IMPROVING BALANCE
Associated with Acoustic Neuroma

Essentially everyone who has been treated for an acoustic neuroma experiences difficulty with balance and/or dizziness to some degree. For some, these symptoms may be mild and noticeable only in certain circumstances, such as ambulating with head movements, or walking in the dark. For others, there may be difficulty returning to work, or even performing regular daily activities such as driving, shopping, house work and even working on your computer. Why is there such a difference in recovery of balance? Can anything be done to improve one's chances of recovering balance well enough to return to a reasonably normal lifestyle? The purpose of this booklet is to give guidance on improving stability for those patients impacted by an acoustic neuroma.

NORMAL BALANCE FUNCTION

Perception of stability is the result of a complex brain function that uses three systems to inform the brain how the body is oriented in space and how it is moving in relation to its surroundings. Each system works independently and together, so if one or two systems are being challenged, the remaining one or two will help you maintain your balance. The three major senses that provide balance input to the brain are: (1) Your vestibular system, which is the balance portion of your inner ear, relays information to your brain regarding head movement in a straight line (reaching), and head rotation (turning your head). (2) Your vision orients you to an object you are looking at. (3) Proprioception is the body's sense of how your joints are aligned during activities using your legs. In other words, are they lined up or are they moving? Information sent to your brain by sensors (proprioceptors) in the joints of your legs assist the brain in contracting muscle around the joints for stability.

Vestibular System

The vestibular system in the inner ear is responsible for detecting movements of your head through space. The vestibular system detects linear accelerations of your head (reaching/bending), and rotary movements of your head (turning your head to the right or left, looking up and down). The three semicircular canals of the inner ear detect rotation horizontally, vertically, or at an angle. The other two sensors of you inner ear detect acceleration in a linear direction forward or backward, or movement up or down. It is important to remember that you have a vestibular system within each ear and that they function as a pair. The two vestibular systems are oriented so that movement of the head in any direction will cause an equal but opposite reaction in one ear compared with the other side.

For example; if you turn your head to the right, the vestibular system on the right turns "on" and tells your brain of the movement, and the vestibular system on the left turns "off" so as not to confuse your brain (Illustration I). While turning your head, your brain moves your eyes the exact speed as your head in the opposite direction so your eyes and head are moving as one, keeping your gaze stable.

This amazing coordination between your head and eye movements is referred to as the vestibular (inner ear) ocular (eyes) reflex; VOR. This allows you to walk and move your head at the same time without the feeling of dizziness or disorientation. Information from your vestibular system responsible for the VOR is sent along the vestibular nerve to your brain, and your brain moves your eyes. When you touch something hot, your brain reflexively contracts muscles in your arm to move your hand away from the heat; when you turn your head, your brain reflexively contracts eye muscles to move your eyes; (VOR).

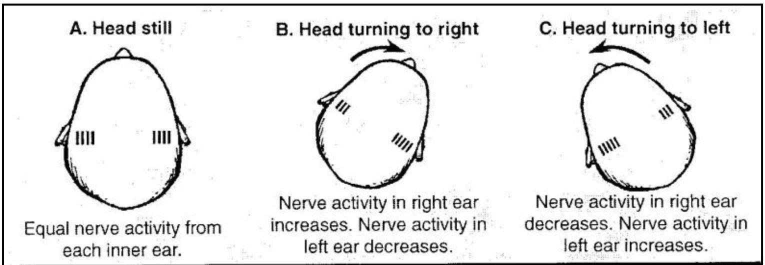


Illustration I

Vision

The eyes play an important part in perception of balance and movement. Your vision orientates you to objects in your surroundings. One can judge how fast he or she is moving based on how fast objects are moving in his or her visual field. This perception is most accurate when objects are fixed and close. You can also use your vision to orient yourself vertically, allowing you to align your trunk correctly in reference to other upright objects in space. This works best when there are straight, vertical objects to compare with the body position. It is harder when you are surrounded by irregularly shaped objects. Because of the use of objects for reference, vision is much less helpful when one is surrounded by moving things, or dim lighting. This explains why walking in a dimly lit environment may be difficult for an acoustic neuroma patient.

Proprioception

Proprioceptive sensors in the joints of the ankles, knees, hips and spine give the brain feedback regarding the alignment of the bones of the joints and how the body is moving them. This can be demonstrated by a fairly simple test of the proprioceptive sense. With eyes closed, a person has another person move his or her ankle up or down. If this proprioceptive sense is accurate, the person whose ankle is being moved will have no difficulty telling its correct position. These joint proprioceptive sensors tell the brain how the body is bending from the ankles, knees, hips and back.

There are also proprioceptive pressure sensors in the soles of the feet that tell the brain if the body is leaning forward, backward, or to one side. When standing on a firm surface, one can tell if he or she is leaning forward by noting more pressure on the balls of the feet and toes. If one is leaning backward, there is more pressure on the heels. When leaning to the right, more pressure is perceived on the right foot and less on the left. These proprioceptive sensors work together to inform the brain of the position of the body relative to the floor through foot and ankle joint movements.

The proprioceptive sense works well on a firm, flat surfaces. However, if the ground is soft and squishy (a sandy beach, grass, or even soft carpet), there is very little change in the pressure on the soles of the feet and accurate feedback to the brain is difficult. When the ground is very uneven (walking over a rocky trail), changes in pressure on the soles of the feet are completely useless in determining body position.

Although proprioceptive sensors are primarily used for maintaining a stable posture when standing, people do use pressure sensors in other parts of the body to perceive movement relative to the environment touching them. When sitting in a chair, sensors in the bottom and back tell a person that he is not moving relative to the chair. When lying in bed, one can feel the bed against a large part of the body, reassuring him that he is not moving relative to the bed. It is for this reason that people who have poor function of the vestibular system or lack visual input feel stable only when sitting or lying in bed. That is why many times people with decreased vestibular input because of an acoustic neuroma will use their sense of touch to maintain their balance (touching furniture or walls when they are walking).

PRIORITY OF BALANCE SENSORS

Most of the time, all three sensors (the vestibular system in the ears, vision and proprioception) work together in a complementary fashion. When one system is challenged (i.e., while standing on foam) the proprioceptors in the joints of your legs will be of no use, so your brain will use information from your visual and vestibular systems to maintain your balance. Sometimes these systems give conflicting information. An example would be looking out the side window of a car that is traveling down a smooth highway at a constant speed. Since the vestibular system in the ears sense acceleration, the ears tell the brain that the body is not moving. Proprioception and pressure sensors tell the brain that the body is not moving on the car seat. But the eyes say that the body is moving at 60 miles per hour. The brain needs to be able to handle that conflict. If it does not, the person feels motion sickness.

Because these three senses sometimes give conflicting information, the brain gives priority to some senses over others. Typically, the vestibular system in the inner ears has the highest priority. A healthy vestibular sense is essentially always right. Vision is given second priority under most circumstances. If, however, moving objects fill the entire field of vision, the brain will give vision first priority over the vestibular sense.

A good example of this occurs while riding in a car. You may feel that you are moving, even though your ears tell the brain that your head is still, and the proprioceptors tell you that you are still against the seat. Another example occurs if you are at a red light and the car next to you moves forward, and you feel as if you are moving (visual input) and "hit" the brakes.

Another good example of this occurs at an IMAX movie theater. These movies are shown on a huge screen that fills the entire visual field. When a person sees the world twirling on the screen, he feels that he is moving, even though the ears tell the brain that the head is still and proprioception and pressure sensors tell the person that the body is still against the seat.

EFFECT OF AN ACOUSTIC NEUROMA

An acoustic neuroma is a benign tumor that involves the nerve that connects the inner ear to the brain. More accurately termed a vestibular schwannoma, this tumor distorts or reduces the input sent to the brain from the vestibular (balance) system in the inner ear. As it grows larger, it involves the nerve fibers that transmit hearing information, thereby causing a hearing loss and gradually reducing input from the balance portion of the ear. As an acoustic neuroma slowly grows, it gradually reduces the input from the vestibular portion of the inner ear that the brain relies on to help us maintain our balance .

Based on what has been discussed about how the balance system in the ears function, it would be reasonable to deduce that this would cause a gradual increasing sensation of spinning, but instead, something quite different happens. Amazingly, the cerebellum of the brain (motor control center) has the ability to suppress the activity from the opposite normal side to keep the two ears functioning at similar levels of activity.

In essence, the brain fine-tunes the two ears so that they can work accurately in tandem with each other. The brain does this without the person having to think about it as long as he is active enough and the remaining senses, especially vision, are good enough to show the brain that a misalignment is present.

It is important to note that a person with an acoustic neuroma is more affected by the location of the tumor relative to the balance nerve and its blood supply than by the size of the tumor itself. These two factors explain the great variability of the effects on the balance system from person to person.

The brain needs to see a problem in order to fix or adjust it. An active person with an acoustic tumor may notice subtle feelings of unsteadiness and dizziness during certain situations when moving the head quickly. As the tumor grows and disrupts more balance fibers, the cerebellum of the brain continues to suppress the activity of the other ear. By this time, the brain is getting less information from the two ears even though they are still working together. The affected vestibular system is getting less sensitive.

Now, the person with an acoustic tumor may feel a bit less sure of his or her balance when in a situation that requires very good balance such as standing on the top of a step ladder, or ambulating with head movements. The amount of balance fibers affected by an acoustic tumor is not directly determined by the size of the tumor. Some small tumors may cause nearly total disruption of normal balance function from that ear; other large tumors may still allow fairly good balance function to remain. The part of the nerve involved and involvement of the blood supply to the inner ear are two reasons why there is such variability in the degree to which these tumors affect the function of the balance system.

Balance Recovery Following Microsurgical Removal of an Acoustic Neuroma

When an acoustic tumor is removed through microsurgery, the balance fibers in which the tumor is growing are removed along with the tumor. Unless the tumor had previously affected all the balance fibers during its growth, this causes a sudden decrease in the balance input that the brain receives from that ear. Since the other ear is still working normally, the brain can only interpret this sudden change to mean that the head is spinning in a circle. This is perceived as vertigo or the perception of the world spinning around the body, or the body spinning in a stationary world. Fortunately, for many acoustic neuroma patients it only takes about a day or so for the cerebellum to dampen information from the opposite ear and recalibrate information processing. This leads to a resolution in the vertigo.

The brain will now need to learn to navigate without any significant information from the ears. Since the vestibular system no longer can take the role of first priority, the brain appoints one of the other senses to this position; typically this is vision. Within a week or so, this has taken place and the person recovering from acoustic tumor surgery can walk the halls and even go up and down stairs. However, the brain needs good visual information for balance based on vision to function properly. It needs to see objects nearby to judge how fast the body is moving and in what direction. The brain also needs accurate information from proprioceptive input. A firm, smooth surface to walk on provides this information.

This visual priority works reasonably well, but it does have its limitations especially in places that are dimly lit or chaotic. Therefore, in an environment with limited or distorted visual information you may feel more unbalanced, dizzy or disoriented. For example, when walking in dim light, there usually is not enough information for the brain to judge stability. When walking outdoors in a wide open area, there are no nearby objects to use to determine how fast one is moving or even to tell if one is leaning to the side. When walking in areas where one is surrounded by moving people, the brain cannot tell how fast the body is moving because the visual reference points are themselves moving. Walking downstairs is difficult because it is hard to see the stair surfaces clearly. If there is also a soft or uneven surface causing a decrease in proprioceptive input, the brain has even less ability to determine the body's position in space. This causes the feeling that is described as dizziness, lightheadedness, unsteadiness, postural instability or giddiness.

After someone has had an acoustic neuroma removed, he will typically notice that as long as the head is moved slowly, the surrounding visual environment stays still. If, however, the head is moved quickly, it can cause a feeling of disorientation, dizziness, and imbalance. It is as if the visual world does not move quite as quickly as the head and has to catch up. The VOR, the reflex responsible for telling the brain your head is moving so it can contract muscles to move your eyes, loses its accuracy after removal of an acoustic neuroma. As previously discussed, microsurgical removal of an acoustic neuroma causes loss of function of the vestibular system on that side. Shortly afterwards, the brain shuts down the other side to make the two sides more similar. As a result, there is little activity of the inner ear system to direct the eyes to move in a perfectly coordinated way with the head.

Fortunately over the months after removal of an acoustic neuroma, the nerve cells in the vestibular area of the brain slowly develop a steady activity on their own and there is a slow return of information from the vestibular system. (Illustration II) This return of vestibular activity will help you become steadier as time goes on. For the person recovering from AN removal, this gradual return of brain-vestibular coordination will cause the vestibular system to become the most dominant means of stability. For the recovery to be complete, the Vestibular Ocular Reflex (VOR) needs to be made as accurate as possible. If this does not occur, feelings of unsteadiness or dizziness may continue for years after tumor removal. Since this final recovery function often does not occur on its own, balance therapy or rehabilitation can help teach the brain to make these adjustments, in which the brain learns to compensate for the loss of inner ear input.

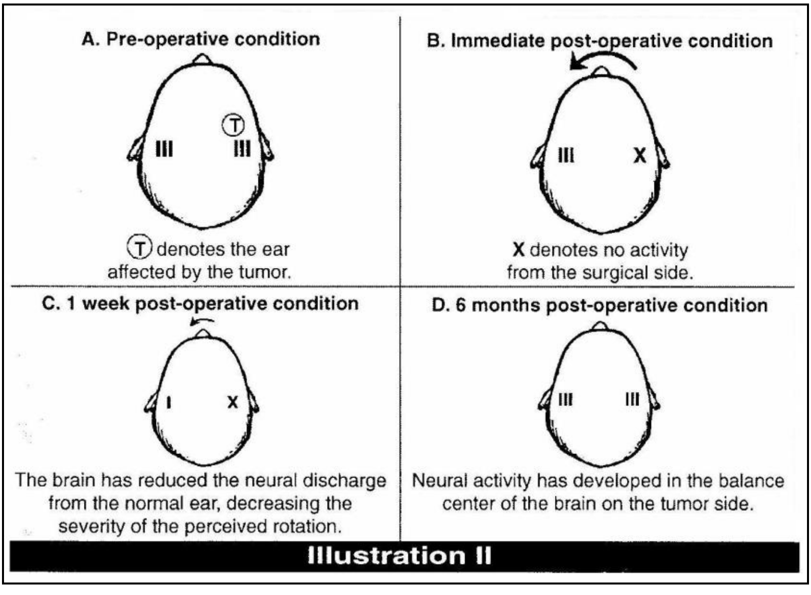


Illustration II

Balance Recovery Following Radiosurgery for an Acoustic Neuroma
An acoustic neuroma typically causes a gradual reduction of balance nerve function as it grows. Following radiosurgery on an acoustic tumor, there may be continued gradual reduction of balance fibers due to radiation induced inflammation and recovery.

The same general principles that apply to improving balance after microsurgical treatment apply after focused radiation therapy, but with some differences. When a tumor is surgically removed, the change in balance function occurs quickly with no further change over time. Once there is no input from the balance system on the affected side, no further reduction can occur.

With radiation, change occurs more slowly, often with some persistence of balance function on the treated side. Because the reduction in balance input from the treated ear occurs more slowly, most people do not experience marked feelings of dizziness immediately after treatment. But since the tumor itself, along with the radiation therapy, creates a difference in function of the normal side versus the treated side, balance recovery requires that the brain adjust the normal side to function at a level similar to the tumor side, assign the balance system in the ears to the first priority and fine-tune the VOR to keep eye movements perfectly coordinated with head movements, in the same way it would with surgical removal.

A potential cause for persistent unsteadiness after radiation therapy is intermittent malfunctioning of the remaining active balance fibers within the tumor. Since the brain cannot adjust to a changing level of function within the balance system in the ear, instability may continue.

GENERAL CONCEPTS OF BALANCE THERAPY

Complete compensation for the loss of function of one inner ear balance system often fails to occur on its own. The major balance dysfunctions that occur are 1) The failure of the vestibular system to return as the primary sense utilized for stability, and 2) An inaccurate Vestibular-Ocular Reflex (VOR) that causes an unstable visual field with rapid head movement. The brain will correct the balance system only as much as it has to. As long as the strategy the brain has adopted (in this case vision), works reasonably well, it will stick with that system. For the most part, people can function reasonably well with a continuation of the visual system as the priority sense for balance, but there will be limitations with many activities.

For example, it is bothersome to feel a bit unsteady or dizzy when going downstairs, walking in a crowded shopping mall or walking down a grocery store aisle where many colored boxes create the visual image of movement, but typically these activities are not performed frequently enough for the brain to correct the problem.

Balance therapy is designed to strengthen the working relationship of the visual, proprioceptive and remaining vestibular system. It does this by creating situations where the post-treatment strategy (visual predominance for balance) does not work well enough for the patient to feel steady. This encourages the brain to make corrections. The brain learns well when given small problems that are relatively easy to correct and continues to learn when presented with these problems frequently enough to remember a strategy. You have to remember you have not forgotten how to keep your balance; your brain needs to learn how to interpret the new way in which information is presented to it.

The exercises that are performed to improve balance and/or decrease dizziness should stress the perception of stability enough to make you unsteady. If this feeling of mild dizziness occurs, it should stop within 10 to 15 minutes after the exercise session, then the lesson has been an appropriate challenge. If, however, feelings of dizziness persist for 30 minutes or longer, or are so intense that they cause nausea, the session has been too challenging for the brain to learn as effectively as possible. If this occurs, the next session should be a little less challenging. Twice a day appears to be the ideal frequency for the most rapid progress. Once a day is better than none, but the progress tends to be a little slower.

In order to force the brain to make vestibular function the first priority for balance, you will need to be placed in an environment in which problems will occur if either the visual or proprioceptive systems are being used as the primary system. This forces the brain to use the only sense left that is helpful: the vestibular system in the inner ear. These exercises are ideally done outside, but indoor exercises can also be developed. Closing the eyes eliminates visual input. Walking on a foam pad or soft, fluffy rug will decrease proprioceptive input.

Early on, after microsurgical removal of an acoustic neuroma, most people naturally tend to move slowly, often moving the head and body together to avoid the feeling of dizziness and unsteadiness. As balance recovery progresses, it is important to force the brain to adjust to faster and faster movements of the head and trunk to develop flexibility and coordination of head and neck movements.

It is also important to note that during the recovery process, the movements the brain experiences the most are the ones in which the corrections are greatest. If, following an acoustic tumor removal, the only movements that cause the feeling of dizziness are bending over or lying down in bed, these are the movements that need to be done regularly (several times at least twice a day) to show the brain that there is a significant problem that needs to be corrected.

Neck muscles on the side of the surgery for removal of an acoustic tumor will often become stiff during the healing process. This neck muscle stiffness can further contribute to the perception of dizziness, especially when moving the head because of changes in nerve receptors in the neck. The neck muscles are a back-up system for vestibular input and any disruption in muscle flexibility or strength can cause dizziness and imbalance (cervicogenic dizziness). Therefore neck exercises are also included in the following pages.

Stretching receptors within the neck muscles and joint proprioception sensors in the vertebrae of the neck tell the brain how fast the head is turning on the shoulders. If the muscles on one side of the neck are stiffer than the muscles on the other side, this causes input through these stretch receptors that the brain perceives as the head turning. Stretching exercises that promote normal neck muscle flexibility and full range of motion of the neck will help eliminate this problem, and potentially prevent future painful musculoskeletal conditions associated with restricted muscles and joints. It is also necessary to be able to move the head fully for adequate performance of balance rehabilitation exercises.

MAKE SURE YOU ARE SAFE! MANY PEOPLE FEEL THE MORE DIFFICULT OR THE MORE THEY DO THE EXERCISES THE BETTER, WHICH CAN LEAD TO FALLS AND SET THE TREATMENT COURSE BACK.

SPECIFIC SUGGESTIONS FOR BALANCE EXERCISES

Balance difficulties will vary from person to person. Some supervision may be necessary initially. If any exercise is very easy and does not produce any symptoms of unsteadiness, the patient may discontinue the exercise. Exercises should be done one to two times per day.

Unless an assistive device, such as a cane, is used for other reasons, the assistive device should be used only in the early phase of rehabilitation and should be discontinued as soon as is safely possible. It is best to let the body relearn balance strategies without relying on an external source.

Early in the rehabilitation process, it is helpful to use a night light to minimize chances of falling. Initially after microsurgical removal of an acoustic tumor, the patient will depend a great deal on vision to maintain balance. Primary reliance on vision should be decreased as soon as possible by the patient looking around (moving the head) when walking, not keeping the eyes focused on the ground or a point in the horizon. Although it is ideal to start a balance rehabilitation program as early as possible after microsurgical removal of an acoustic neuroma, improvement can be gained with this approach even if it is started many years after the surgery was performed.

Note of Caution:

You are encouraged to be cautious about performing the exercises; they may require the evaluation and instruction for the proper technique from a physical therapist. You may want to begin all exercises indoors before going outdoors to prevent tripping and falling. Also with the turns, we recommend you lead with your head first, to reduce dizziness and improve balance control. These exercises may initially increase your symptoms; try to work through them at your comfort level. You should stop doing the exercises if you experience:

- Sudden change or fluctuation in your hearing.
- New onset of ringing in your ear, or an increase in current intensity.
- Any fluid discharge from your ear.
- Any pain in your ear.
- Any severe pain in your neck or back.

BALANCE EXERCISES
NECK FLEXIBILITY

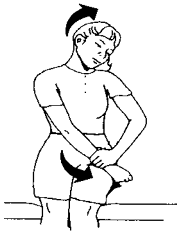
There may be neck stiffness following surgery. Stretches will help improve mobility to allow full head movement for vestibular training and potentially reduce the chance for future pain in this area. These exercises will improve neck flexibility and range of motion and should be performed twice daily. All stretching exercises should be performed to the point of a gentle stretch but not into a painful range of motion.

Scar Massage
Avoid irritating the incision site with a surgical approach to acoustic neuroma removal. Once the physician has determined that the scar is healed, scar massage can begin. This will help decrease sensitivity of the scar and improve mobility.

Gently massage the skin over and around the scar in the direction of the scar, perpendicular to the scar and in small circles. If the skin is very sensitive, start with light pressure on, then off. It is not necessary to use lotion with this, since good contact with the skin to allow movement of the tissue below the surface is important. This should be comfortable and may be stopped after a few weeks if the scar tissue is mobile, not sensitive to touch and there is neck mobility.

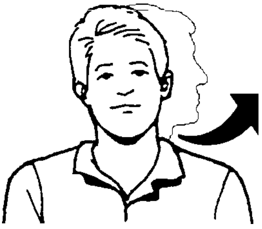
Gradually the muscles should relax, and you will gain further range of motion.

NECK STRETCH: Grasp arm above wrist and pull downward and across body while gently tilting head.



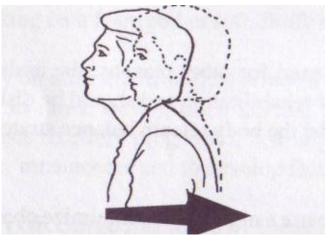
Hold 20 seconds. Relax. Repeat 3 times.

NECK ROTATION: Turn head to look over left shoulder, then turn to look over right shoulder.



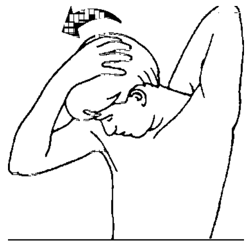
Hold 5 seconds. Repeat 10 times.

NECK RETRACTION: Pull head straight back keeping jaw and eyes level.



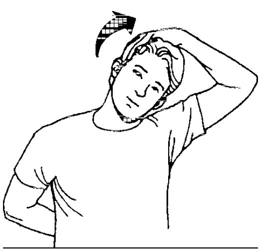
Hold 5 seconds. Repeat 10 times.

LEVATOR SCAPULA STRETCH: Place hand on same side shoulder blade. With other hand gently stretch head down and away.



Hold 20 seconds. Repeat 3 times.

UPPER TRAPEZIUS STRETCH: Gently grasp side of head while reaching behind back with other hand. Tilt head away until a gentle stretch is felt.



Hold 20 seconds. Repeat 3 times, both sides.

WALKING EXERCISES

Walking, gradually increasing daily movements and the speed at which these movements are done, will be important. Additional exercises challenging balance and vestibular systems will help recovery.

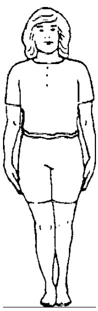
Walk 10 steps turning head left and right. Pivot quickly 180 degrees to the right then walk 10 steps looking up and down. Pivot 180 degrees to the left and begin sequence again. If dizziness becomes uncomfortable, pause briefly. Repeat this sequence 5-10 times in the home or every couple of minutes throughout a daily outdoor walk. This will be more difficult on uneven terrain.

STANDING EXERCISES

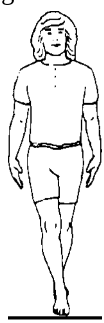
For safety, standing exercises should initially be done near a wall with someone standing nearby or may be performed alone backed into a corner. Increase the difficulty of the exercises by:

1. Closing eyes
2. Standing on a pillow
3. Moving head up and down and side to side

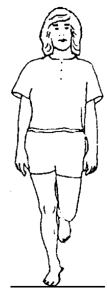
Stand with feet together.



Stand with one foot directly in front of the other as if standing on a balance beam.



Stand on one leg.



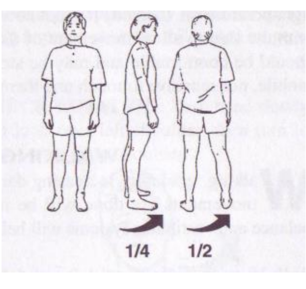
Do these 2 times per day. Hold positions 30 seconds. Repeat each exercise 3 times.

MOVEMENT EXERCISES

Movements should be repeated 5-10 times twice daily with a pause between each repetition to allow the dizziness to stop (or return to baseline). Increase the difficulty of the exercises by closing eyes (with someone standing nearby for safety) and/or by doing the standing exercises on an uneven surface. Begin movements at a moderate speed and gradually increase the speed.

1. Standing, turn in one direction. Begin with a quarter turn and progress to 180 degrees, then 360 degrees. Repeat in the other direction.

2. Try bending forward, rolling left to right or reaching up. If any of these cause dizziness, incorporate them into the exercises as outlined above.

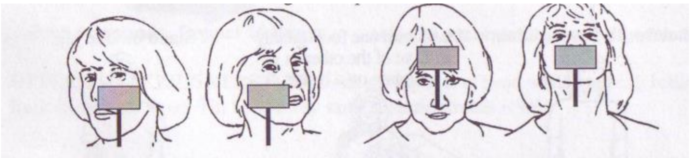


GAZE STABILIZATION EXERCISES

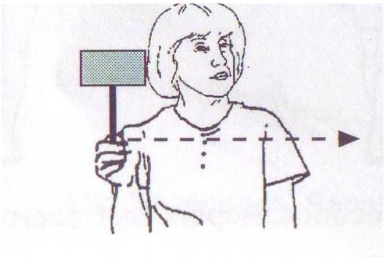
Write a word in large letters on the back of a card. Keep the word in focus throughout the exercise. Gradually increase the speed of head movement. Begin with a solid background behind the target being used. Once this can be done comfortably at a fairly fast speed, place a busy background behind the target (examples are a checkerboard, television, or busy patterned curtains). This should be continued even if dizziness is experienced. If the dizziness becomes uncomfortable, temporarily slow down the head movements. Make sure the targets remain in focus. You may increase the speed of your head or target as long as the target remains in focus.

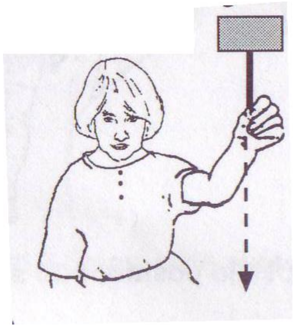
Begin these gaze stabilization exercises sitting. Increase the difficulty of these exercises by standing, and then standing on an uneven surface such as a pillow. For safety, the standing exercises should initially be done in a room corner or with someone standing nearby.

1. Keep eyes focused on word. Hold target stationary and move head side to side for 1-2 minutes. Do the same moving head up and down.



2. Keep eyes focused on the word. Move head side to side moving the card in the opposite direction. Do the same for moving head up and down.





NOTE
A referral to a Vestibular Rehabilitation Therapist (Physical or Occupational Therapist) is often very helpful in progressing central compensation and recovery of balance function. Discuss questions regarding therapy with your physician.

Imbalance resulting from acoustic neuromas and their treatment is usually treatable with physical therapy (vestibular rehabilitation). Imbalance may, however, persist and this may cause significant difficulties with daily activities. Persistent imbalance may be due to numerous factors, including visual problems and nerve or muscle problems in the legs. In some cases, persistent imbalance may be due to the poor or abnormal signal coming from residual vestibular nerve fibers on the AN side. This abnormal vestibular nerve signal may interfere with the brain's interpretation of the signal coming from the other ear's vestibular nerve.

If vestibular rehabilitation is ineffective at correcting the imbalance, destruction of the remaining balance signal in the AN ear maybe helpful. This may be accomplished surgically or with injection of gentamicin, an antibiotic, into the affected ear. The gentamicin injection (up to 5 of them) is used to kill the vestibular hair cells. This may reduce the signal coming from the affected vestibular nerve sufficiently to allow better compensation.

If it doesn't work, a labyrinthectomy (i.e., removal of the inner ear) can be done. Gentamicin also can cause hearing loss and labyrinthectomy uniformly causes deafness, so they're usually used only when the hearing is not useful. These interventions are considered something of a last resort if there are no other causes or potential means of treating imbalance.

For Additional Balance Exercises, please go to the ANA website Member Section in the Newsletter Directory, March 2013, at www.ANAUSA.org or contact the ANA office at 877-200-8211.

WHAT IS THE ACOUSTIC NEUROMA ASSOCIATION (ANA)?

Acoustic Neuroma Association was founded in Carlisle, Pennsylvania, in 1981 by a recovered patient, Virginia Fickel Ehr. She found no patient information or patient support available when she had surgery for the removal of an acoustic neuroma in 1977. She resolved that future acoustic neuroma patients should have easy-to-read medical material about their condition, and support and comfort from each other. With the help of her physician, she contacted eight other patients and formed the organization.

The association is incorporated and is a 501(c)(3) non-profit organization. The patient-focused, member organization now serves close to 5,000 members, is governed by an all-patient Board of Directors and is operated by a small staff in metropolitan Atlanta, GA.

ANA membership benefits include receipt of a quarterly newsletter, patient information booklets, access to a network of local support groups, access to a list of acoustic neuroma patients willing to talk about their experience throughout the country, our website Member Section and an invitation to a biennial symposium on acoustic neuroma. Our exclusive website Member Section includes published medical journal articles on acoustic neuroma and all of our patient information booklets and newsletters and many symposium presentations. ANA also maintains an interactive website at www.ANAUSA.org with an ANA Discussion Forum.

ANA is patient-founded, patient-focused and patient-funded. ANA recommends treatment from a medical team with substantial acoustic neuroma experience. Although the association cannot recommend specific doctors, medical centers or medical procedures, guidelines for selecting a qualified medical professional can be found at the ANA website, www.ANAUSA.org. Now available on our website is a listing of medical resources. The physicians and organizations listed have self-reported data to meet criteria established by ANA for having substantial experience in treating acoustic neuromas. The listings should NOT in any way be construed as an endorsement or recommendation by ANA. It is every individual’s responsibility to verify the qualifications, education and experience of any healthcare professional.

ANA PUBLICATIONS

You may want to order other ANA publications. Address your request to the following:

ANA
600 Peachtree Parkway, Suite 108
Cumming, GA 30041

Or phone us at 1-877-200-8211 or contact us by email at info@ANAUSA.org. Be sure to enclose the proper amount, as well as your name, address and zip code. Payment may also be made by check or by credit card using your Visa® or Mastercard®. You may also order any of these publications on our website at www.ANAUSA.org using your Visa® or Mastercard®.

Booklets	**Color**	**Price Each***
Acoustic Neuroma Basic Overview	Tan	$1.50
Diagnosis: AN – What Next?	Peach	$2.00
Eye Care after AN Surgery	Yellow	$3.00
Facial Nerve and AN: Possible Damage & Rehabilitation	Gray	$2.00
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NOTE: ANA Members can view patient information booklets and newsletters online on our website at www.ANAUSA.org in our Member Section.