BALANCE EVALUATION INFORMATION

Balance disorders that cause dizziness may manifest itself a variety of ways—imbalance, blurry vision, spinning, tilting, and lightheadedness. All interfere with quality of life and could lead to serious falls. Since you have some balance problem, the physician has scheduled you for a variety of tests, which are outlined below. Since the balance system is a complex system involving the inner ear and its nerve pathways, these evaluations provide a complete picture of your balance system. The first two tests are done today. The bulk of the testing is done on another day and the testing takes approximately 2-2 ½ hours to complete. Those tests are VNG, VEMP, ECoG and VOR testing. There are special instructions for these tests. (See pre-test instructions) When you return to follow up with Dr. Katz regarding the results of the balance testing, we will complete the last test-ABR. This test takes approximately 20-30 minutes to complete.

- Audiogram, tympanograms, acoustic reflexes and reflex decay
- Distortion Product Otoacoustic Emissions (DPOAEs)
- Auditory Brainstem Response (ABR)
- Electrocochleography (ECoG)
- Videonystagmography (VNG)
- Vestibular Myogenic Evoked Potential (VEMP)
- Rotation Head testing (VOR)

The audiogram assesses your hearing sensitivity to soft sounds as well as your ability to understand speech. Tympanograms and acoustic reflexes assess any blockage or abnormal pressure in the middle ear as well as assessing the facial nerve.

DPOAEs assess the inner ear's response to sound. It looks at the tiny hair cells inside the inner ear. It is a test of inner ear function. This is an automatic test requiring you to be quiet.

ABR assesses the hearing nerve and the pathway through the brainstem up to the brain.

ECoG assesses the pressure inside the inner ear. This is used to diagnose abnormal pressure in the inner ear, which may be causing the balance disorder.

VNG assesses your balance system. It is comprised of a number of tests. One test measures dizziness that may be associated with different positions and head movement. One test evaluates how well the inner ear is working to keep you balanced. There are a number of tests that assess how your visual system is working to help keep you balanced. Combined, these tests assess one of the branches of the balance nerve, the inner ear mechanism for balance, as well as the many nerve pathways to the brain.

VEMP assesses one of the otolith organs (one of the sensory organs for balance) and part of the balance nerve. When VNG is combined with VEMP, you test both branches of the balance nerve.

VOR testing assesses the nerve pathway from the ear to the brain.

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- Distortion Product Otoacoustic Emissions (DPOAEs)
- Auditory Brainstem Response (ABR)
- Electrocochleography (ECoG)
- Videonystagmography (VNG)
- Vestibular Myogenic Evoked Potential (VEMP)
- Computerized Dynamic Posturography (CDP)

The audiogram assesses your hearing sensitivity to soft sounds as well as your ability to understand speech. This test would determine if there was any hearing loss. Tympanograms and acoustic reflexes assess any middle ear blockage or abnormal pressure in the middle ear as well as assessing the VII cranial nerve. ***This test would be helpful for patients with Eustachian tube dysfunction as well as patients with middle ear disease. These tests can be completed for adults as well as children.***

DPOAEs assess the inner ear's response to sound. It looks at the outer hair cells inside the inner ear. It is a test of cochlear function. ***This test would be helpful for patients complaining of fullness, tinnitus, autoimmune disease of the inner ear, fluctuating hearing loss and dizziness. It can be used to screen a newborn's hearing.***

ECoG assesses the pressure inside the cochlea. This is used to diagnose abnormal pressure in the inner ear, which may be causing the balance disorder, pressure and fullness in the ear. ***This test would be helpful for patients with Meniere's disease. It can be abnormal for patients with perilymph fistulas as well.***

ABR assesses the VIII nerve and the pathway through the brainstem. ***This test would be helpful for patients who have asymmetrical hearing loss, tinnitus, brainstem degenerative disorders, such as multiple sclerosis and dizziness.***

VNG assesses your balance system. ***VNG is the gold standard for diagnosis of vestibular neuritis, BPPV, unilateral and bilateral vestibular loss, and cerebellar degeneration.*** It is comprised of a number of tests. One test measures dizziness that may be associated with different positions and head movement. One test evaluates how well the inner ear (lateral semicircular canal as well as the superior branch of the vestibular nerve) is keeping the patient balanced. There are a number of tests that assess how the oculomotor system (cranial nerves III, IV, V) is working to help keep the patient balanced. Combined, these tests assess one of the branches of the balance nerve, the inner ear mechanism for balance, as well as the many nerve pathways to the brain.

VEMP assesses one of the otolith organs (the saccule located in the vestibule) and the inferior branch of the vestibular nerve. When VNG is combined with VEMP, you test both branches of the balance nerve. ***This test would be helpful in determining vestibular neuritis, labyrinthitis, dizziness associated with migraines (migraine associated vertigo), as well as superior canal dehiscence.***

CDP assesses how well the inner ear, the eyes somatosensory systems are working together to keep the patient balanced. This looks at vestibulospinal reflex and can assist in determining the extent of the functional impact of bilateral hypofunction. It evaluates the impact of the expected effectiveness of vestibular rehabilitation. ***This test would be helpful for patients who have a history of falling.***

There are special instructions for last three tests. (See pre-test instructions)

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PRE-TEST INSTRUCTIONS FOR BALANCE EVALUATION FOR VNG, VEMP, CDP

Forty-eight hours (48) do not take anything that would make you sleepy or drowsy. These medications suppress the response we are trying to record. This would include:

- Antivert (also known as Meclizine),
- Dramamine or Scopolamine patch for motion sickness
- Valium, Librium, sedatives for sleep, or anti anxiety medications,
- Night time cold or allergy medication
- Alcohol and/or recreational drugs
- _____

If you have any questions regarding your medication, please contact your physician.

You may take medication for diabetes, high blood pressure and heart medications. DO NOT STOP LIFE-SUSTAINING MEDICATIONS.

On the day of the test, eat lightly but no more than 3 hours before the test. If you are diabetic, follow your physician's advice. Wear comfortable clothing. No eye makeup or lotion on the face.

Bring your dizzy questionnaire in on this visit.

If you have any additional questions, please feel free to contact your physician or our office.

Please sign in at the reception desk in our Munster, IN location. PLEASE BE PROMPT. The time set aside for this test is scheduled for you and we cannot see other patients during that time. Therefore, if you are unable to keep the appointment, please give us 24 hours notice. If you need to reschedule, please call the balance department at 219-934-9396 ext. 2225.

Customized Vestibular Rehabilitation Therapy (VRT).

What is Customized VRT? Customized VRT tailors the exercises that cause the patient's symptoms of dizziness or imbalance. VRT involves a three prong approach—*habituation exercises* which are designed to facilitate central nervous system compensation by extinguishing pathological responses to head motion, *postural control exercises* and *general conditioning activities*. VRT uses a problem oriented approach. Exercises are designed to target problems areas that are identified during the assessment. In addition, the patient's diagnosis, and medical history are also included in the therapy plan. In general, exercises are performed at various speeds of movement and in various positions and are performed with both eyes opened and eyes closed.

Why Does It Work? The vestibular system sends "internal" input to the brain telling the brain how the head is oriented in space. The visual and somatosensory system provides "external" input to the brain about our movement and mobility. When there is a conflict, the brain inaccurately interprets the perception of motion. Therefore, active movements stimulate the sensory inputs that are necessary for balance. This process is referred to as vestibular compensation which results from active neuronal changes in the brain in response to sensory conflicts produced by vestibular pathology.

How Does It Work? There are adaptation exercises, substitution exercises and a combination of both that will result in vestibular compensation. ***However, these exercises can make you dizzy!!*** In order for the brain to compensate, the brain needs to see what is wrong so it can fix it. Typically exercises are done for 1 to 2 minutes each with 15-20 repetitions, 2-3 times a day. The patient should rest between exercises. These exercises must stress the vestibular system in different ways in order to achieve vestibular compensation.

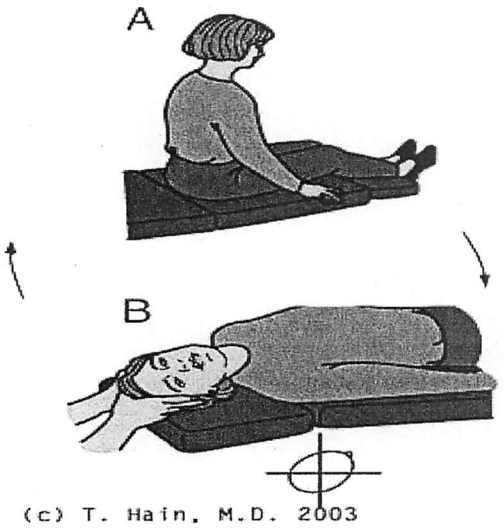
Adaptation exercises improve gain of the VOR and therefore improve gaze stabilization. An example of this would be holding a business card and looking at the card while moving your head back and forth horizontally and vertically. The best stimulus to induce adaptation is one that produces an error signal that the CNS attempts to reduce by modifying the gain of the vestibular system.

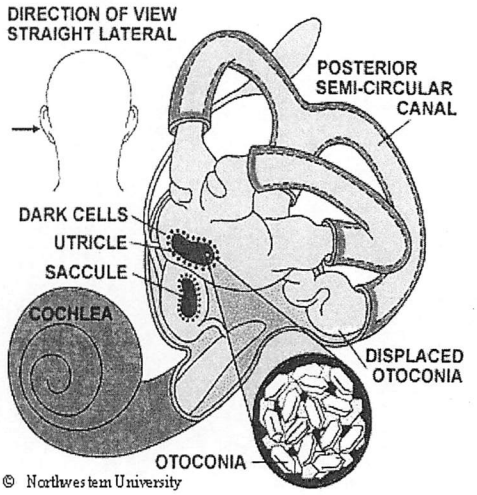
Substitution exercises uses of visual and somatosensory cues to better utilize these remaining senses more efficiently. An example of a substitution exercise would be to walk on a balance beam in a heal-to-toe pattern. This exercise would involve utilizing both visual cues and somatosensory cues.

A combination of both adaptation and substitution would include movements of the head, tasks requiring coordination of the eyes with the head, total body movements and balance tasks. An example of this exercise would be to walk in place on a trampoline with and without visual cues. These exercises involve the use of vestibular, visual and somatosensory cues.

Who Benefits from Therapy and Who Doesn't: There are many reasonable indications for VRT. BPPV (Benign Paroxysmal Positional Vertigo) is a common cause of dizziness. About 20% of all dizziness is due to BPPV. The symptoms of BPPV include dizziness or vertigo, imbalance, nausea and lightheadedness and are always associated always precipitated by a change of position of the head with respect to gravity. Specific interventions, such as the Epley or Semont maneuvers, have an 80% cure rate for BPPV and can usually be performed in a doctor's office. There are several other exercises for BPPV which include Brandt-Daroff exercises, and log roll exercises (for lateral canal BPPV). For

example, getting out of bed or rolling over in bed are common motions that can cause problems. A Canalith Repositioning Procedure (CRP) is identical to the Dix Hallpike maneuver. The patient is moved from a sitting to supine position with the head hanging off the bed and turned 45 degrees. This position is held for 15-20 seconds. In BPPV, dizziness is generally thought to be due to displaced otoconia or small calcium crystals (also known as "ear rocks") that derive from the utricle and have become displaced. (See figures below).





Others who would benefit from VRT would be patients with unilateral as well as bilateral vestibular loss. This would include patients who have vestibular neuritis, acoustic neuroma, or bilateral loss due to gentamicin toxicity or vestibular nerve section. Another indication for the use of VRT as a primary treatment modality is multifactoral balance difficulties, such as those seen in the elderly. These individuals may benefit from postural control exercises and individualized conditioning programs.

Individuals **not** likely to benefit from vestibular therapy include mainly persons without a vestibular problem, such as those with low blood pressure (also known as orthostatic hypotension), medication reactions (other than those causing ototoxicity), Migraine associated vertigo, Transient ischemic attack (TIA), which are mini strokes and those individuals in litigation.

Can I do therapy at home or do I have to come in for treatment? Therapy generally takes place over a 6 to 8 week period of doing the exercises 2-3 times daily. It may take up to 4 weeks before symptoms begin to decrease. After 2 months, the exercises are gradually decreased to once a day. Since these exercises "stress" the system, these exercises will exacerbate your dizzy symptoms and produce mild to moderate vestibular symptoms. These exercises will make you dizzy !!! Therefore, the patient needs to be highly motivated to do an exercise program at home.

Where can I get more information? For more information go to www.vestibular.org or contact Vestibular Disorders Association, P.O. Box 13305, Portland, OR 97213 (800) 837-8428.