamous papilloma respectively. All 3 malignant cases proved out to be squamous cell carcinoma. The sensitivity and specificity of MDCT for neoplastic lesions was 100%. However, with respect to malignancy, though it was 100% sensitive yet its