Botulinum toxin type B in blepharospasm and hemifacial spasm

Botulinum neurotoxins (BTXs) inhibit the presynaptic release of acetylcholine causing a clinical improvement that results in sustained muscle weakness and have been used in the past 20 years to induce selective blocking of hyperactive striatal (and smooth) muscles. All the different seven serotypes of BTXs have inhibition properties than the reconstituted solution of BTX-A, but the severe, adverse reaction reported in a single patient with BLS has not been described in previous trials using this compound for cervical dystonia and has rarely been reported in conjunction with BTX-A use; it should, however, not discourage the planning of further dose ranging studies of BTX-B and studies on larger series of patients designed to compare the effect of BTX-B with both placebo and BTX-A in different neurological disorders.

Competing interests: CC has been reimbursed by Elan, Allergan and Ipsen (manufacturers of different botulinum neurotoxins) for attending several conferences. MFC has been reimbursed by Allergan for attending a conference. ARB has been reimbursed by Allergan and Ipsen for attending several conferences.

C Colosimo, M Chianese, M Giovannelli
Dipartimento di Scienze Neurologiche, Università La Sapienza, Rome, Italy

M F Contarino, A R Bentivoglio
Istituto di Neurologia, Università Cattolica del Sacro Cuore, Rome, Italy

Correspondence to: Dr C Colosimo, Dipartimento di Scienze Neurologiche, Università La Sapienza, viale dell’Università 30, 00185 Rome, Italy; carlo.colosimo@uniroma1.it

References


Persistent bitter taste as an initial symptom of amyotrophic lateral sclerosis

Amyotrophic lateral sclerosis (ALS) is characterised by progressive degeneration of upper and lower motor neurones. Clinical symptoms include weakness, dysphagia, dysarthria,
muscle atrophy and fasciculations, hyperreflexia, spasticity, Babinski signs, and clonus. Here we report on two patients with sporadic ALS in whom the disease initially presented with a persistent bitter “metallic” taste.

**Case reports**

Patient 1 was a previously healthy 64 year old woman. At the time of admission, she reported a four month history of a persistent bitter “metallic” taste confined to the posterior third and the epiglottis. It has been shown experimentally and clinically that anaesthesia of the chorda tympani nerve branch results in intensified perception of bitter taste from the posterior tongue, suggesting that the WAY of the chorda tympani normally inhibits the glossopharyngeal and vagal nerve input.¹ In fact, spontaneous bitter taste dysgeusia (phantogeusia) similar to that perceived by our patients was observed in the posterior tongue after anaesthesia of the chorda tympani.² Hence it may be speculated that mild sensory neuropathy of the chorda tympani branches may be responsible for our findings. Sensory signs have indeed been described in ALS. However, if at all, they develop relatively late in the disease.³ Furthermore, the spatial gustatory function test did not reveal hypogeusia confined to a localised region of the tongue in our patients, although the sensitivity of this test for mild gustatory disturbances is probably low.⁴ Unfortunately, neither patient was available for electrodiagnostic studies to further clarify our hypothesis.⁵

Alternatively, the dysgeusia may be of central nervous origin. Both patients presented with bilateral facial sensory paralyses reflecting a prominent bulbary involvement in the dis- ease picture. Thus it may be assumed that bilateral degeneration of the brain stem solitary tract nucleus may be responsible for the dysgeusia in our patients. Interestingly, dysfunction of the autonomic nervous system—which in our observation, but we believe that future studies may be able to address these issues.

**References**


**Schizophrenia and episodic ataxia type 2**

The frequent co-occurrence of degenerative cerebellar pathology and schizophrenia, as well as the recently reported increased association rate between autosomal dominant ataxias and major psychosis, strongly suggests the involvement of the cerebellum in the pathophysiology of schizophrenia.⁶ The analysis of associations between psychosis and neurodegenerative diseases may improve our understanding of the pathophysiology of schizophrenia and facilitate the search for susceptibility genes for this disorder.⁷ To our best knowledge, there have been no previous reports about an association between schizophrenia and the periodic autosomal dominant ataxias, such as episodic ataxia type 1 and type 2 (EA1 and EA2). We present a case of a young man who has been diagnosed with paranoid schizophrenia (ICD-10: F20.0) and episodic ataxia type 2.

**Case study**

The patient, a man aged 27 years, was first admitted to our hospital with psychotic symptoms in June 1995. He presented with paranoid delusions and delusions of reference, auditory hallucinations (commenting voices), formal thought disorder, and behaviour disorder, as well as negative symptoms such as blunted affect, poor rapport, and lack of spontaneity. He was diagnosed as having paranoid schizophrenia (ICD-10: F20.0) and showed a PANSS (positive and negative symptom scale) total score of 68/69.

The patient was initially treated with risperidone (6 mg/d) which led to a slight improvement in his psychotic symptoms. After discharge from our hospital in September 1995 he regularly attended our outpatient clinic. Despite treatment with risperidone and later with haloperidol decanoate (20 mg/2 weeks), he continued to have chronic psychotic symptoms, with persistent auditory hallucinations. In April 2001 at this admission he was suffering from severe psychosis (paranoid delusions, auditory hallucinations, formal thought disorder, and behaviour disorganisation) and negative symptoms (fig 1). Antipsychotic treatment with quetiapine (800 mg/d; 4 weeks) and subsequently with amisulpride (600 mg/d; 4 weeks) did not lead to any improvement in the psychosis. At this time, a neurological investigation showed gaze evoked nystagmus and upward gaze palsy, though attacks of ataxia had neither been reported by the patient nor noticed by the nurses.

Because of persistence of the psychotic symptoms, we began treatment with clozapine (600 mg/d) and observed a gradual deterioration in psychosis over the next four weeks despite sufficient serum levels of cloza- pine. At that time the first severe ataxic attacks appeared. They were manifested by gait ataxia, dysarthria, and slight intention tremor of the upper extremities and persisted for at least several hours. After other causes of cerebellar dysfunction—such as inflammatory, toxic, and vascular disease—had been excluded, the patient was diagnosed as having episodic ataxia type 2 because he met the following clinical diagnostic criteria: duration of episodes (hours to days), gait and stance ataxia, interictal absence of most symptoms (except oculomotor deficits). Consequently, we began treatment with acetazolamide (200 mg twice daily) and switched the antipsychotic medication from clozapine (potentially 600 mg/d) to amitriptyline (400 mg/d). This led to both a complete elimination of ataxia episodes and a gradual amelioration of the psychotic symptoms. At the time of discharge six weeks later, the total PANSS score was 90. At all subsequent follow up investigations undertaken monthly until December 2002 the psychotic symptoms remained unchanged (fig 1) and there was no recurrence of the ataxia attacks.
### Association of cardiomyopathy caused by autonomic nervous system impairment with the Miller Fisher syndrome

We report a case of Miller Fisher syndrome associated with reversible left ventricular wall motion abnormalities similar to takotsubo shaped cardiomyopathy.

### Case report

A 58 year old man was admitted to our hospital because of ataxia, ophthalmoplegia, and dysarthria. He had a 10 year history of hypertension. Four weeks before admission, he had common cold-like symptoms. Ten days before admission, he developed difficulties with walking and speaking. The next day he was unable to walk or lift his eyelids. He was admitted to another hospital, where he was diagnosed as having a brain stem infarct. During admission, he developed tightness in the chest for three to four days which improved spontaneously. Because of exacerbation of his neurological symptoms, he was transferred to our hospital.

On initial physical examination, his blood pressure was 150/106 mm Hg and in regular rhythm. He was afebrile and had no respiratory difficulty. On neurological examination, he was fully orientated. His pupils were slightly mydriatic bilaterally (right 6 mm, left 6.5 mm) and the light reflex was absent on both sides. Complete ophthalmoplegia and peripheral facial palsy were observed bilaterally. He had severe dysarthria with restricted movements of the soft palate and tongue. Although muscle strength was preserved, deep tendon reflexes were absent in the four extremities. The plantar responses were flexor. There was no definite involvement of sensory function. Ataxia was observed in the four extremities.

Routine laboratory tests were normal except for a slightly increased white blood cell count. Cerebrospinal fluid obtained on the first hospital day showed a normal protein concentration per high power field and an increased protein level of 82 mg/dl. Aetiological investigations, including anti-GM1, anti-GM2, anti-GD1a, anti-GM1b, anti-GT1a, anti-GQ1b, anti-GD1b, anti-GT1b titres, were all and the heart rate was 108 beats/min and in regular rhythm. Results of thyroid function tests, angiotensin converting enzyme level, c-ANCA, p-ANCA, anti-acetylcholine receptor antibody, serum electroimmunophoresis, and polymerase chain reaction analysis for CSF tuberculosis and herpes simplex virus were all normal. Serum titres of influenza A and B, measles, mumps, varicella-zoster virus, cytomegalovirus, Epstein-Barr virus, herpes simplex virus, rubella, and mycoplasma were also normal. Cranial magnetic resonance (MR) imaging and MR angiography showed no abnormal lesions. EEG findings were normal. Nerve conduction studies showed decreased F wave persistence in the arms. Motor and sensory nerve conduction velocities were well maintained.

On the basis of the neurological findings, we established a diagnosis of the Miller Fisher syndrome. The patient was treated with a 12 litre plasma exchange over six days, followed by high dose intravenous gamma globulin (400 mg/kg/day for five continuous days).

There was no chest pain during admission to our hospital; however, an ECG on the first hospital day showed sinus tachycardia with slightly elevated ST segments in leads V3–V5. T waves were inverted in leads I, II, AVL, and V3–6 on the fifth day. These findings, in

---

**Figure 1** Positive and negative syndrome scales, treatment with antipsychotic agents, and the frequency of episodes of ataxia.

### Episodic ataxia

In this patient obviously follows an autosomal dominant trait. The patient's mother suffers from cerebellar atrophy with severe gait and limb ataxia, dysarthria, and ocular motor deficits. Her father is reported to have had ocular motor deficits as well.

At the age of 12 months, a neurological examination of our patient showed saccadic pursuit and vertical spontaneous nystagmus. Since the age of 18 months, spells of gait and stance ataxia have been described (15 to 20 minutes long, one to four times in four to six weeks). At the age of three years and nine months, a neurological investigation showed gaze evoked nystagmus, saccadic pursuit, and absence of optokinetic nystagmus (both horizontal and vertical). At that age a suspicion of migraine was raised but not confirmed. At the same time abnormal EEG patterns with sharp waves over the left temporal lobe were reported.

Recent EEGs done before, during, and after treatment with clonazepam showed abnormal bilateral theta-delta activity (4–7 cps and 2–3 cps) in the temporal and parietal regions. Magnetic resonance (MR) imaging done in 1995, 1997, and 2001 showed no signs of atrophy or cerebral signal alteration. Proton MR spectroscopy done in July 2001 revealed decreased N-acetylaspartate to creatine ratios in the cerebellum vermis region and left cerebellar hemisphere. On 1H-ironenilz SPECT in July 2002, there was a reduced density of the GABA(A)-benzodiazepine receptor complex in the cerebellum as well as in the frontal dorsolateral and occipital regions.

### Comment

This case shows an association between clinically diagnosed episodic ataxia type 2 and schizophrenia. Cessation of ataxia episodes as a response to treatment with acetazolamide supports the clinical diagnosis of EA2 and rules out alternative pathologies such as SCA6 and EA1, which are known to have only a paroxysmal response to acetazolamide, if any.

and EA1, which are known to have only a paroxysmal response to acetazolamide, if any.

### References

both ophthalmoplegia and gait disturbance. Uptake (fig 1B). The patient was discharged on scintigraphy on the 70th day showed improved scintigraphy done on the 12th day revealed a reversible left ventricular dysfunction associated with Guillain–Barré syndrome – an expression of catecholamine cardiotoxicity? Jpn Circ J 1995; 59: 236–40.

Figure 1 MIBG (metiodobenzylguanidine) myocardial scintigrams on the 12th day (A) and the 70th day (B). On the 12th day, MIBG uptake was reduced in the anterior, inferior, and lateral walls (A). The uptake had recovered by the 70th day (B).

conjunction with the previous episode of chest tightness, led us to suspect acute coronary syndrome, and we undertook coronary angiography. Although the coronary arteries were free of any lesions, a left ventriculogram showed severe hypokinesis in the anterolateral, apical, and diaphragmatic segments, with an ejection fraction of 34%. Provocative vasospasm was not confirmed. Maximum creatine kinase MB release was 8.0 ng/ml (normal < 5.0 ng/ml). A left ventriculogram on the 13th hospital day showed an improvement in the hypokinesis, with an ejection fraction of 44%. There were no specific abnormal findings on myocardial biopsy. Serum noradrenaline (norepinephrine) concentrations were increased to 810 ng/l, 1160 ng/l, and 549 ng/l on the seventh, 14th, and 78th day, respectively (normal 90–420 ng/l). Thallium-201 scintigraphy on the ninth day showed only mild hypoperfusion in the lateral wall; however, 123I-metiodobenzylguanidine (MIBG) scintigraphy done on the 12th day revealed a decrease in uptake in the anterior, inferior, and lateral walls in the early phase (fig 1A). MIBG scintigraphy on the 70th day showed improved uptake (fig 1B). The patient was discharged on the 130th day with marked improvement in both ophthalmoplegia and gait disturbance.

Comment
In this case, serum anti-GQ1b antibody was negative despite its common association with Miller Fisher syndrome. However, we feel that the triad of ataxia, areflexia, and ophthalmoplegia in association with dissociation of protein and cytological findings in the CSF and the absence of specific findings on cranial MR imaging and MR angiography is sufficient to justify our diagnosis of the Miller Fisher syndrome. Autonomic dysfunctions consisting of sinus tachycardia, increased serum noradrenaline, and decreased MIBG uptake were noted in this case. As these dysfunctions were reversible and paralleled the severity of the Miller Fisher syndrome, they probably have the same aetiology. Because 123I-metiodobenzylguanidine is a physiological analogue of noradrenaline, and is actively transported into the noradrenaline granules of sympathetic nerve terminals by uptake-1, decreased MIBG uptake in the early phase suggested the involvement of cardiac autonomic nerves. Normal findings on coronary angiography, as well as unremarkable findings on thallium-201 scintigraphy, ruled out ischaemic cardiomyopathy. Thus autonomic dysfunction in the cardiovascular system was considered to have been an important factor in the present case.

Takotsubo shaped cardiomyopathy is a unique heart syndrome characterised by reversible left ventricular apical wall motion abnormalities with chest symptoms, ECG changes, and minimal myocardial enzymatic release mimicking acute myocardial infarction without coronary stenosis. The syndrome is named “takotsubo shaped” cardiomyopathy as it has often been reported in Japan and the unique configuration of left ventriculogram resembles a takotsubo, a Japanese word describing an octopus pot. The left ventricular wall motion abnormality observed in the present case can be included in the takotsubo shaped cardiomyopathy category because of its reversible course and other clinical characteristics. Although the detailed aetiology of this syndrome remains unclear, enhanced sympathetic activity or vasospasm are considered to play a role in the development of contraction abnormalities. Three cases of Guillain–Barré syndrome with reversible left ventricular dysfunction have previously been reported. In all these cases, the apical regions were mainly involved. In two of the three cases, MIBG scintigraphy was done and showed decreased uptake around the apex in both cases.

To our knowledge, this is the first report of a case of Miller Fisher syndrome with reversible cardiomyopathy caused by impairment of the autonomic nervous system. This cardiac syndrome may easily be missed because of its transient nature, with minimal abnormalities on routine laboratory findings. However, careful cardiac examination including ECG, left ventriculography, and MIBG scintigraphy may lead to the identification of further cases of Miller Fisher syndrome showing this cardiac complication.

M Oomura, T Yamawaki, H Oe, H Moriwaki, K Miyashita, H Naritomi
Cerebrovascular Division, Department of Internal Medicine, National Cardiovascular Centre, S-7-1 Fujishiro-dai, Suita, Osaka 565-8565, Japan
Cardiovascular Division, Department of Internal Medicine, National Cardiovascular Centre
Correspondence to: Dr Hiroaki Naritomi; hnariot@hsp.ncvc.go.jp

References

No evidence of type 1 or type 3 hypersensitivity mechanism in amoxicillin/clavulanic acid induced aseptic meningitis

Drug induced aseptic meningitis has been reported in response to various agents, in particular non-steroidal anti-inflammatory drugs, intravenous immunoglobulins, anti-CD3 monoclonal antibody (OKT3), and antibiotics. Hypersensitivity reactions (especially type 1 and type 3) have been invoked as the cause by many investigators. This hypothesis is supported by the detection of immune complexes in the serum or cerebrospinal fluid (CSF) of some patients.

To our knowledge, only two cases of aseptic meningitis induced by amoxicillin with or without clavulanic acid have been reported. We report a third case of probable amoxicillin induced aseptic meningitis where we performed laboratory studies for type 1 or type 3 hypersensitivity mechanisms.

Case report
A 62 year old man presented to our hospital because of fever (up to 40°C) and severe headache for four days. Both had begun approximately six hours after the intake of one tablet of 500 mg amoxicillin plus 125 mg clavulanic acid (Augmentan®, SmithKline Beecham) as antibiotic prophylaxis before a planned dental surgical procedure. He had discontinued the antibiotic after two tablets and cancelled the appointment with the dentist. Five weeks before, he had already had to cancel the planned operation, because he had exactly the same (but more severe) signs and symptoms, also approximately six hours after the intake of one tablet of amoxicillin/ clavulanic acid. Following discontinuation of the prophylactic antibiotic (after two tablets), the fever and headache had subsided over the course of three weeks without any treatment.
It may also lead to several adverse reactions.

Salicylic acid has numerous beneficial effects. Widely used for more than 2000 years, it has numerous beneficial effects. Another adverse effect of amoxicillin/clavulanic acid induced by a defect of the vestibulospinal reflexes, the oscillopsia is caused by a defect of the membranous labyrinth. As all his symptoms persisted, he came to our dizziness unit nine months later. The Halmeagyi–Curthoys test (head impulse test to evaluate the function of the semicircular canals) was pathological and revealed a dynamic deficit of the horizontal semicircular canal bilaterally. Romberg testing showed increased sway which worsened when the eyes were closed. His gait was based and also worsened with the eyes closed. However, his hearing was normal, and he had no cerebellar signs.

Electromyography revealed a significant bilateral caloric hyporesponsiveness (peak slow–phase velocity of the caloric nystagmus during irrigation with 44°C warm water: right ear, 2°/s; left ear, 5°/s; and with 30°C cold water: right ear, 5°/s; left ear, 5°/s). Further, the pre- and postrotatory nystagmus lasted less than three seconds and showed a gain of < 0.2. Hearing tests, including an audiogram, were normal. Blood tests for other possible causes of bilateral vestibulopathy (antibodies against inner ear structures, antinuclear antibodies, anticytoplasmic antibodies, rheumatic factor, vitamin B-12, folate acid, and so on), as well as high resolution magnetic resonance imaging of the cerebello-pontine angle and labyrinth were normal. As mentioned above, testing of the serum revealed the presence of monoclonal IgG lambda gammopathy (total protein 8.7 g/dl; normal range 6.0 to 8.0 g/dl; IgG concentration 28.2 g/dl; normal range 7.0 to 16.0 g/dl). The time course of symptom development following the ingestion of a high dose of aspirin provides strong evidence that the isolated and persistent bilateral vestibulopathy was caused by the drug. Although aspirin induced bilateral vestibulopathy has not been reported before, it is likely that other patients taking aspirin have developed it, as bilateral vestibulopathy is often overlooked.

For more than 150 years it has been known that high doses of salicylates can cause tinnitus, loss of absolute acoustic sensitivity, and alterations of perceived sounds, which may develop in the initial days of treatment. It is also known that the susceptibility of individual subjects to salicylate induced inner ear toxicity varies greatly, but why this is so is unclear. Various attempts have been made to explain the toxic effects of salicylic acid. Otoacoustic emissions have been used to show that salicylates cause changes in the mechanosensory functioning of the cochlea; in particular, spontaneous emissions are decreased. Histopathological animal studies have revealed significant changes of only the outer hair cell lateral membrane. In vitro experiments have shown that the fast motile responses of outer hair cells are reduced. As regards the underlying mechanisms, aspirin seems to directly inhibit the mechanoelectrical transduction process by partitioning the salicylate molecules in the membrane of hair cells. These latter findings suggest to us that this newly described adverse reaction to aspirin may be related to our patient's monoclonal IgG lambda gammopathy. The raised IgG concentration could have promoted such partitioning of the molecules in the hair cell membrane, assuming they are able to enter the endolymphatic space. However, this does not explain the isolated impairment of the vestibular function. From a clinical point of view, it is relevant to consider this additional adverse effect of aspirin, especially as it is unpredictable owing to varying individual susceptibilities. If a patient has taken higher dosages of aspirin and complains of dizziness, his vestibular function should be tested for bilateral vestibulopathy.

**References**


**Another adverse effect of aspirin: bilateral vestibulopathy**

Widely used for more than 2000 years, salicylic acid has numerous beneficial effects. It may also lead to several adverse reactions, affecting for instance the auditory system. Persistent dysfunction of the vestibular system, however, has not yet been described. We report a patient who took 5–6 g aspirin a day for three days for arthralgia. Subsequently he felt unsteady and had oscillopsia while walking, but no tinnitus or hyperacusis. Caloric irrigation revealed a bilateral vestibulopathy which was most probably caused by the direct effect of aspirin on the vestibular hair cells.

**Case report**

A 61 year old teacher took 5–6 g aspirin a day for three days to treat his arthralgia, but no other drugs during this period. Two or three days later he felt unsteady while walking. This problem was worse on uneven ground and in the dark. During head movements and while walking he perceived apparent motion of the visual scene and his vision was blurred. Hearing was normal and he did not complain of tinnitus. He had not had vertigo or hearing problems previously, and his family history was also unremarkable. Though he had had monoclonal (IgG lambda) gammopathy for five years, a bone marrow biopsy proved normal, and thus his condition had been diagnosed as "monoclonal gammopathy of unknown significance."

As all his symptoms persisted, he came to our dizziness unit nine months later. The Halmeagyi–Curthoys test (head impulse test to evaluate the function of the semicircular canals) was pathological and revealed a dynamic deficit of the horizontal semicircular canal bilaterally. Romberg testing showed increased sway which worsened when the eyes were closed. His gait was based and also worsened with the eyes closed. However, his hearing was normal, and he had no cerebellar signs.

Electromyography revealed a significant bilateral caloric hyporesponsiveness (peak slow–phase velocity of the caloric nystagmus during irrigation with 44°C warm water: right ear, 2°/s; left ear, 5°/s; and with 30°C cold water: right ear, 5°/s; left ear, 5°/s). Further, the pre- and postrotatory nystagmus lasted less than three seconds and showed a gain of < 0.2. Hearing tests, including an audiogram, were normal. Blood tests for other possible causes of bilateral vestibulopathy (antibodies against inner ear structures, antinuclear antibodies, anticytoplasmic antibodies, rheumatic factor, vitamin B-12, folate acid, and so on), as well as high resolution magnetic resonance imaging of the cerebello-pontine angle and labyrinth were normal. As mentioned above, testing of the serum revealed the presence of monoclonal IgG lambda gammopathy (total protein 8.7 g/dl; normal range 6.0 to 8.0 g/dl; IgG concentration 28.2 g/dl; normal range 7.0 to 16.0 g/dl). The time course of symptom development following the ingestion of a high dose of aspirin provides strong evidence that the isolated and persistent bilateral vestibulopathy was caused by the drug. Although aspirin induced bilateral vestibulopathy has not been reported before, it is likely that other patients taking aspirin have developed it, as bilateral vestibulopathy is often overlooked.

For more than 150 years it has been known that high doses of salicylates can cause tinnitus, loss of absolute acoustic sensitivity, and alterations of perceived sounds, which may develop in the initial days of treatment. It is also known that the susceptibility of individual subjects to salicylate induced inner ear toxicity varies greatly, but why this is so is unclear. Various attempts have been made to explain the toxic effects of salicylic acid. Otoacoustic emissions have been used to show that salicylates cause changes in the mechanosensory functioning of the cochlea; in particular, spontaneous emissions are decreased. Histopathological animal studies have revealed significant changes of only the outer hair cell lateral membrane. In vitro experiments have shown that the fast motile responses of outer hair cells are reduced. As regards the underlying mechanisms, aspirin seems to directly inhibit the mechanoelectrical transduction process by partitioning the salicylate molecules in the membrane of hair cells. These latter findings suggest to us that this newly described adverse reaction to aspirin may be related to our patient’s monoclonal IgG lambda gammopathy. The raised IgG concentration could have promoted such partitioning of the molecules in the hair cell membrane, assuming they are able to enter the endolymphatic space. However, this does not explain the isolated impairment of the vestibular function. From a clinical point of view, it is relevant to consider this additional adverse effect of aspirin, especially as it is unpredictable owing to varying individual susceptibilities. If a patient has taken higher dosages of aspirin and complains of dizziness, his vestibular function should be tested for bilateral vestibulopathy.