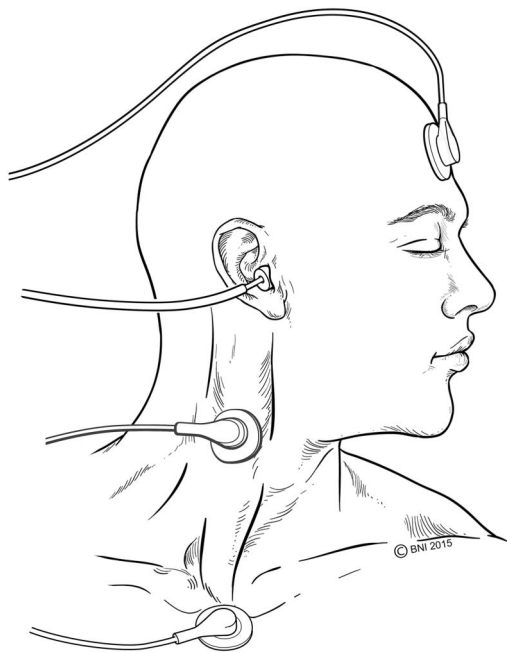


Figure 1 Electrode placement montage for cervical vestibular evoked myogenic potential of the right ear



Surface recording electrodes are placed on the tonically contracted right sternocleidomastoid (achieved by having the patient actively turn the head to the left and lift the head slightly) during recordings. © Barrow Neurological Institute, Phoenix, AZ. Used with permission.

via the cervical vestibulocollic pathway (figure 2).^{8–10} Surface EMG responses from the tonically contracted ipsilateral sternocleidomastoid muscle are averaged to yield a biphasic waveform response (figure 3). cVEMP responses can also be derived from the masseter, triceps, and gastrocnemius muscles.^{11,12}

The oVEMP test is believed to measure vestibular function from the utricle via the superior vestibular nerve, which then crosses the midline to the contralateral medial longitudinal fasciculus and the oculomotor nucleus (figure 4).^{9,13} oVEMP does not substantially involve the semicircular canals.¹⁴ oVEMP uses an air- or bone-conducted sound stimulus and averages the surface EMG responses from the contralateral inferior oblique muscle (figure 4) to yield a biphasic waveform (figure 5). Measurements are made of the latencies of the early peaks (n10 or n1 and p16 or p2 for oVEMP) and a peak-to-peak amplitude (figure 5).

Technical considerations in VEMP. cVEMP technical standards have been proposed.¹⁵ VEMP responses attenuate after age 60 years, and thus the studies included here apply to people aged <60 years.^{16,17} Sensorineural hearing loss does not affect cVEMP/oVEMP.¹⁸ Conductive hearing loss may reduce sound intensity at the oval window and render

VEMP responses unobtainable. For both cVEMP and oVEMP, the minimum sound stimulus needed to evoke a biphasic VEMP response is called the threshold (table e-1 at Neurology.org).

This guideline addresses published evidence related to cVEMP and oVEMP for peripheral vestibular disorders.

Superior canal dehiscence syndrome. Superior canal dehiscence syndrome (SCDS) is caused by an abnormal opening (dehiscence) in the temporal bone that forms the roof of the superior semicircular canal.¹⁹ Overall, 1%–2% of the population has abnormal thinning of the temporal bone near the superior semicircular canal.²⁰ Further erosion may occur with age.²¹ The average age at diagnosis is 46 years.²² Dehiscence renders the membranous labyrinth unusually susceptible to sound and pressure changes.

SCDS diagnosis is based on the combination of vestibular and auditory signs and symptoms and temporal bone CT. Patients with SCDS commonly report pressure-induced (coughing, sneezing, straining) and sound-induced vertigo, dizziness, and the Tullio phenomenon (dizziness induced by sound) or autophony (hearing one's internal body sounds) due to increased sensitivity to sound conducted through bone. Clinical examination may reveal eye movements induced by Valsalva maneuvers, by pressure in the external auditory canal, or by sounds.^{19,23} Patients may have an air–bone gap, especially at the lower frequencies.²⁴ For those with disabling symptoms, case series suggest a benefit with surgical plugging or resurfacing of the bony opening.²⁵

A 2000 American Academy of Neurology (AAN) guideline provides guidance on vestibular testing techniques in adults and children.²⁶ In this new guideline, 4 questions were asked regarding the diagnostic accuracy of cVEMP and oVEMP: (1) Does cVEMP accurately identify SCDS? (2) Does oVEMP accurately identify SCDS? (3) For suspected vestibular symptoms, does cVEMP/oVEMP accurately identify vestibular dysfunction related to the saccule/utricle? (4) For vestibular symptoms, does cVEMP/oVEMP accurately and substantively aid in diagnosis of any specific vestibular disorder besides SCDS?

DESCRIPTION OF THE ANALYTIC PROCESS In September 2010, the AAN guideline subcommittee convened an expert panel to develop this practice guideline (appendices e-1 and e-2), following the process described in the 2004 AAN process manual.²⁷ The panel searched MEDLINE, Cochrane Central Register of Controlled Trials (CENTRAL), Literatura Latino Americana em Ciências da Saúde (LILACS), and Science Citation Index for relevant articles in all languages published from January 1, 1980, through March 1, 2015, finding only relevant articles in