Vestibular

What Is Vestibular Rehabilitation?

The primary role of the vestibular system is to tell the brain where the head is in space. Quite simply, the vestibular system is our internal reference telling the brain how our head is orientated - up, down, tilted, etc.

People with vestibular inner ear disorder often experience problems with balance or movement-related dizziness. These symptoms affect a person's ability to change positions (such as lying down and getting up from a chair) or move about without imbalance and vertigo. Loss of balance and dizziness can be debilitating and contribute to a diminished quality of life.

Vestibular rehabilitation is an exercise− based program designed by a specialized physical therapist to improve balance and reduce dizziness-related problems. A treatment plan will be developed that will improve your ability to function in activities of everyday living, reduce your risk for falling, and, ultimately, improve your quality of life.

Who benefits from Vestibular Rehabilitation

Patients who can benefit from vestibular rehabilitation therapy are those diagnosed with dizziness, imbalance, vertigo, Meniere's syndrome, benign paroxysmal positional vertigo (BPPV), neck-related dizziness, and migraines. Other candidates are patients who have had a stroke or brain injury or who frequently fall.

Dizziness is defined as...

- Feelings of unsteadiness
- Wooziness (queasy and disoriented)
- Lightheadedness
- Feelings of passing out
- Sensations of moving, spinning, swaying, tilting, or whirling
- These sensations occur when standing still, lying down, or changing positions
- Symptoms can last for seconds, minutes, or days

You can be fitter, faster, stronger, and more independent. We will work hard to help you achieve your goals in a healthy way.

You. Only Better

Vestibular Rehabilitation

Vestibular Rehabilitation, which is a form of Balance Retraining Therapy, has emerged over the past several years as an alternative treatment for patients with chronic non-resolved motion intolerance, visual sensitivity, and imbalance problems. Patients get better and return to normal lives because of this treatment. The history and how of vestibular rehabilitation are important keys to knowing why therapy works and what therapy type will be most successful.

History...
Although Vestibular Rehabilitation has only recently gained international acceptance, the concept of coordinated head, body, and eye exercises as a treatment for vestibular disorders is actually over 60 years old. As far back as the mid 1940's, an English Ear, Nose and Throat (ENT) doctor, Dr. Cawthorne, observed that some dizzy patients did better or recovered sooner when performing rapid head movements. In cooperation with a physiotherapist, Cooksey, they developed a regimen of exercises which are still used today, with some modification. Also, in the late 1960's, the discovery of particles in the inner ear lead to the development of the Brandt-Daroff Activity in the 1980's and in the early 90's with the Parnes, Semont, and Epley leading the way to repositioning maneuvers.

Since the resurgence of interest and research in vestibular/balance rehabilitation in the mid 1980's, hundreds of articles have been published in otolaryngology, neurology, and physical therapy journals. The overwhelming conclusion of these research studies has documented the benefits of this management strategy for patients with vestibular dysfunction as well as other disorders of the balance system.

How and Why Vestibular Rehabilitation Works

How...

In order to understand how Vestibular Rehabilitation works and the underlying corrective mechanisms, it is important to remember that the primary role of the vestibular system is to tell the brain where the head is in space. Quite simply, the vestibular system is our internal reference telling the brain how our head is orientated - up, down, tilt, etc. The visual and somatosensory (touch, pressure, pain) systems, on the other hand, are external references, providing our brain with information about the movement and stability of the world around us. Working together and when the systems agree, it is the integration of these sensory modalities that provides us with normal equilibrium.

When there is a conflict between internal and external references, the result is the brain's inaccurate perception or hallucination of motion, or vertigo (dizziness). An example of this occurring in everyday life is the feeling of moving forward when stopped at a traffic light, when a larger vehicle in your peripheral vision has rolled backward. There was simply a conflict between the three sensory modalities. The input from the motion detector aspect of the visual system overrode the input from the vestibular and somatosensory systems creating the hallucination or perception of motion.

Another way to look at a conflict in the balance system is to think of yourself as a car with a front-end alignment problem. If you take your hands off the wheel, if you are distracted, or if the environment is challenging, you can find yourself drifting into another lane. In a sense, this is the "dizziness" you may experience with a balance disorder. Hitting the burm or getting a horn from someone next to you is the signal you are going off-kilter. It is the symptoms of dizziness - the possible nausea, visual sensitivity, motion intolerance, and/or feeling of unsteadiness that you may feel with a balance disorder. It can last for seconds, minutes, hours, days, or daily. The first thing you will want to do is avoid the sensation - I would think the same. If something makes you feel sick, you're first inclination is to stop the movement. You may also be given vestibular suppressants to reduce the symptoms - over 70% of all patients going to the PCP for dizziness are given Meclizine. The problem with both these issues is that in most cases (not all), this is the exact opposite of what you should do. Have you ever wondered how a figureskater spins or a combat pilot flies a jet - they challenge to the point of "dizziness" or "disorientation" and then recover. They do it in a dose-like manner - just like taking a pill for arthritis pain. Through repetition, practice, and mental training most are able to reduce the symptoms and even eliminate the problem. This is what needs to be done with most balance disorders but frankly is not done.

Why...
There Are Three Accepted Models To Explain Why Therapy Works:

**Adaptation:** The central vestibular system (brainstem) and brain learns to adapt to the imbalanced signal coming in from the impaired peripheral vestibular sensory receptors. The role of the vestibulo-ocular reflex (ear-eye reflex) is to keep the eyes focused on a target during head movement. If the incoming signal from the two internal head movement sensors (canals and otolith organ of your ear) is not in synchrony, the result is a sense of "after-motion" with head movement (you feel dizzy/off-balance). A primary component of the balance system adversely affected by the imbalance from the two peripheral vestibular mechanisms is the vestibulo-ocular reflex (keeps eyes steady). Gaze stabilization exercises work to "return" the vestibulo-ocular reflex to eliminate the retinal slippage (blurred vision) and the patient's perception of this "after motion." Another easily understood example is that of the two propeller airplane with one propeller operating at only half the Rpm's of the other. There is no way to increase the damaged or reduced propeller's output, so the on-board computer is programmed to accept or adapt to the imbalanced signal and maintain the plane's trajectory and course.

**Substitution:** The role of compensatory shift when one or more sensory systems is lost or damaged is well known. The visually impaired individual does not develop better hearing acuity, nor does the deafened individual gain better vision. They simply utilize their remaining senses more efficiently. The redundancy of multiple sensory inputs allows the fully intact individual to waste much of the input. So, for the individual who has lost vestibular function, dependency on the remaining equilibrium sensory components, e.g. vestibulo-spinal, cervico-spinal and visual inputs, must be made trustworthy.

**Habituation:** As Dr. Tim Hains explains, "If one exposes oneself to something over and over, one may get "used to it". In physiology, this is called habituation, and it works for dizziness too. Examples of this approach are the "Norre" exercises, and the "Kitchen sink" approach to dizziness. The main problem with this approach is that it takes a long time and it is difficult to tolerate the repetitive motion needed to make an impact."

Types of vestibular rehabilitation therapy

**Chronic Dizziness (pdf):** This medical review was done in 2002 by Neil Shepard and David Solomon. It explains in detail the reasons why vestibular retraining therapy is necessary in the treatment of chronic dizziness and some reasons why there is failure to compensate.

There are four general ways in which vestibular rehab programs may be implemented. One or more of the approaches may be used. The goal is always to help you get better as quickly as possible in a safe and caring manner.

**Self-Directed Home Programs:** This approach is most commonly used with patients who do not require supervision during their exercises, are not in an acute state, or whose lives do not allow weekly visits. Following a one, one-hour training or instructional session, the patient is provided with a set of exercises within a self-directed program. Best results occur when the patient spends 5-15 minute sessions two to three times a day. Most patients report a significant reduction or elimination of their symptoms within a three to four week time span.

**Vestibular Rehabilitation in the Clinic:** This program is designed for patients whose symptoms may be acute and who may require supervision during their exercises. Therapy sessions usually incorporate the use of a variety of special vestibular therapy apparatus, which most patients find challenging. There is also an
emphasis on fall prevention for older patients. Typically, the patient participates in one or two 60-minute sessions per week, with an average program of 10 to 16 sessions. As the patient progresses and gains confidence, they will also be given self-directed home programs to quicken their improvement.

**Static/Dynamic Balance Retraining:** This therapy is for individuals who have a loss of balance, unsteadiness or may be falling. Most of these patients report dizziness, but in fact they are describing dysequilibrium or off-balance. There is an emphasis on practical solutions to common problems, e.g. difficulty getting around in the dark, walking on uneven surfaces (such as thick carpeting or lawns), and negotiating steps and curbs. Fall prevention, movement coordination and improved participation in everyday activities are all high priorities of the balance retraining program.

**Repositioning/Epley Maneuvers:** Some call it "top-shelf" syndrome or positional vertigo - specifically for patients with a diagnosis of Benign Paroxysmal Positioning Vertigo (BPPV), vestibular/balance therapy may consist of one or more visits using a repositioning maneuver for management of the positional vertigo. There are several approaches in the management of BPPV - these treatment protocols reposition the stones (calcium/crystals) which have escaped from the Otolith Organ and are now moving in the semicircular canals. The two most common maneuvers are the following:

- Epley/Canalith Repositioning Maneuver
- Semont/Liberatory Maneuver