Neuro-ophthalmology/ -otology

P1918

Otolith-ocular responses in patients with acute brainstem lesions: ocular vestibular-evoked myogenic potentials

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Objective: The ocular vestibular-evoked myogenic potential (oVEMP), a recently documented otolith-ocular reflex, is considered to manifest the central projections of the primary otolithic afferent fibres to the oculomotor nuclei. The aim of our study is to define oVEMP abnormality in patients with acute brainstem lesions and to determine the brainstem structures involved in the generation of oVEMPs.

Methods: In response to air-conducted tone burst sound (ACS), oVEMP was measured in 52 patients with acute brainstem lesions. Individualized brainstem lesions were projected to a standard brain mapping template for normalization and the probabilistic lesion maps were constructed.

Results: More than half (n=28, 53.8%) of the patients with acute brainstem lesions showed abnormal oVEMP. The majority of patients with abnormal oVEMPs showed lesions in the dorsomedial brainstem that contains the medial longitudinal fasciculus, the crossed ventral tegmental tract and the oculomotor nuclei and nerves.

Interpretation: The otolith-ocular pathway appears to be located in the dorsomedial brainstem. Complemented to the cervical VEMP for the uncrossed otolith-spinal function, oVEMP to ACS can be applied to evaluate the crossed otolith-ocular function in the central vestibulopathy.

P1919

Drusen and AMD are associated with reduced cognitive function: the Tromsø study

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Introduction: Drusen are accumulations of extracellular material found in Bruch’s membrane of the eye. Drusen are a common finding in the ageing macula and are associated with development of age-related macular degeneration (AMD). Studies suggest that drusen and AMD are associated with neurodegenerative diseases and reduced cognitive function. Population-based studies on the relationship between AMD and cognitive functions are rare and have only reported weak associations. Further studies are warranted to examine the relationship between cognitive function, drusen and AMD.

Methods: We included 2,149 stroke-free participants from the population-based Tromsø Study in Norway. Retinal photographs were graded for presence of drusen and AMD. Cognitive function was assessed by the word memory test (short verbal memory), digit-symbol coding test (processing speed), and the tapping test (psychomotor tempo).

Results: We found significant decreased score on the digit-symbol coding test for participants with soft drusen (standardized β=-0.15, 95% CI: -0.24 to -0.06) and for participants with intermediate drusen (standardized β=-0.20, 95% CI: -0.30 to -0.10). AMD was associated with significant decreased score on the word memory test (standardized β=-0.26, 95% CI: -0.51 to -0.01).

Conclusions: The findings suggest that drusen deposition may share similar pathophysiology with reduced cognitive function or that drusen deposition and reduced cognitive function may be different symptoms of the same underlying disease process.
P1920

Selective impairment of high acceleration vestibulo-ocular reflex in spinocerebellar ataxia type 6

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Spinocerebellar ataxia type 6 (SCA6) may show various patterns of abnormal eye movements, primarily due to cerebellar dysfunction. Vestibulo-ocular reflex (VOR) abnormalities include reduced time constants, and increased or decreased gain of the VOR during rotation test. However, selective impairment of high acceleration VOR has not been reported. A 63-year-old woman with a history of dizziness and imbalance for 15 years underwent evaluation of the VOR using bithermal caloric and rotary chair tests, and head impulse test (HIT) using a magnetic search coil technique. She showed spontaneous downbeat nystagmus, gaze-evoked nystagmus in both horizontal and vertical directions, positional nystagmus, saccadic dysmetria, impaired smooth pursuit, and positive bedside HIT in addition to dysarthria, dysmetria, and hypo-active deep tendon reflexes. The results of bithermal caloric and rotation tests were normal, but the head impulse VOR gains were markedly decreased for all 6 semicircular canals when measured using a magnetic search coil technique. Brain MRI showed diffuse cerebellar atrophy, especially in the vermal area. She was found to have SCA6 mutation. High acceleration VOR may be selectively impaired in SCA6. Patients with SCA6 should have scrutinized evaluation of vestibular function over the broad range of acceleration stimuli.

P1921

Clinical characteristics of recurred benign paroxysmal positional vertigo after successful repositioning

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Objectives: Benign paroxysmal positioning vertigo (BPPV) is the most common cause of vertigo and usually easily treated with repositioning manoeuvre. Although half of all patients eventually have a recurrence, the clinical characteristics of recurred BPPV were not studied yet.

Methods: We reviewed the records of 1305 patients with BPPV from Eulji BPPV registry between May, 1999 and January, 2012. Among 409 patients who experienced recurrence during the follow-up period, typical nystagmus and vertigo were elicited by provoking manoeuvres (Dix-Hallpike test or roll test in the supine position) in 177 patients (34 men and 133 women, mean age was 57±13 years). We compared the involved side and canals of recurred cases with first attack.

Results: Among 177 patients, 97 were posterior canal-BPPV and 80 were horizontal canal-BPPV (calalolithiasis 50, cupulolithiasis 30). The same side of ears was involved in 142 (79.8%) of 177 recurred patients. 47.2% of cases involved same canals as first one. The severity of symptoms of recurred cases was milder than in the first attack.

Conclusions: Most recurrences occurred on the same side of ear, and recurred cases have less severe symptoms.

P1922

Abstract cancelled
P1923

Geotropic central positional nystagmus with hemorrhagic infarction in the territory of medial posterior inferior cerebellar artery

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Background: Recurrent positional vertigo and/or nystagmus caused by cerebrovascular disease or other brain lesions, so called central positional paroxysmal vertigo (CPPV), could be encountered in clinical practice even though the most common diagnosis of recurrent positional vertigo syndrome is benign paroxysmal positional vertigo (BPPV). To clinicians, the differentiation CPPV from BPPV could be a critical issue.

Case: A 55-year-old man visited our dizziness clinic with recurrent positional vertigo and headache. Neuro-otologic examinations including supine roll test revealed geotropic positional nystagmus. Even though the patient had unsteadiness, the initial diagnosis was BPPV involving the lateral semicircular canal. Several repositioning manoeuvres failed to remove the symptoms and signs. Unresponsiveness to the repositioning manoeuvre, combined with unsteadiness and headache led to check brain images. Brain MRI revealed acute infarction with hemorrhagic transformation in the territory of the medial posterior inferior cerebellar artery, involving the right inferomedial cerebellum including nodulus. The quality of vertigo and the geotropic nystagmus had improved slightly, but those symptoms were persistent for the 2-year follow-up period.

Conclusion: It has been known that central positional nystagmus is mostly downbeat or apogeotropic pattern, but geotropic nystagmus can manifest as a central positional nystagmus. The most common cause of geotropic nystagmus is BPPV involving the lateral canal; however, persistent geotropic nystagmus even after proper repositioning manoeuvre and combined neurologic signs can point to the central etiology. In this case, the irritative hemorrhagic cerebellar lesion involving the nodulus might be a cause of geotropic central positional nystagmus.

P1924

The prognostic value of vestibular evoked myogenic potential in patients with lower-brainstem strokes

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Objective: To find the relationship between the National Institutes of Health Stroke Scale (NIHSS) and Vestibular Evoked Myogenic Potential (VEMP) results in central origin dizziness patients according to status of recovery. Also, the usefulness of VEMP was evaluated as a tool for predicting recovery.

Materials and methods: From September 2007 to August 2010, a prospective study was done involving 18 patients who were admitted - and later discharged after recovery - after being diagnosed with central origin dizziness. Examination of neurologic deficits was performed by a physician (a 2nd year Neurology resident) who was not familiar with the research. The NIHSS was evaluated four times every week, and VEMP was also performed identically on both sternocleidomastoid muscles. Both values were compared and analyzed.

Results: In VEMP results according to recovery stages in central origin dizziness patients, there was a decrease in latency and asymmetry of p13, but there was no difference in latency and difference of latency of n23. Upon comparing both results, p13 and the level of asymmetry decreased as the value of the NIHSS decreased according to recovery of symptoms. Correlation between the two groups was statistically significant (p<0.05).

Conclusion: Compared to the NIHSS, results of VEMP allow for objective evaluation of symptom recovery as well as consistent results and also may be useful in clinical practice due to its safety.
P1925
Post-infectious optic neuritis associated with scrub typhus
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Introduction: To describe a patient who developed post-infectious optic neuritis associated with scrub typhus.

Methods: An 8-year-old boy was hospitalized for fever, chills, myalgia, and multiple maculopapular rashes. He was noted to have an eschar in his body trunk. Extensive testing for infectious etiology was negative except for scrub typhus antibody titre of 1:5120. Fever, chills, and myalgia rapidly resolved after doxycycline treatment. Two weeks later, the patient developed painless visual loss in the bilateral eyes.

Results: Upon neurological examination, visual acuity was counting fingers at 1 meter in the right eye and he was unable to perceive the light in the left eye. Fundoscopy revealed optic disc oedema in bilateral eyes. Gadolinium-enhanced T1-weighted MRI of the orbit showed bilateral enhancement of the optic nerves indicative of bilateral optic neuritis. He was treated with intravenous methylprednisolone 800mg for 5 days, followed by a tapering course of oral prednisolone. Two months after the onset of his visual symptoms, visual acuity was improved completely.

Conclusion: We concluded that the patient’s optic neuritis was likely associated with the scrub typhus, which has not been reported previously. The timing of visual loss may support an immunological mechanism of scrub typhus-associated optic neuritis. Treatment of post-infectious optic neuritis with high-dose corticosteroid appears effective in our patient.

P1926
Pure upbeat nystagmus in association with bilateral internuclear ophthalmoplegia
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Background and significance: Upbeat nystagmus occurs in ventral pontine tegmental lesions affecting the ventral tegmental tract carrying signals for upward vestibulo-ocular reflex (VOR), and in caudal medullary lesions involving the nucleus of Roller, one of the perihypoglossal nuclei which might contribute to vertical oculomotor integration. However, pure upbeat nystagmus in straight ahead position of gaze has not been described in association with bilateral internuclear ophthalmoplegia (INO) from pontine tegmental lesion involving the medial longitudinal fasciculus (MLF). We report pure upbeat nystagmus in a patient with bilateral INO due to dorsomedial pontine tegmental lesions.

Case report: A 66-year-old man developed horizontal diplopia and oscillopsia for three weeks. Examination showed bilateral INO and upbeat nystagmus with fixation, which disappeared in darkness. It was enhanced during upgaze and convergence, and decreased in downward gaze. Vertical head impulse tests were normal. Video-oculography disclosed pure upbeat nystagmus with exponentially decreasing slow phases. Brain MRI showed enhancing lesions involving bilateral dorsomedial pons extending from middle to upper portion. Upbeat nystagmus and bilateral INO improved with intravenous dexamethasone administration.

Conclusions: Upbeat nystagmus in our patient may be attributed to damage of the cell groups of the paramedian tracts (PMT) or the projections from the interstitial nucleus of Cajal (INC) to PMT, or disruption of connections between INC and the nucleus of Roller.
Vertigo and psychological distress
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Introduction: With a lifetime prevalence of 10.3% of the general population, vestibular vertigo is a widespread symptom. Furthermore, psychiatric disorders are present in nearly half of the patients presenting at specialized units for dizziness. Therefore, the importance of further elucidating the connections between vertiginous and psychiatric symptoms becomes clear.

Methods: 137 healthy adults completed two questionnaires: the Symptom-Checklist-90-Revised (SCL-90-R) and the Vestibular Symptom Scale (VSS). Additional information on patient history and socio-demographic factors was gathered and assessed in a multivariate regression analysis.

Results: The global severity of psychological distress (GSI) was positively correlated to the self-reported severity of “vertigo and related symptoms” (p<0.001), just as each of the SCL-90-R subscales (p<0.001 for “somatisation” to 0.18 (p=0.039) for “psychoticism”). Subjects holding a university degree reported lower psychological distress compared to subjects with a lower educational level (GSI means: 0.31 vs. 0.42; p=0.019). Women reported higher levels of depression than men (0.59 vs. 0.41; p=0.008). Subjects who declared any kind of disease during the last twelve months scored higher on both vertiginous symptoms and psychological distress (VER means: 0.21 vs. 0.14; p=0.023; GSI means: 0.43 vs. 0.28; p<0.001).

Conclusions: These results indicate a clear connection between psychological distress and vertigo. The existence of psychopathological symptoms aggravates the subjective severity of vertigo, and vice versa. This study adds to the growing evidence of the bidirectional link between these two symptom entities.
P1929

Vestibular function test of dizziness patients by vestibular evoked myogenic potential

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Background and objectives: Since the saccule is a frequent site of hydrops formation, we evaluated whether vestibular evoked myogenic potential (VEMP) responses can reflect the diagnosis and the stage of Menière’s disease. And we also studied other vestibular diseases such as vestibular neuritis and benign paroxysmal positional vertigo.

Materials and methods: Retrospectively, we analyzed the results of VEMP in 42 patients (20 men and 22 women) with unilateral definite Menière’s disease, 21 patients (10 men and 11 women) with vestibular neuritis, and 21 patients (10 men and 11 women) with benign paroxysmal positional vertigo (BPPV). All subjects underwent VEMP testing using ipsilateral 1 KHz-tone burst sound with 105 dB nHL.

Results: VEMP was present in 85% of Menière’s affected ear. The latency of p13 of affected ears in patients with Menière’s disease, vestibular neuritis (VN), BPPV was not significantly prolonged than that of normal ears in the control group except left n23 latency in Menière’s disease. In patients with Menière’s disease, the amplitude-ratio was statistically (p=0.006) larger than that of the control group. Relationship was found in amplitude ratio among groups classified by the stage of Menière’s disease.

Conclusion: This study shows that amplitude ratio of VEMP response is a useful method to determine the severity and prognosis of Menière’s disease. We recommend VEMP to quantitatively explain to the patient the severity of Menière’s disease.

P1930

Prevalence of migraine in low tension glaucoma patients

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Introduction: Some authors reported a significant relationship between migraine and low tension glaucoma.

Objective: To investigate the prevalence of migraine in patients with low tension glaucoma and to evaluate MRI and EEG abnormalities in low tension glaucoma migraineurs.

Methods: A prospective study conducted on 40 controls and 39 patients with low tension glaucoma in Mansoura Ophthalmology Center diagnosed by fundus examination, tonometry, and full threshold perimetry. A standardized questionnaire was used to indicate migraine positives. Brain MRI and EEG were done for migraineurs in the control and patient groups.

Results: Migraine was more common in patients with low tension glaucoma than in the control group (p=0.03). In patients with low tension glaucoma, females were associated with higher prevalence of migraine than males (20.5 vs. 10.3%). Patients with age group ranging from 20 to 25 years had a higher incidence of migraine than other age groups. Of the low tension glaucoma migraineurs, 16.7% and 33.3% had abnormal brain MRI and EEG, respectively.

Conclusion: Migraine is more common in low tension glaucoma patients than in controls. It is also more prevalent in low tension glaucoma female gender and those with age ranging from 20 to 25.
P1931

Transient supranuclear gaze palsy associated with persistent primitive trigeminal artery

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Primitive trigeminal artery is the most frequent embryonic communication between the carotid and vertebrobasilar system with the estimated incidence of 0.1-1.0%. We report a case presented with recurrent supranuclear vertical gaze palsy related to PTA as a symptom of vertebrobasilar insufficiency. A 57-year-old man was admitted to our hospital because of recurrent vertical diplopia for 7 days. On admission he was alert, but presented with conjugated gaze palsy. In the neuro-ophthalmologic examination, the vertical vestibulo-ocular reflex and Bell’s phenomenon was preserved. There were no accompanying neurologic deficits such as cranial nerve palsies and cerebellar dysfunction. His ocular finding prolonged only for 5 hours then disafferead thereafter. We could not find any evidence of acute ischemic lesion on the magnetic resonance (MR) imaging. MR angiography and digital subtraction angiography, however, showed persistent anastomosis from the cavernous segment of right internal carotid artery (ICA) to the proximal portion of basilar artery (BA). As expected, distal portion of BA was hypoplastic. Vertical gaze palsy can be caused by a lesion involving the thalamus, rostral interstitial nuclei of medial longitudinal fasciculus, or posterior commissure. Hypoplastic BA might cause transient ischemic symptoms. Previous reports dealing with persistent PTA suggested that the mechanism of ischemia in the posterior circulation be embolism from the ICA stenosis or in-situ thrombosis in the PTA itself. In contrast to the previous studies, our case could show that ischemic symptoms localized to the mesodiencephalon might be caused by hemodynamic insufficiency from hypoplastic BA.

P1932

Non-traumatic carotid-cavernous fistula combined with acute brain stem infarction resulting in hemiparesis

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Background: Carotid-cavernous fistula (CCF) is abnormal arteriovenous communications between the carotid and cavernous sinus. Direct CCF results from a tear in the intracavernous carotid artery, usually due to trauma or intervention. Indirect CCF generally occurs spontaneously and shows more subtle signs. CCF is usually combined with aneurysm or trauma. CCF is relatively rare, but may show progressive, diverse symptoms such as decreased visual acuity, exophthalmosis, ophthalmoplegia, and cerebral ischemia due to increased venous pressure. However, hemiparesis has been rarely reported. We report a case of CCF combined with multiple brainstem infarctions causing hemiparesis.

Case report: A 74-year-old woman visited our hospital with a chief complaint of gait disturbance, headache, and repeated vomiting during 10 days. She had a medical history of diabetes, hypertension, and hyperlipidemia. She had no traumatic history. A neurological examination revealed mild dysarthria, right exophthalmos with conjunctival oedema and ophthalmoplegia, deceased visual acuity of the right eye, left hemiparesis (MRC Grade III) and decreased pinprick sensation of left upper and lower limbs. Blood tests showed elevated level of total cholesterol (343mg/dl) and erythrocyte sedimentation rate(ESR) (30mm/hr). Random serum glucose level was elevated to 265mg/dl. Other studies were within normal limits. A brain MRI and MR angiography showed a recent infarction on the right pontine and medulla oblongata and fistula of the right carotid and cavernous sinus.

Conclusion: CCS is usually combined with aneurysm or trauma, and hemiparesis has rarely been reported. We report a case of non-traumatic, no aneurysmal CCF combined with hemiparesis.
P1933
Calycopterin induces mitochondrial biogenesis and autophagy in PC12 neuron-like cells exposed to \( \text{H}_2\text{O}_2 \)

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**Introduction:** An increase in the intracellular levels of antioxidant agents, and at the same time the removal of already damaged components, are both part of the oxidative stress response. Flavones have been considered as one of the antioxidants. We determine the neuroprotective effects of calycopterin as natural flavones, on \( \text{H}_2\text{O}_2 \)-treated PC12 neuronal cells.

**Methods:** PC12 cells treated with 25, 50 and 100\( \mu \text{M} \) of calycopterin for 3h, followed by adding \( \text{H}_2\text{O}_2 \) (150\( \mu \text{M} \)). Apoptosis was assessed by MTT test, acridine orange/ethidium bromide and Hoescht staining and the autophagy was determined by Mono Dansyl Cadaverin and acridine stain. Inflammation, ER stress, mitochondrial biogenesis and autophagy factors were measured by Western blot method.

**Results:** We found that calycopterin protects differentiated PC12 cells by inhibiting caspase-dependent pathway of apoptosis. Calycopterin could decrease ER stress by decreasing calpain and caspase-12 levels. These inhibitions were along with stabilization of Nrf2, phosphorylation of CREB and decrease of NF-KB levels. The level of inflammatory factors such as NF-KB, TNF\( \alpha \) and COX-2 was also decreased by calycopterin. Interestingly, calycopterin promotes mitochondrial biogenesis through increase of PGC1\( \alpha \), NRF1 and TFAM. We also measured important factors involved in autophagy such as LC3B, Atg-7, Atg-12 and P62. Calycopterin could increase autophagy in order to protect PC12 neuronal cells from death.

**Conclusions:** We provided documentation of neuroprotective effect of a natural flavone, calycopterin, against \( \text{H}_2\text{O}_2 \)-induced oxidative stress in differentiated PC12 cells by modulating the level of transcription factors, increasing the level of antioxidant factors and promoting biogenesis of mitochondria and autophagy.

P1934
Central retinal artery obstruction (CRAO) - clinical and colour Doppler imaging (CDI) characteristics

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**Introduction:** CRAO represents an abrupt diminution of blood flow through the CRA severe enough to cause ischemia of the inner retina.

**Purpose:** To assess the role of CDI in the etiological diagnosis of CRAO.

**Patients and methods:** 4 patients with clinical suspicion of unilateral CRAO were examined following a protocol including CDI of orbital vessels.

**Results:** They had no emboli visible on ophthalmoscopy. The first patient had no blood flow signal on CDI on a surface of 2 millimetres behind the left optic disc. B-scan ultrasound evaluation found a small round, moderate reflective echo within the left optic nerve, 2 millimetres behind the optic disc. Left ICA ultrasound examination found an ulcerated ateromatous plaque, being the source of cholesterol emboli. The second patient had no detectable flow in the right CRA, due to multiple reverberations determined by calcic arterial emboli, placed 5 millimetres behind the right optic disc. The angio-CT showed an unstable ateromatous plaque, being the source of the emboli. The third patient had characteristic CDI findings for Horton disease: low blood velocities, especially end-diastolic velocities, and high RI in all retrobulbar vessels, in both orbits (severe diminished blood flow velocities in the CRA, especially on the affected side). The diagnosis was sustained by temporal arteries ultrasound and biopsy. The last patient had very low blood flow velocities in the left CRA, due to an acute left ICA occlusion.

**Conclusions:** Ultrasound investigation is a valuable diagnostic tool for identifying potential systemic conditions associated with CRAO.
P1935

Ophthalmoplegia without ataxia: a case report
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Acute ophthalmoplegia without ataxia (AOWA) is an extremely rare disease in which acute impairment of ocular movements is usually the sole clinical manifestation. We report a patient with isolated acute ophthalmoplegia and anti-GQ1b IgG antibody in CSF whose treatment with intravenous immunoglobulin (IVIg) led to clinical recovery within four weeks. Case was a 68-year-old woman with diplopia, bilateral blepharoptosis and dizziness that started one week ago. She had diarrhea just before her complaints. Examination revealed bilateral incomplete ptosis and total ophthalmoplegia. Pupillary reaction to light was decreased bilaterally. Other findings like orbital and cranial MRIs were normal. Biochemistry, blood count, sedimentation, C-reactive protein, thyroid hormones, glycosylated haemoglobin, and thiamine levels were normal. ANA, ENA, ANCA, anti-dsDNA, anti-acetylcholine receptor antibodies, HIV, and VDRL was negative. CSF protein and glucose levels were normal, and there were no cells. Anti GQ1b IgG antibodies were positive in CSF. Neostigmine test was negative. Nerve conduction studies were normal. AOWA was considered and IVIg 0.4g/kg/d for five consecutive days was started. In the fourth week examination was normal besides bilateral slight ptosis.

AOWA has been designated as an atypical form of Miller-Fisher syndrome. The new diagnostic criteria for AOWA, fulfilled by the presented patient, include acute or subacute onset of external/internal ophthalmoplegia, absence of other neurological symptoms, presence of antiGQ1b IgG antibodies and exclusion of other identifiable causes. Cases of AOWA successfully treated with IVIg have been reported. The disease can have a good prognosis without treatment, though the time to complete recovery is longer.

P1936

Isolated cranial neuritis due to paranasal sinusitis: two case reports
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P1937

Clinical analysis of hearing loss due to spontaneous intracranial hypotension
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P1938

Visual evoked potentials in patients with diabetic neuropathy
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Acute myopia induced by administration of 25mg/day single-dose topiramate: a case report
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P1940

Abstract cancelled

P1941

Neuro-ophtalmologic examination of stroke patients
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P1942

Abstract cancelled

P1943

Non-invasive alternating current stimulation improves vision after traumatic injury of the optic nerve
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P1944

Unusual cause of ptosis
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