
Medical Policy



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***Current Policy Effective Date: 3/1/25**
(See policy history boxes for previous effective dates)

Title: Vestibular Function Testing

Description/Background

Dizziness, vertigo, and balance impairments can arise from a loss of vestibular function. A number of established laboratory-based tests are used to evaluate whether the symptoms are due to dysfunction of the semicircular canals. These tests are based on the vestibulo-ocular reflex, which is an involuntary movement of the eyes (nystagmus) in response to vestibular stimulation.

VERTIGO

The vestibular system is an important component in balance control. It includes 5 end organs, 3 semicircular canals sensitive to head rotations, and 2 otolith organs (sacculi, utricle) that sense gravity and straight-line (forward, backward, left, right, downward or upward) accelerations. Vertigo is the primary symptom of vestibular dysfunction. It can be experienced as illusory movement such as spinning, swaying, or tilting. Vertigo may be associated with a feeling of being pushed or pulled to the ground, blurred vision, nausea and vomiting, or postural and gait instability. Vertigo may arise from damage or dysfunction of the vestibular labyrinth, vestibular nerve, or central vestibular structures in the brainstem.

Vertigo may be caused by loose particles (otoconia) from the otolith organs that pass into 1 of the semicircular canals, most frequently the posterior canal. Specific head movements cause the particle to stimulate the canal, causing brief benign paroxysmal positional vertigo.

Diagnosis

Brief benign paroxysmal positional vertigo can usually be diagnosed clinically based on history of positional vertigo, response to the Dix-Hallpike maneuver or lateral roll tests, and resolution of symptoms with canal repositioning maneuvers.

If vertigo cannot be attributed to benign paroxysmal positional vertigo based on history, symptoms, or response to the standard maneuvers, a number of laboratory-based tests can be used to determine whether the vertigo is due to loss of vestibular function.(1,2) These tests are

based on the vestibulo-ocular reflex, which is an involuntary beating movement of the eyes (nystagmus) in response to vestibular stimulation. Nystagmus induced by these tests can help to distinguish between central and peripheral etiologies, in addition to determining whether the deficit is unilateral or bilateral. The typical tests include the electronystagmography (ENG) or videonystagmography (VNG) test batteries, caloric testing, and rotational chair testing.

Electroystagmography/Videonystagmography Test Batteries

The ENG/VNG test batteries include oculomotor evaluation and positional testing. ENG uses electrodes at the canthus of the eyes to detect nystagmus while VNG uses infrared video monitoring with goggles to measure nystagmus.

Caloric Testing

Caloric testing evaluates unilateral vestibular function. In the caloric test, warm or cold water or warm or cold air, is introduced into each of the external ear canals. In some descriptions, caloric testing is conducted as part of ENG/VNG test batteries.

Rotational Chair Testing

Rotational chair testing evaluates bilateral vestibular function. Rotational chair devices include a lightproof booth, computer-driven chair with a head restraint that rotates around a vertical axis, ENG recording, an infrared camera, and a two-way communication system. Typically, the chair is rotated in four different patterns, constant acceleration followed by deceleration, rotating followed by a rapid stop, rotating at progressively increasing velocities, and alternating directions.

Passive rotational testing without a rotational chair may be performed when the rotational chair is not available. For the head impulse test, the patient is instructed to keep his or her eyes on a target. The examiner then turns the head rapidly by about 15°. With passive whole body testing, the examiner rotates the whole body to the rhythm of a metronome.

Vestibular Evoked Myogenic Potential Testing

Vestibular-evoked myogenic potentials (VEMPs) are short-latency, otolith-dependent reflexes recorded from the neck and eye muscles. Cervical VEMPs are recorded from the neck muscles and reflect predominantly saccular function, while ocular VEMPs are reflexes of the extraocular muscles and reflect utricular function. They have an important role in the diagnosis of superior canal dehiscence syndrome and provide complementary information about otolith function that is useful in the diagnosis of other vestibular disorders. Like other evoked potentials, they can provide important localizing information about lesions that may occur along the VEMP pathway.

Vestibular evoked myogenic potential (VEMP) tests are techniques that use loud sound (e.g., click, tone burst) or bone vibration (e.g., tendon hammer tap to the forehead or mastoid) to assess otolith function.⁽³⁾ Both the saccule and utricle are sensitive to sound as well as vibration and movement. During VEMP testing, sticker electrodes are placed on the face and neck. The individual listens to a tapping sound through headphones or is exposed to vibration through a bone-conduction vibrator. The electrodes measure the muscle response to the stimuli. The test measures the amplitude and latency of the muscle response and helps determine the function of the vestibular system.

The cVEMP test is used to assess saccular vestibular signals carried via the vestibulospinal tract. Cervical VEMPs are measured by surface electrodes on the ipsilateral sternocleidomastoid muscle in the neck and are thought to originate primarily in the saccule. Abnormality in any part of the auditory cervical VEMP pathway (saccule, inferior vestibular nerve, vestibular nucleus, medial vestibulospinal tract, the accessory nucleus, the eleventh nerve, sternocleidomastoid) can affect the response.

The ocular VEMP (oVEMP) test is used to measure vestibular function from the utricle via the superior vestibular nerve. Ocular VEMPs detect subtle activity of an extraocular muscle using surface electrodes under the contralateral eye during an upward gaze and are thought to be due primarily to stimulation of the utricle. The vestibulo-ocular reflex stimulated by sound or vibration is very small, but synchronous bursts of activity of the extraocular muscles can be detected by electromyography. Lesions that affect the ocular VEMP may occur in the utricle, superior vestibular nerve, vestibular nucleus, and the crossed vestibulo-ocular reflex pathways.

Dynamic Posturography

Dynamic posturography may also be used to evaluate balance. (See Dynamic Posturography policy for further information)

Treatment

The central vestibular system is able to compensate for loss of peripheral vestibular function. Thus, the primary therapy for peripheral vestibular dysfunction is exercise-based and includes exercises to promote gaze stability, habituate symptoms, and improve balance and gait.(4) Medications such as vestibular suppressants or antiemetics may be used in the acute stage but are not recommended for chronic use. For patients who have recurrent symptoms uncontrolled by other methods, a surgical or ablative approach may be used. The objective of ablation is to stabilize the deficit to allow central compensation.

Regulatory Status

Vestibular analysis devices are currently regulated by the U.S. Food and Drug Administration through the 510(k) pathway, under Food and Drug Administration product code LXV.(5) The term “vestibular analysis devices” includes both diagnostic devices (e.g., rotary chairs, multiaxial chairs) and therapeutic devices (e.g., balance training and balance rehabilitation devices). Some devices indicated for diagnostic testing are included in Table 1.

Table 1. Vestibular Analysis Devices Approved by the Food and Drug Administration

Trade Name	Manufacturer	Date Cleared	510(k) No.
Gyrostim	UltraThera Technologies, Inc.	Apr 2022	K220231
Orion	Interacoustics AVS	Aug 2020	K200529
TRV	Interacoustics AVS	May 2020	K192652
ICS Impulse®	Otometrics	Feb 2013	K122550
Sway Balance™	Sway Medical (Capacity Sports)	Sep 2012	K121590
Nydiag 200 Rotary Chair	Interacoustics A/S	Dec 2010	K102364
Epley Omniax®	Vesticon	Jun 2008	K071973
VMT System	Target Health	Oct 1998	K971549
VORTEQ™ (Vestibular Ocular Reflex Test Equipment)	Micromedical Technologies	May 1989	K891008
RVT-50 Rotary Chair for Vestibular	ICS Medical	Sep 1987	K872093

Testing EquiTest®	Natus Medical (NeuroCom International)	Aug 1985	K851744
Chair, Vestibular, Rotary, Computerized	Contraves	Aug 1978	K781268

An example of equipment used for vestibular evoked myogenic potentials is the Bio-Logic Nav-Pro (Bio-logic Systems Corp), which in 2003 was cleared for marketing by the Food and Drug Administration through the 510(k) process (K994149) for use in the recording and displaying human physiologic data, and for auditory screening and assisting in evaluation of auditory and hearing-related disorders using auditory brainstem responses recorded from electroencephalography electrodes placed on the scalp.

Medical Policy Statement

Vestibular function testing has been established. It is a useful diagnostic option when criteria are met.

Inclusionary and Exclusionary Guidelines

Inclusions:

Vestibular function testing using an electronystagmography and videonystagmography testing batteries, caloric testing, or rotational chair testing when the following conditions have been met:

- The individual has symptoms of vestibular disorder (e.g., dizziness, vertigo, imbalance);
AND
- A clinical evaluation, including maneuvers such as the Dix-Hallpike test if indicated, has failed to identify the cause of the symptoms

The ENG/VNG testing batteries may include caloric testing, positional tests, and oculomotor evaluation (i.e., spontaneous nystagmus including gaze-evoked nystagmus, positional nystagmus, optokinetic nystagmus, smooth pursuit tracking, saccade test).

Vestibular evoked myogenic potential (VEMP) testing when **ANY** of the following conditions have been met:

- Cervical VEMP (cVEMP) with ocular VEMP (oVEMP) when at least **ONE** of the following are met:
 - Ménière's disease is suspected and **ALL** of the following are met:
 - Atypical Ménière's presentation^a
 - The results of the traditional basic balance tests (videonystagmography) have been performed and do not support the diagnosis of Ménière's disease (e.g. oculomotor, caloric test, rotational chair, posturography)
 - Ménière's disease is diagnosed and **ALL** of the following are met:
 - Failure of conservative therapy
 - Study is being used to rule out atypical bilateral Ménière's disease^a
 - Ablative therapy is being contemplated
 - An individual who presents with symptoms suggestive of superior semicircle canal dehiscence syndrome with confirmed or near confirmed dehiscence on CT

- cVEMP testing when the following is met:
 - Vestibular neuritis is suspected and **BOTH** the following are met:
 - Classic presentation^b
 - Caloric test is normal

^a Classic presentation of Ménière's disease includes at least 3 of the following symptoms: Evidence of fluctuating hearing loss on at least 2 hearing tests done in a short period of time; episodic vertigo, fluctuating tinnitus; fluctuating ear fullness or pressure.

^b Classic presentation of vestibular neuritis includes sudden severe vertigo lasting more than 24 hours, severe balance issues, nausea and vomiting, and nystagmus. In addition, there should be no associated new hearing loss with the onset of the dizziness/vertigo.

Exclusions:

Vestibular function testing for:

- Assessment of typical benign paroxysmal positional vertigo that can be diagnosed clinically
- Repeat testing when treatment resolves symptoms
- In all other situations not listed in inclusions
- All other laboratory-based vestibular function tests not described above

CPT/HCPCS Level II Codes (Note: The inclusion of a code in this list is not a guarantee of coverage. Please refer to the medical policy statement to determine the status of a given procedure.)

Established codes:

92517	92519	92537	92538	92540	92541
92542	92544	92545	92546	92547	

Other codes (investigational, not medically necessary, etc.):

92518	92700
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Note: Code(s) may not be covered by all contracts or certificates. Please consult customer or provider inquiry resources at BCBSM or BCN to verify coverage.

Rationale

Laboratory-based vestibular function testing is well-established and has a large evidence base. In a 2000 technology assessment, the American Academy of Neurology (AAN) evaluated tests that stimulate the vestibular system (see Table 2).(1) The AAN included caloric irrigation and rotational chair testing as established as effective, with passive examiner-generated head rotation testing and active head rotation as probably effective but not yet fully accepted by expert consensus. The group noted that quantitative vestibular testing is not always necessary, and a number of bedside methods can be used to evaluate nystagmus.

SUSPECTED BENIGN PAROXYSMAL POSITIONAL VERTIGO

Electronystagmography and Videonystagmography Test Batteries

Clinical Context and Test Purpose

The purpose of electronystagmography and videonystagmography test batteries is to provide a diagnostic option that is an alternative to or an improvement on existing tests, such as clinical diagnosis, in patients with a suspected vestibular disorder not clinically diagnosed as benign paroxysmal positional vertigo (BPPV).

The following PICOs were used to select literature to inform this review.

Populations

The relevant population of interest is individuals with a suspected vestibular disorder not clinically diagnosed as benign paroxysmal positional vertigo.

Interventions

The tests being considered are electronystagmography (ENG) and videonystagmography (VNG) test batteries. These test batteries typically include oculomotor evaluation and positional testing. In electronystagmography tests, nystagmus is detected by electrodes placed at the canthus of the eyes. Infrared video monitoring with goggles is used to measure nystagmus in videonystagmography tests.

Comparators

The main comparator of interest is clinical diagnosis, which may include a detailed history of positional vertigo and assessment of response to the Dix-Hallpike maneuver or canal repositioning maneuvers.

Outcomes

The outcomes of interest are test accuracy, symptoms, functional outcomes, and quality of life. Symptoms of vestibular dysfunction include vertigo, blurred vision, nausea, vomiting, and postural and gait instability. Time for follow-up ranges from months to years for outcomes of interest.

Study Selection Criteria

Below are selection criteria for studies to assess whether a test is clinically valid and useful.

- The study population represents the population of interest. Eligibility and selection are described.
- The test is compared with a credible reference standard.
- If the test is intended to replace or be an adjunct to an existing test; it should also be compared with that test.
- Studies should report sensitivity, specificity, and predictive values. Studies that completely report true- and false-positive results are ideal. Studies reporting other measures (e.g., ROC, AUROC, c-statistic, likelihood ratios) may be included but are less informative.
- Studies should also report reclassification of diagnostic or risk category.

Review of Evidence

The basic electronystagmography (ENG) and videonystagmography (VNG) test batteries include a spontaneous nystagmus test that measures the ability of the eyes to maintain a fixed position, a positional nystagmus test that measures the ability of the eyes to maintain a static position when the head is in different positions, an optokinetic nystagmus test that measures nystagmus caused by viewing a series of targets moving to the right and then to the left, and an oscillating tracking test that evaluates patient ability to track a moving target. The basic

ENG/VNG test batteries with these 4 tests are well-established for evaluating vestibular function in patients who have a suspected vestibular disorder. A 2000 technology assessment by AAN concluded there was strong evidence (level A) of the usefulness of ENG and VNG testing, based on results from prospective and retrospective studies, as well as from expert consensus (see Table 2).

Gofrit et al (2017) assessed 135 patients with vestibular symptoms using physical exam, a specialized questionnaire (Dizziness Handicap Inventory), and ENG testing, which included caloric testing.(6) The physical exam included spontaneous and gaze-evoked nystagmus, tandem and standard walk tests, head shake test, and Romberg maneuver, but excluded the Dix-Hallpike test. Among those with a normal physical exam, testing identified 40 (48.8%) patients who with abnormal ENG results ($p=0.46$); conversely, among patients who had a normal ENG result, 17 (32.2%) had an abnormal physical exam. When severely disabled patients were selected by the Dizziness Handicap Inventory, these patients were equally as likely to have a normal (42.9%) ENG result as to have an abnormal (46.4%) ENG result. Physical examination excluded Dix-Hallpike test by necessity, and the authors noted this and the heterogeneous sample were study limitations.

Section Summary: Electronystagmography and Videonystagmography Test Batteries

Available evidence from controlled studies and expert consensus indicates that ENG/VNG is an appropriate test of vestibular function.

CALORIC TESTING

Clinical Context and Test Purpose

The purpose of caloric testing is to provide a diagnostic option that is an alternative to or an improvement on existing tests, such as clinical diagnosis, in patients with a suspected vestibular disorder not clinically diagnosed as benign paroxysmal positional vertigo.

The question addressed in this evidence review is: Does caloric testing improve the net health outcome in individuals with a suspected vestibular disorder not clinically diagnosed as benign paroxysmal positional vertigo?

The following PICOs were used to select literature to inform this review.

Populations

The relevant population of interest is individuals with a suspected vestibular disorder not clinically diagnosed as benign paroxysmal positional vertigo.

Interventions

The test being considered is caloric testing. This procedure is intended to evaluate unilateral vestibular function and is performed by introducing hot or cold water or air into the external ear canals. Caloric testing is often conducted as part of electronystagmography and videonystagmography test batteries.

Comparators

The main comparator of interest is clinical diagnosis, which may include a detailed history of positional vertigo and assessment of response to the Dix-Hallpike maneuver or canal repositioning maneuvers.

Outcomes

The outcomes of interest are test accuracy, symptoms, functional outcomes, and quality of life. Symptoms of vestibular dysfunction are described above. Time for follow-up ranges from months to years for outcomes of interest.

Study Selection Criteria

Selection criteria for studies are determined using principles described above.

Review of Evidence

Caloric testing is the most widely used vestibular function test and is considered the criterion standard for detecting unilateral vestibular loss.(1,2) When warm or cold water or air is introduced into one of the external ear canals, the temperature change is transmitted through the middle ear and bone, causing a thermal gradient in the semicircular canal and resulting in nystagmus. Cold water will cause a movement response of the eye opposite to the stimulation, while warm water will induce nystagmus in the direction of the ear being stimulated. These eye movements can be measured by electrodes at the canthus or by video monitoring. An asymmetrical response after stimulating both ears indicates unilateral vestibular dysfunction. The 2000 AAN technology assessment concluded there was level A evidence supporting the usefulness of caloric testing. This decision was based on controlled studies, as well as from expert consensus (see Table 2).

Section Summary: Caloric Testing

Available evidence from controlled studies and expert consensus indicates that caloric testing is an appropriate test of vestibular function.

ROTATIONAL CHAIR TESTING

Clinical Context and Test Purpose

The purpose of rotational chair testing is to provide a diagnostic option that is an alternative to or an improvement on existing tests, such as clinical diagnosis, in individuals with a suspected vestibular disorder not clinically diagnosed as benign paroxysmal positional vertigo.

The following PICOs were used to select literature to inform this review.

Populations

The relevant population of interest is individuals with a suspected vestibular disorder not clinically diagnosed as benign paroxysmal positional vertigo.

Interventions

The test being considered is the rotational chair test, which is intended to evaluate bilateral vestibular function. The rotational chair test utilizes a lightproof booth, computer-driven chair with a head restraint that rotates around a vertical axis, electronystagmography recording, an infrared camera, and a two-way communication system. The chair is typically rotated in four different patterns.

Comparators

The main comparator of interest is clinical diagnosis, which may include a detailed history of positional vertigo and assessment of response to the Dix-Hallpike maneuver or canal repositioning maneuvers.

Outcomes

The outcomes of interest are test accuracy, symptoms, functional outcomes, and quality of life. Symptoms of vestibular dysfunction are described above. Time for follow-up ranges from months to years for outcomes of interest.

Study Selection Criteria

Selection criteria for studies are determined using principles described above.

Review of Evidence

Rotational chair testing is considered the criterion standard for detecting bilateral vestibular loss.(1,2) Rotational chair devices include a lightproof booth, computer-driven chair with a head restraint that rotates around a vertical axis, ENG recording, an infrared camera, and a 2-way communication system. Typically, the chair is rotated in 4 different patterns, constant acceleration followed by deceleration, rotation followed by a rapid stop, rotation at progressively increasing velocities, and alternating directions. Each pattern is repeated in both directions several times, and the accompanying post-rotation nystagmus, including parameters of gain, phase, and symmetry, is measured and averaged. Although traditionally used to detect bilateral vestibular loss, this battery can identify a unilateral vestibular deficit and identify the site of the lesion. The 2000 AAN technology assessment concluded there was level A evidence supporting the usefulness of rotational chair testing. This decision was based on the results of prospective and retrospective studies, as well as from expert consensus (see Table 2).

Section Summary: Rotational Chair Testing

Available evidence from prospective studies, retrospective studies, and expert consensus indicates that rotational chair testing is an appropriate test of vestibular function.

VESTIBULAR EVOKED MYOGENIC POTENTIAL TESTING

Clinical Context and Test Purpose

The purpose of vestibular evoked myogenic potential testing is to provide a diagnostic or confirmatory option that is an alternative to or an improvement on existing tests, such as clinical diagnosis, in individuals with a suspected vestibular disorder not clinically diagnosed as benign paroxysmal positional vertigo.

The following PICOs were used to select literature to inform this review.

Populations

The relevant population of interest is individuals with a suspected vestibular disorder not clinically diagnosed as benign paroxysmal positional vertigo.

Interventions

The test being considered is vestibular evoked myogenic potential testing (VEMP). Vestibular evoked myogenic potential (VEMP) tests use sound or vibration to stimulate the otolith organs. Cervical VEMP (cVEMP) measures evoked electrical potentials in the ipsilateral

sternocleidomastoid muscle following stimulation of the saccule, while ocular VEMP (oVEMP) measures electrical potentials in the extraocular muscles contralateral to the utricle.

Comparators

The main comparator of interest is clinical diagnosis, which may include a detailed history of positional vertigo and assessment of response to the Dix-Hallpike maneuver or canal repositioning maneuvers.

Outcomes

The outcomes of interest are test accuracy, symptoms, functional outcomes, and quality of life. Symptoms of vestibular dysfunction are described above. Time for follow-up ranges from months to years for outcomes of interest.

Study Selection Criteria

Selection criteria for studies are determined using principles described above.

Review of Evidence

There is a large and rapidly growing literature on VEMPs for the assessment of otolith function, although most studies assess how cVEMP and oVEMP change with various disease states. VEMPs have been evaluated in superior canal dehiscence, vestibular neuritis, benign paroxysmal positional vertigo (BPPV), vestibular schwannoma, Ménière's disease, vestibular migraine, and central vestibular disorders.(7)

Taylor et al (2020) discussed the clinical utility of VEMP testing. A key advantage of recording VEMPs is they test a different part of the vestibular system to caloric and video head impulse testing and are thus complementary to the assessment of vestibular function. They have a unique and very specific role in the diagnosis of third-mobile window disorders and, when combined with tests of canal function, assist in the demonstration of profiles of abnormalities for disorders such as Ménière disease and vestibular neuritis. The clearest application of VEMPs was listed as the diagnosis of superior canal dehiscence syndrome. Authors felt it was important to note that while VEMPs do not replace computerized tomography (CT) imaging, their value can be appreciated from the approximately 4% of apparent superior canal dehiscence syndrome cases identified from retrospective reviews of CT imaging, which included canal plane reconstructions. This is significantly higher than the 0.5 to 0.6% incidence estimated from cadaver specimens, indicating that CT imaging can over-call the diagnosis. In individuals with isolated recurrent vertigo (i.e., without any aural or headache symptoms [suspected Ménière's disease]) a retrospective study found that 94 of 146 patients had abnormal cVEMPs on initial testing and 19% of these went on to develop Ménière's disease and experience cochlear symptoms, compared with only 4% of individuals with normal cVEMPs. In vestibular neuritis, cVEMP abnormalities may be present in up to 58% of individuals tested acutely, reflecting additional inferior nerve involvement, and thus, differentiating classic "superior neuritis" from a mixed or total pattern of involvement. In some cases involving the inferior nerve, posterior canal video head impulse test will be normal and cVEMPs will be the only abnormality to indicate dysfunction.

There are a number of concerns about using VEMPs to assess the otolith organs. One issue is that sound and bone conduction stimuli are likely to influence senses other than the saccule and utricle, and stimulation of structures other than the utricle can affect the VEMP. In addition, VEMP responses have been shown to decrease with age, with a high rate of absent responses

in normal older adults.(8) Another is that latency and amplitude measures are very sensitive to variables that can be introduced by the examiner, as observed in a 2016 study that included 1038 patients whose ailments included vestibular migraine or neuritis, BPPV, somatoform, phobic postural vertigo, unilateral or bilateral vestibulopathy, Ménière's disease, downbeat nystagmus syndrome, and other diagnoses.(9) The authors observed significant differences between examiners for measures of oVEMP and cVEMP latencies, concluding that the field should “work on a better standard for VEMP recordings.

Choi (2020) reviewed the clinical finding of VEMP testing for specific disease processes. Vestibular neuropathy was found to be primarily diagnosed based on the clinical context. Abnormal ocular VEMPs are anticipated in individuals with superior vestibular neuropathy, while abnormal cervical VEMPs are expected in individuals with inferior vestibular neuropathy. Ocular and cervical VEMPs can be abnormal when both superior and inferior nerves are involved. In atypical cases of vestibular neuropathy in which the inflammation is scattered over the vestibular labyrinth rather than spreading through the nerve branch, VEMP tests would be useful for localizing the lesions. Both cervical and ocular VEMPs have been reported to be abnormal in individuals with Ménière's disease when compared with normal subjects. Some of the reviewed studies indicated that ocular and cervical VEMP abnormalities might be useful for differentiating or predicting Ménière's disease in isolated auditory or vestibular syndromes such as acute low-frequency sensorineural hearing loss and benign recurrent vertigo without hearing loss. VEMPs could also provide a specific diagnostic clue for the diagnosis of superior canal dehiscence. Both ocular and cervical VEMPs are known to exhibit elevated responses to auditory clicks and tone bursts, with the threshold decreasing to 75 dB SPL, such that VEMPs are not inducible in the normal ear. Therefore, a VEMP threshold test should be applied to individuals with the clinical manifestations of superior canal dehiscence. Since recovery of the VEMP amplitude and threshold after surgical treatment for superior canal dehiscence has been reported, VEMPs can also be useful for monitoring the surgical outcomes.

Taylor et al (2019) discussed the use of VEMP testing in regard to otolith function testing. Cervical- and ocular-VEMPs are short latency surface potentials produced through the activation of saccular and utricular afferents by sound and vibration. They are tests of dynamic otolith function. The subjective visual vertical/horizontal (SVV/H) test in peripheral lesions probes static asymmetries in utricular function and represents a perceptual error in perceived gravitational vertical/horizontal. VEMPs and SVV/H enable the characterization of patterns and severity of otolith dysfunction in common vestibular disorders. Authors determined that when combined with tests of semicircular canal function, they provide a useful tool for eliciting diagnostic profiles in vestibular neuritis and Ménière disease. Furthermore, VEMPs were reported as being valuable in the pre-surgical confirmation of superior semicircular canal dehiscence and in some cases, may alert the clinician to the presence of a vestibular schwannoma in individuals with symmetrical hearing.

A cohort study by Verrecchia et al (2019) evaluated oVEMP testing in individuals experiencing dizziness.(10) The study included 10 patients diagnosed with superior canal dehiscence syndrome and 135 individuals with dizziness that was not already diagnosed as superior canal dehiscence syndrome. The study included 4 oVEMP parameters (amplitude, latency, amplitude asymmetry ratio, and interaural latency difference). Of the parameters, the amplitude to air-conducted stimulation had the greatest diagnostic accuracy (area under the

curve score, 0.96). A cutoff point of 16.7 μ V resulted in a sensitivity of 100% and specificity of 89%.

A cohort study (Hunter et al [2017]) compared cVEMP and oVEMP testing in 39 individuals who had known superior semicircular canal dehiscence, with a control cohort of 84 age-matched symptom-free individuals.(11) Primary end points included peak-to-peak amplitudes of the 2 treatments and sensitivity and specificity. The authors observed that between cVEMP and oVEMP, cVEMP peak amplitudes ($>214.3 \mu$ V) were less effective overall for diagnosis of semicircular canal dehiscence (area under the curve, 0.731). At the 2 treatment centers from which patients were drawn, oVEMP amplitudes and cVEMP thresholds proved to be the superior tests (overall area under the curve scores, 0.856 and 0.912, respectively). For individuals between 50 and 60 years of age, testing cVEMP threshold (<75 decibels) provided sensitivity of 100%, as well as good specificity (92.9%). Overall, findings suggested superiority of cVEMP thresholds or oVEMP amplitudes over measurement of cVEMP amplitudes.

Section Summary: Vestibular Evoked Myogenic Potential Testing

Available evidence from controlled cohort and retrospective studies and consensus guidelines indicate that cVemp and oVemp are an appropriate test of vestibular function in certain situations.

DIAGNOSED BENIGN PAROXYSMAL POSITIONAL VERTIGO

Laboratory-Based Vestibular Function Testing

Clinical Context and Test Purpose

The purpose of laboratory-based vestibular function testing is to provide a diagnostic option that is an alternative to or an improvement on existing tests, such as clinical diagnosis, in individuals with a diagnosed benign paroxysmal positional vertigo.

The following PICOs were used to select literature to inform this review.

Populations

The relevant population of interest is individuals with clinically diagnosed benign paroxysmal positional vertigo with typical presentation.

Interventions

The test being considered is laboratory-based vestibular function testing.

Comparators

The main comparator of interest is clinical diagnosis, which may include a detailed history of positional vertigo and assessment of response to the Dix-Hallpike maneuver or canal repositioning maneuvers.

Outcomes

The general outcomes of interest are test accuracy, symptoms, functional outcomes, and quality of life. Symptoms of vestibular dysfunction are described above. Time for follow-up ranges from months to years for outcomes of interest.

Study Selection Criteria

Selection criteria for studies are determined using principles described above.

Review of Evidence

BPPV with a typical presentation is usually diagnosed clinically with a combination of a history of periods of brief positional vertigo, recurrence of symptoms with the Dix-Hallpike maneuver or lateral roll procedures, and/or alleviation of symptoms after canal repositioning maneuver. The Dix-Hallpike maneuver is the criterion standard for the diagnosis of posterior canal BPPV, limiting evaluation of its performance characteristics.(12,13)) The 2008 practice guidelines from the American Academy of Otolaryngology – Head and Neck Surgery gave a strong recommendation for the diagnosis of BPPV of the posterior canal when vertigo associated with nystagmus has been provoked by the Dix-Hallpike maneuver.(13) If the Dix-Hallpike maneuver is negative, but the history is consistent with BPPV, a lateral roll test can be used to assess BPPV of the horizontal canal. In the event that both the Dix-Hallpike maneuver and lateral roll tests are negative, alleviation of symptoms with the canal repositioning maneuver supports a diagnosis of BPPV. The Academy has recommended against vestibular testing in patients who meet clinical criteria for the diagnosis of BPPV.(13) The cited the weak nature of the evidence, which included expert opinion, case reports, and reason from first principles, as the basis for its recommendation. The AAN came to a similar conclusion in its 2017 practice guidelines, citing insufficient (level C) evidence to recommend vestibular testing for BPPV patients.(14) If the clinical presentation is atypical, if Dix-Hallpike testing elicits equivocal or unusual nystagmus findings, if symptoms do not resolve following treatment, or if there are additional symptoms or signs, vestibular function testing may be indicated.

Section Summary: Laboratory-Based Vestibular Function Testing

There is sufficient evidence to suggest that laboratory-based vestibular function testing is not indicated in patients who are diagnosed with benign paroxysmal positional vertigo.

SUMMARY OF EVIDENCE

Undiagnosed Benign Paroxysmal Positional Vertigo with Testing other than VEMP Testing

For individuals who have a suspected vestibular disorder not clinically diagnosed as BPPV who receive electronystagmography/videonystagmography test batteries, caloric testing, or rotational chair testing, the evidence includes technology assessments of a large body of literature. Relevant outcomes are test accuracy, symptoms, functional outcomes, and quality of life. Based on review of controlled studies, caloric testing was given a level A recommendation that this test is predictive of loss of vestibular function. Based on a prospective study assessing a narrow spectrum of individuals with the suspected vestibular dysfunction and a well-designed retrospective study, which included a criterion standard test, rotational chair testing was also given a level A recommendation. These tests are both considered criterion standard tests of vestibular function. electronystagmography/videonystagmography test batteries, which may include caloric testing, are also established methods of assessing loss of vestibular function. The evidence is sufficient to determine that the technology results in a meaningful improvement in the net health outcome.

Undiagnosed Benign Paroxysmal Positional Vertigo with VEMP Testing

For individuals who have a suspected vestibular disorder not clinically diagnosed as BPPV who receive vestibular evoked myogenic potentials (VEMP) testing, the evidence includes mainly association studies and consensus guidelines. Relevant outcomes are test accuracy,

symptoms, functional outcomes, and quality of life. There is a large and rapidly growing literature on VEMP tests for the assessment of otolith function. Controlled cohort, retrospective studies and consensus guidelines support the use of cVEMP and oVEMP in specific situations pertaining to Ménière's disease, superior semicircular canal dehiscence and vestibular canal neuritis. The evidence is sufficient to determine that the technology results in a meaningful improvement in the net health outcome.

Diagnosed Benign Paroxysmal Positional Vertigo

For individuals who have clinically diagnosed BPPV with typical presentation who receive laboratory-based vestibular function testing, the evidence includes technology assessments and practice guidelines. Relevant outcomes are test accuracy, symptoms, functional outcomes, and quality of life. BPPV with a typical presentation can be diagnosed clinically based on history, the Dix-Hallpike maneuver, lateral roll test, and canalith repositioning procedures; thus, laboratory-based vestibular function testing does not add diagnostic information in such routine cases. The evidence is sufficient to determine that the technology is unlikely to improve the net health outcome.

Supplemental Information

PRACTICE GUIDELINES AND POSITION STATEMENTS

American Academy of Audiology

The American Academy of Audiology published a position statement in 2005 on the audiologist's role in the diagnosis and treatment of vestibular disorders.(15) Citing a 2004 scope of practice report, the Academy stated that "An audiologist is a person who, by virtue of academic degree, clinical training, and license to practice and/or professional credential, is uniquely qualified to provide a comprehensive array of professional services related to the prevention of hearing loss and the audiologic identification, assessment, diagnosis, and treatment of persons with impairment of auditory and vestibular function, and to the prevention of impairments associated with them."(16) Evaluations of vestibular and extr vestibular systems may include:

- video-oculography, videonystagmography, and electronystagmography
- tests of dynamic visual acuity,
- tests of active and passive rotation,
- tests of postural stability, and
- tests of vestibular evoked myogenic potentials.

Vestibular treatment and therapy protocols that fall within the scope of practice are also described. The Academy considers vestibular function testing following treatment to be an essential part of the clinical practice.

American Academy of Neurology

The American Academy of Neurology (2000) published a technology assessment on vestibular testing techniques in adults and children.(1) Although the assessment was retired in 2021, it compared various vestibular testing techniques (see Table 2).

Table 2. Comparison of Vestibular Test Techniques and Level of Evidence

Technique	Advantages	Disadvantages	SOR and QOE^a
Clinical head-shaking test	Inexpensive, easily	Nonquantitative; may not detect	Class III

	performed during examination	bilateral vestibular loss or mild unilateral vestibular loss	
Vibration-induced nystagmus	Inexpensive, easily performed during examination	Nonquantitative; may not detect bilateral vestibular loss or mild unilateral vestibular loss	Class III
Clinical head thrust sign	Inexpensive, easily performed during examination	Nonquantitative; may not detect bilateral vestibular loss or mild unilateral vestibular loss	Class III
Caloric testing (ENG or infrared VNG)	“Gold standard” study for detecting unilateral vestibular loss	Intensity of caloric stimulation depends on anatomy and irrigation technique; less sensitive and specific than rotational chair testing for bilateral vestibular loss	Strength: A; Quality: classes II, III, IV, and expert consensus
Rotational chair testing (computer driven chair rotations)	“Gold standard” study for detecting bilateral vestibular loss	Not widely available; generally not effective for testing frequencies >1.0 Hz; less sensitive than caloric testing for unilateral vestibular hypofunction	Strength: A; Quality: classes II, III, IV, and expert consensus
Passive examiner generated head rotation testing	Portable alternative to rotational chair testing	Probably not practical at frequencies >2 Hz and may be difficult for patients with neck pain; not sensitive to unilateral vestibular loss	Strength: B; Quality: class II, not yet fully accepted by expert consensus
Active head rotation (self-generated head turns)	Allows testing of vestibulo-ocular reflex from 1-5 Hz; portable; inexpensive	Normative data limited; some patients cannot rotate head sufficiently well to test at higher frequencies; may not detect partial unilateral vestibular loss	Strength: B; Quality: class II, not yet fully accepted by expert consensus

ENG: electronystagmography; QOE: quality of evidence; SOR: strength of recommendation; VNG: videonystagmography.

^a The American Academy of Neurology strength of evidence rating system is as follow. For strength of recommendation: A: established as useful or predictive; B: probably useful or predictive. For quality of evidence: class II: Evidence provided by a prospective study of a narrow spectrum of persons with the suspected condition, or a well-designed retrospective study of a broad spectrum of persons with an established condition (by "gold standard") compared with a broad spectrum of control subjects, in which the test is applied in a blinded evaluation, and enabling the assessment of appropriate measures of diagnostic accuracy; class III: Evidence provided by a retrospective study, in which either persons with the established condition or control subjects are of a narrow spectrum, and in which the test is applied in a blinded evaluation; class IV: Any design in which the test is not applied in a blinded evaluation, OR evidence is provided by the expert opinion alone or in descriptive case series (without control subjects).

The 2017 practice guidelines from AAN (reaffirmed 2021) assessed the diagnostic value of vestibular evoked myogenic potential testing in individuals with vestibular symptoms.(14) The conditions of interest included superior canal dehiscence syndrome, vestibular neuritis or migraine, Ménière’s disease, and benign paroxysmal positional vertigo (BPPV). The evidence for testing in BPPV was drawn from 2 class III studies, neither of which presented sufficient diagnostic value of vestibular evoked myogenic potential testing for the treatment to be recommended (level C evidence). Evidence is insufficient to determine whether cVEMP and oVEMP can accurately identify vestibular function specifically related to the saccule/utricle, or whether cVEMP or oVEMP is useful in diagnosing vestibular neuritis or Ménière’s disease. Level C negative: It has not been demonstrated that cVEMP substantively aids in diagnosing benign paroxysmal positional vertigo, or that cVEMP or oVEMP aids in diagnosing/managing vestibular migraine.

American Academy of Otolaryngology – Head and Neck Surgery

In 2008, the American Academy of Otolaryngology – Head and Neck Surgery (AAO-HNS) published practice guidelines on benign paroxysmal positional vertigo (BPPV).(13) The guidelines were endorsed by AAN and the American Academy of Family Physicians. The

panel made strong recommendations for the diagnosis of BPPV when vertigo associated with nystagmus is provoked by the Dix-Hallpike maneuver. The panel recommended against vestibular testing, unless the diagnosis is uncertain or there are additional symptoms or signs unrelated to BPPV that warrant testing.

The American Academy of Otolaryngology—Head and Neck Surgery (2014) recognizes that Vestibular Evoked Myogenic Potential (VEMP) testing is a useful neurophysiologic test and is medically indicated and appropriate in the evaluation of certain persons with suspected auditory and balance or dizziness disorders.

In 2017, the AAO-HNS updated its guidelines on BPPV, retaining the recommendation for the diagnosis of BPPV if a Dix-Hallpike maneuver elicits vertigo associated with nystagmus.(17) The panel recommended a canalith repositioning procedure as treatment for posterior canal BPPV, although subsequent post procedural postural restrictions were strongly warned against. Individuals with symptoms similar to BPPV but for whom the Dix-Hallpike does not evoke nystagmus should be subjected to a supine roll test. Potential diagnoses of BPPV should be distinguished from confounding factors, and individuals should have regular reassessment and follow-up. One of the techniques that the panel recommended against is vestibular testing for an individual who meets diagnostic criteria for BPPV in the absence of additional vestibular signs and/or symptoms inconsistent with BPPV that warrant testing.

International Federation of Clinical Neurophysiology

A 2014 expert consensus document on cervical vestibular evoked myogenic potential methods from the International Federation of Clinical Neurophysiology has stated that the clinical use of vestibular evoked myogenic potential “is evolving and questions still exist about its physiology and measurement.”(18)

ONGOING AND UNPUBLISHED CLINICAL TRIALS

Some currently unpublished trials that might influence this review are listed in Table 3.

Table 3. List of Ongoing Clinical Trials

NCT No.	Trial Name	Planned Enrollment	Completion Date
Unpublished			
NCT02483429 ^a	Acute-Video-oculography for Vertigo in Emergency Rooms for Rapid Triage (AVERT)	195 (actual)	Mar 2023 (actual)

NCT: national clinical trial

^a Denotes industry-sponsored or cosponsored trial

U.S. PREVENTIVE SERVICES TASK FORCE RECOMMENDATIONS

Not applicable.

Government Regulations

National:

There is no National Coverage Determination

Local:

There is no Local Coverage Determination

(The above Medicare information is current as of the review date for this policy. However, the coverage issues and policies maintained by the Centers for Medicare & Medicare Services [CMS, formerly HCFA] are updated and/or revised periodically. Therefore, the most current CMS information may not be contained in this document. For the most current information, the reader should contact an official Medicare source.)

Related Policies

Dynamic Posturography

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The articles reviewed in this research include those obtained in an Internet based literature search for relevant medical references through October 23, 2024, the date the research was completed.

Joint BCBSM/BCN Medical Policy History

Policy Effective Date	BCBSM Signature Date	BCN Signature Date	Comments
3/1/14	12/10/13	1/16/14	Joint policy established
5/1/15	2/17/15	2/27/15	Routine maintenance
7/1/16	4/19/16	4/19/16	Routine maintenance
7/1/17	6/20/17	6/20/17	<ul style="list-style-type: none"> Aligned with new BCBSA policy Replacing Vestibular Autorotation Test policy
9/1/18	6/19/18	6/19/18	Routine maintenance
9/1/19	6/18/19		Routine maintenance
1/1/20	10/15/19		Routine maintenance
1/1/21	10/20/20		Routine maintenance
1/1/22	10/19/21		Routine maintenance 92517-9 added as EI
1/1/23	10/18/22		Routine maintenance (slp)
1/1/24	10/17/23		Routine maintenance (slp) Vendor managed: N/A
1/1/25	10/15/24		Routine management (slp) Vendor managed: N/A
3/1/25	12/17/24		<ul style="list-style-type: none"> Off cycle review - Criteria added for VEMP testing for Ménière's disease, Superior Canal Dehiscence, and vestibular canal neuritis per SME (Otology-Neurotology, Otolaryngology) recommendation 92517 and 92519 moved to EST

Next Review Date: 4th Qtr, 2025

**BLUE CARE NETWORK BENEFIT COVERAGE
POLICY: VESTIBULAR FUNCTION TESTING**

I. Coverage Determination:

Commercial HMO (includes Self-Funded groups unless otherwise specified)	Covered, criteria apply.
BCNA (Medicare Advantage)	Refer to the Medicare information under the Government Regulations section of this policy.
BCN65 (Medicare Complementary)	Coinurance covered if primary Medicare covers the service.

II. Administrative Guidelines:

- The member's contract must be active at the time the service is rendered.
- Coverage is based on each member's certificate and is not guaranteed. Please consult the individual member's certificate for details. Additional information regarding coverage or benefits may also be obtained through customer or provider inquiry services at BCN.
- The service must be authorized by the member's PCP except for Self-Referral Option (SRO) members seeking Tier 2 coverage.
- Services must be performed by a BCN-contracted provider, if available, except for Self-Referral Option (SRO) members seeking Tier 2 coverage.
- Payment is based on BCN payment rules, individual certificate and certificate riders.
- Appropriate copayments will apply. Refer to certificate and applicable riders for detailed information.
- CPT - HCPCS codes are used for descriptive purposes only and are not a guarantee of coverage.
- *Duplicate (back-up) equipment is not a covered benefit.*