

Dizziness and Balance

Diagnostic Tests Reviewed

A Review of Diagnostic Tests for Vestibular Therapy

Audiologic Testing

The challenge of correct diagnosis of many vestibular disorders is tackled with a series of diagnostic tests.

For example, many patients with ear related conditions can experience both vertigo and hearing loss, but in other cases, they do not.

One way to get to the source of the problem is through audiology tests that give information about the patient's hearing, cochlear hair cell function, middle ear function, and several neural aspects of the hearing-balance system.

Audiology testing can include pure tone (air and bone) and word discrimination tests.

Other methods of diagnosis include Immitance Audiometry which evaluates middle and inner ear and some neurological pathways, Otoacoustic Emissions which examines the outer hair cell function of the inner ear, and Brainstem Auditory Evoked Response (BAER) which tests the neural conductivity of the hearing and balance nerve.

Gans Sensory Organization Performance Test (SOP)

The SOP test looks at whether an equilibrium dysfunction exists and is conducted with a combination of the Romberg, clinical test of sensory equipment (CTSIB) and Fukuda Stepping Tests.

It also tells whether any dysfunction is CNS or peripheral and indicates its impact on the balance system.

The SOP test can also help document status of recovery following treatment.

Computerized Dynamic Visual Acuity Test (CDVAT)

When the patient moves his or her head through a series of controlled movements, this test measures changes in vision.

Oscillopsia is defined as a collapse of gaze stabilization during active head movement caused by peripheral or central vestibular disorders.

An abnormal vestibulo-ocular reflex (VOR) function of as minimal as three degrees can change vision from 20/20 to 20/200 with simple head movements.

This vision test is done as the patient does first horizontal and then vertical head movements of 2.5 cycles per second, which is in the low to middle range of normally active head movements.

Through the test, the function problem caused by the vestibular dysfunction can be determined to be used as a baseline for comparison against improvements following vestibular rehabilitation therapy.

Vestibular Autorotation Testing

This active rotation test measuring both vertical and horizontal head movements over a frequency range of between two to eight cycles per second allows for measurement of function gain and quantitative analysis of the patient

It shows the direction of head movement as well as its frequency. The patient simply looks straight ahead while moving their head to auditory signals.

Like the tests described previously, this one provides diagnostic information as well as measurements of the outcome of therapy. It can be obtained through passive tests like the Rotary Chair where the patient sits while being harmonically accelerated, or through active tests in which the person moves their head in response to auditory cues.

Videonystagmography (VNG)

The most frequently used test to determine vestibular function is the VNG. By using infrared video cameras, the movement of each eye is recorded.

The VNG has subsets that include Dix-Hallpike (tests for BPPV-PC), ocular motor tests (gathers information about the central vestibular and neuropharmacologic systems connections in the brain), gaze testing (checking for the presence of spontaneous nystagmus, high frequency headshake test (which can provoke nystagmus if the patient has non-stabilized or uncompensated unilateral vestibular function), positional testing (which documents if there is static positional nystagmus) and caloric tests (in which each ear is irrigated with warm and cool air or water either above or below body temperature which creates a thermal convection).

In the caloric tests, the responsiveness of each of the respective ear's horizontal semicircular canals is determined through measuring the patient's induced nystagmus. A difference of 25% in the total nystagmus of the two ears suggests a caloric weakness, usually attributed to a central or peripheral dysfunction.

Vestibular-Evoked Myogenic Potentials (VEMPS)

VEMP is an important diagnostic tool because there is no other vestibular function test which provides data on the saccule or its innervation by the inferior branch of the vestibular nerve. The VEMP test is based on the reflex, which happens between the otolith system (the saccule) and the sternocleidomastoid muscle (SCM).

Well studied in humans and animals, the vestibulo-colic reflex, the VCR is a classic reflex arc with a sensory, CNS, and motor output component.

Using this test, the hearing professional can gain information about the integrity of the saccule and inferior

vestibular nerve along with the reflex arc through the brainstem and that allows them to determine both otologic and neurologic conditions such as Meniere's, superior canal dehiscence syndrome and neurological disorders such as multiple sclerosis.