

*Brainstem auditory-evoked responses (BAERs)*, also known as ABRs, are useful in differentiating the site of sensorineural hearing loss. In response to sound, five distinct electrical potentials arising from different stations along the peripheral and central auditory pathway (eighth nerve, cochlear nucleus, superior olivary complex, lateral lemniscus, and inferior colliculus) can be identified using computer averaging from scalp surface electrodes. BAERs are valuable in situations in which patients cannot or will not give reliable voluntary thresholds. They are also used to assess the integrity of the auditory nerve and brainstem in various clinical situations, including intraoperative monitoring, and in determination of brain death.

The *VEMP test* investigates otolith and vestibular nerve function by presenting a high-level acoustic stimulus and evoking a short-latency electromyographic potential; cVEMP (or cervical VEMP) and oVEMP (or ocular VEMP) have been described. The cVEMP elicits a vestibulocollic reflex whose afferent limb arises from acoustically sensitive cells in the saccule, with signals conducted via the inferior vestibular nerve. cVEMP is a biphasic, short-latency response recorded from the tonically contracted sternocleidomastoid muscle in response to loud auditory clicks or tones. cVEMPs may be diminished or absent in patients with early and late Ménière's disease, vestibular neuritis, benign paroxysmal positional vertigo, and vestibular schwannoma. On the other hand, the threshold for VEMPs may be lower in cases of superior canal dehiscence, other inner-ear dehiscence ("third window"), and perilymphatic fistula. The oVEMP, in contrast, is a response involving the utricle primarily and superior vestibular nerve. The oVEMP excitatory response is recorded from the extraocular muscle. The oVEMP is abnormal in superior vestibular neuritis.

**Imaging Studies** The choice of radiologic tests is largely determined by whether the goal is to evaluate the bony anatomy of the external, middle, and inner ear or to image the auditory nerve and brain. Axial and coronal CT of the temporal bone with fine 0.3-mm cuts is ideal for determining the caliber of the external auditory canal, integrity of the ossicular chain, and presence of middle-ear or mastoid disease;