ENTAA Care
Ear, Nose & Throat, Asthma & Allergy
Audiology & Hearing Aid Center
Speech & Balance Center

Explanation of Hearing and Balance Tests

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All patients with ear or dizziness complaints need basic hearing and balance tests depending upon the diagnosis, and these tests may need to be repeated. Usually tests done at other facilities must be repeated to determine their accuracy and to determine whether any changes have occurred.

Audiological Assessment

The audiological assessment consists of a hearing test and immittance audiometry. The hearing test is a subjective test performed to assess the function of the auditory system. The patient is seated in a sound treated room with headphones or ear inserts placed on or in their ears. The patient is instructed to respond to series of tones to determine the presence or absence of hearing loss, as well as the type and degree of hearing loss. The patient is also given a series of words to determine their ability to discriminate speech sounds.

Immittance audiometry is an objective test that measures the status of the middle ear and reflexes of the auditory muscle. A probe is painlessly placed in the ear canal via a headset. The tympanogram graphs the movement of the eardrum (tympanic membrane) in response to changes in pressure. This measures fluid in the middle ear and whether or not the eardrum and bones for hearing are functioning normally. Acoustic reflex decay testing assesses whether the reflex can be maintained for 10 seconds. The presence or absence of these reflexes is significant for diagnosis of tumors growing on the hearing nerve.

Electronystagmography

(ENG)

This is a series of tests to determine problems within the vestibular (balance) portion of the inner ear. The inner ear and the eye muscles are intimately connected in the brainstem so that eye movements can be used to determine the status of the inner ear's semicircular canals. Electrodes are placed near the eyes. These electrodes record movement of the eyes throughout the test. Tracking tests require the patient to follow various targets.

In positional testing, the patients are required to move into various positions to determine if positional vertigo occurs. Caloric testing provides the physician with essential information regarding the function of each individual balance system. Different temperatures of air or water are used to stimulate the balance system in the inner ear. This may cause a sensation of spinning for a few seconds, which is normal. If stimulation is successful the eyes move back and forth (nystagmus), which is recorded and measured.

The tracing is read similar to the way an EKG from the heart is read. A reduced or absent response indicates pathology (causes) within the vestibular system.

Balance Testing Using the Balance Master

Balance Testing is done using a computerized balance platform to assess the entire balance mechanism. To balance normally we need input from the eyes, the inner ear, and the proprioceptive system (nerve endings in the muscles and joints) to the brain. The brain organizes the information and sends messages to the limbs and body to keep us in balance.

This is an unconscious mechanism. In order to test this, the patient is placed on a platform that measures body sway with the eyes open and closed. Each input is tested individually to determine if they are working normally. Then the eye input and proprioceptive (movement) system is removed to see if the patient can balance using the inner ear only. The balance master is an important study to help the doctor make a proper diagnosis.

Brainstem Auditory Evoked Response

(BAER)

The Brainstem Auditory Evoked Response (BAER) in an objective measure of the electrical activity of the auditory nerve pathway from the inner ear to the brainstem. In this test, a clicking sound is presented to one ear at a time. The electrical activity of this signal is recorded by electrodes and averaged for more than 2,000 signals.

The averaged response is displayed as a waveform that contains peaks, which correspond to various points along the nerve pathway. The time between these peaks is measured and compared to those obtained from studies of many healthy persons. A delay in a response can indicate a growth on the hearing nerve.

The BAER is also helpful in the diagnosis of demyelinating diseases (multiple sclerosis) of the brain, tumors of the hearing and balance nerve (acoustic neuroma), and vascular lesions (strokes) of the brain stem. Threshold testing can be done to determine if hearing is present in an individual or person unable to perform a conventional hearing test. It can also give information as to whether hearing may be present in infants that are at high-risk for having hearing disorders. BAER is also used in the operating room to monitor auditory function while an acoustic neuroma is being removed.

Electrocochleography

(EcoG)

This test is usually done in conjunction with the BAER test since it requires the same type of electrode setup and stimulus. EcoG is a test that measures the pressures within the inner ear. An increase in pressure in the inner ear may indicate Meniere's disease. Meniere's disease is an increase of inner ear fluid that produces pressure.

Otoacoustic Emissions

(OAE)

The OAE test is done to check the response of the outer hair cells in a part of the inner ear called the cochlea. Sound is introduced into the ear; the ear gives off minute sounds which can be heard with a computer. The presence of otoacoustic emissions means that the hair cells are functioning and are able to respond to sound in a normal way. This test helps diagnose whether the problem is in the hair cells or in the hearing nerve.

In Summary

Combined, these tests give a complete picture of how the inner ear is functioning and provide information necessary to make an accurate diagnosis of hearing and balance / dizziness problems so that the correct and most effective treatment can be advised.