BlueCross BlueShield of Alabama

**Name of Blue Advantage Policy:**

# Evoked Potential Studies

Policy #: 395
Latest Review Date: March 2022
Category: Medical

## BACKGROUND:

***Blue Advantage*** *medical policy does not conflict with Local Coverage Determinations (LCDs), Local Medical Review Policies (LMRPs) or National Coverage Determinations (NCDs) or with coverage provisions in Medicare manuals, instructions or operational policy letters. In order to be covered by Blue Advantage the service shall be reasonable and necessary under Title XVIII of the Social Security Act, Section 1862(a)(1)(A). The service is considered reasonable and necessary if it is determined that the service is:*

1. *Safe and effective;*
2. *Not experimental or investigational*;*
3. *Appropriate, including duration and frequency that is considered appropriate for the service, in terms of whether it is:*
   - *Furnished in accordance with accepted standards of medical practice for the diagnosis or treatment of the patient's condition or to improve the function of a malformed body member;*
   - *Furnished in a setting appropriate to the patient's medical needs and condition;*
   - *Ordered and furnished by qualified personnel;*
   - *One that meets, but does not exceed, the patient's medical need; and*
   - *At least as beneficial as an existing and available medically appropriate alternative.*

**Routine costs of qualifying clinical trial services with dates of service on or after September 19, 2000 which meet the requirements of the Clinical Trials NCD are considered reasonable and necessary by Medicare. Providers should bill* ***Original Medicare*** *for covered services that are related to* ***clinical trials*** *that meet Medicare requirements (Refer to Medicare National Coverage Determinations Manual, Chapter 1, Section 310 and Medicare Claims Processing Manual Chapter 32, Sections 69.0-69.11).*

## POLICY:

**Effective for dates of service on or after March 24, 2020:**

**Blue Advantage** will treat **automated visual evoked potentials** (VEP) as a **non-covered** benefit and as **investigational**.

**Blue Advantage** will treat **brain stem auditory evoked response (BAER)**, also known as brainstem auditory evoked potentials (BAEP) or auditory evoked potentials (AEP) as a **covered benefit** for any of the following indications:

- To diagnose suspected acoustic neuroma;
- To assess recovery of brainstem function after a lesion compressing the brainstem has been surgically removed;
- To localize the cause of a central nervous system deficit seen on exam, but not explained by CT or MRI;
- To diagnose and monitor demyelinating and degenerative disease affecting the brain stem (e.g., central pontine myelinolysis, olivopontocerebellar (OPC) degeneration);
- To evaluate infants and children who have suspected hearing loss that cannot be effectively measured or monitored through audiometry;
- To screen infants and children under age 5 for hearing loss;

**NOTE:** For purposes of neonatal screening, only limited auditory evoked potentials or limited evoked otoacoustic emissions may be considered a covered benefit. Neonates who fail this screening test are then referred for comprehensive auditory evoked response testing or comprehensive otoacoustic emissions.

- To assess brain death or profound metabolic coma in selected cases where diagnosis or outcome is unclear from standard tests (e.g., EEG);
- To diagnose post-meningitic deafness in children.

**Blue Advantage** will treat **BAER** as a **non-covered benefit**:

- As a test to identify persons at increased risk for developing clinically definite multiple sclerosis (CDMS).

**Blue Advantage** will treat **comprehensive auditory evoked response testing and comprehensive otoacoustic emissions** as a **non-covered benefit** for neonatal screening.

**For all other evoked potential studies, see L34429 and L34537.**

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**Effective for dates of service February 26, 2018, through March 23, 2020:**

For automated visual evoked potentials and auditory evoked potentials, refer to LCD L34555.

For all other evoked potential studies, see L34429 and L34537.

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**For dates of service prior to February 26, 2018:**

**Blue Advantage** will treat **somatosensory evoked potentials** (SEP, SSEP) or **dermatosensory evoked potentials** (DSEP) as a **covered benefit** for any of the following indications:

- Unexplained myelopathy;
- To localize the cause of a central nervous system deficit seen on exam, but not explained by lesions seen on CT or MRI;
- To identify clinically silent brain lesions in multiple sclerosis (MS) suspects in order to establish the diagnosis, where MS is suspected due to presence of suggestive neurologic symptoms plus one or more other objective findings (brain plaque on MRI, clinical lesions by history and physical examination, and/or positive CSF as determined by oligoclonal bands detected by established methods such as isoelectric focusing, different from any such bands in serum, or by an increased IgG index);
- To manage persons with spinocerebellar degeneration (e.g., Friedreich's ataxia, olivopontocerebellar (OPC) degeneration);
- To assess any decline which may warrant emergency surgery in an unconscious person with a spinal cord injury who shows specific structural damage to the somatosensory system and is a candidate for emergency spinal cord surgery;
- To evaluate a person with suspected brain death.

**Blue Advantage** will treat **somatosensory evoked potentials** (SEP, SSEP) or **dermatosensory evoked potentials** (DSEP) as a **non-covered benefit** and as **investigational** for all other indications, including but not limited to:

- SEP in conscious persons with severe spinal cord or head injuries, as the standard neurologic exam is the most direct way to evaluate any deficits;
- SEP in the diagnosis or management of amyotrophic lateral sclerosis (ALS);
- SEP in the diagnosis of cervical spondylitic myeloradiculopathy;
- SEP in the diagnosis or management of acquired metabolic disorders (e.g., lead toxicity, B12 deficiency);
- SEP in the diagnosis of thoracic outlet syndrome;
- SEP for the diagnosis of carpal tunnel syndrome/ulnar nerve entrapment;
- SEP for radiculopathies and peripheral nerve lesions where standard nerve conduction velocity studies are diagnostic.

**Note: Depending on the clinical condition being investigated, it may be medically necessary to test several nerves in one extremity and compare them with the opposite limb.**

**Documentation Requirements:**

The physician's SEP report should note which nerves were tested, latencies at various testing points, and an evaluation of whether the resulting values are normal or abnormal.

**Blue Advantage** will treat **visual evoked potentials (VEP)** as a **covered benefit** for any of the following indications:

- To identify persons at increased risk for developing clinically definite multiple sclerosis;
- To diagnose or monitor multiple sclerosis (acute or chronic phases);
- To localize the cause of a visual field defect, not explained by lesions seen on CT or MRI, metabolic disorders, or infectious diseases;
- To evaluate signs and symptoms of visual loss in persons who are unable to communicate (e.g., unresponsive persons, etc.).

**Blue Advantage** will treat **visual evoked potentials** (VEP) as a **non-covered benefit** and as **investigational** for all other indications, including for routine screening of infants.

**Blue Advantage** will treat **automated visual evoked potentials** (VEP) as a **non-covered** benefit and as **investigational**.

**Blue Advantage** will treat **brain stem auditory evoked response** (BAER), also known as brainstem auditory evoked potentials (BAEP) or auditory evoked potentials (AEP) as a **covered benefit** for any of the following indications:

- To diagnose suspected acoustic neuroma;
- To assess recovery of brainstem function after a lesion compressing the brainstem has been surgically removed;
- To localize the cause of a central nervous system deficit seen on exam, but not explained by CT or MRI;
- To diagnose and monitor demyelinating and degenerative disease affecting the brain stem (e.g., central pontine myelinolysis, olivopontocerebellar (OPC) degeneration);
- To evaluate infants and children who have suspected hearing loss that cannot be effectively measured or monitored through audiometry;
- To screen infants and children under age 5 for hearing loss;

**NOTE: For purposes of neonatal screening, only limited auditory evoked potentials or limited evoked otoacoustic emissions may be considered medically necessary. Neonates who fail this screening test are then referred for comprehensive auditory evoked response testing or comprehensive otoacoustic emissions.**

- To assess brain death or profound metabolic coma in selected cases where diagnosis or outcome is unclear from standard tests (e.g., EEG);
- To diagnose post-meningitic deafness in children.

**Blue Advantage** will treat BAER as a **non-covered benefit** and as **investigational**:

- as a test to identify persons at increased risk for developing clinically definite multiple sclerosis (CDMS).

**Blue Advantage** will treat **comprehensive auditory evoked response testing** and **comprehensive otoacoustic emissions** as a **non-covered** benefit and as **investigational** for neonatal screening.

**Miscellaneous Indications:**
The following studies and indications are considered not medically necessary and investigational:

- AEP to determine gestational age or conceptual age in pre-term neonates;
- Cognitive evoked potentials, also known as auditory or visual P300 or P3 cognitive evoked potentials, to diagnose cognitive dysfunction in persons with dementia (e.g., Alzheimer's disease and Parkinson's disease) or to identify the etiology of depression in persons with chronic demyelinating disease;
- Event-related potentials for the diagnosis of attention deficit/hyperactivity disorder or post-traumatic stress disorder, or assessment of brain injury, or evaluation of comatose persons;
- Gustatory evoked potentials for diagnosing taste disorders;
- Motor evoked potentials, other than for intraoperative use with SSEP;
- Cortical auditory evoked response (CAER) for the diagnosis of depression, attention deficit/hyperactivity disorder, autism, or any other indication;
- Vestibular evoked myogenic potentials (VEMP).

*Blue Advantage does not approve or deny procedures, services, testing, or equipment for our members. Our decisions concern coverage only. The decision of whether or not to have a certain test, treatment or procedure is one made between the physician and his/her patient. Blue Advantage administers benefits based on the members' contract and medical policies. Physicians should always exercise their best medical judgment in providing the care they feel is most appropriate for their patients. Needed care should not be delayed or refused because of a coverage determination.*

## DESCRIPTION OF PROCEDURE OR SERVICE:

Evoked potentials are the electrical signals generated by the nervous system in response to sensory stimuli. The sensory system involved and the sequence of activation of different neural structures determines the timing and location of these signals. Because of their low voltage, evoked potentials generally are not discernible without computer averaging to differentiate them from ongoing EEG activity and other sources of electrical noise. Typically, it is necessary to present the stimulus repeatedly, averaging the time-locked brain or spinal cord responses to a series of identical stimuli, while allowing unrelated noise to average out. In the clinical setting, evoked potential studies are an extension of the neurological exam. They help reveal the existence and often suggest the location of neurological lesions. Evoked potentials are most useful when they detect clinically silent abnormalities that might otherwise go unrecognized, or when they assist in resolving vague or equivocal symptoms and findings. Evoked potential studies are tests of function. The findings usually are not etiologically specific. These types of evoked potentials are routinely performed: somatosensory, visual, and brainstem auditory.

**Somatosensory Evoked Potentials (SSEP or SEP)**
Somatosensory evoked potentials consist of a series of waves that reflect sequential activation of neural structures along the somatosensory pathways. The noninvasive clinical studies are performed by the repetitive, submaximal, electrical stimulation of a sensory or mixed sensorimotor peripheral nerve and recording the averaged responses from electrodes placed over proximal portions of the nerve stimulated, plexus, spine, and scalp. Amplitude, peak and interpeak latency measurements with side-to-side comparisons are used to assess abnormalities. SEP are used to aid in the determination of a diagnosis. SEP can also be performed by stimulating the skin in dermatomal areas (DSEP). The evoked potential response depends on the functional integrity of the nerve that is stimulated. SEP are an extension of the electrodiagnostic evaluation and are used to evaluate nerves that cannot be studied by conventional nerve conduction studies, including electromyography. An abnormal SEP points to a problem in the nerve conduction mechanism that carries the impulse to the brain. However, the SEP abnormality is not disease specific; an abnormal SEP indicates impairments associated with certain disorders. An abnormal SEP signifies an impaired pathway, helps to localize it, and provides a prognostic guide. The SEP does not provide any indication about the nature of the underlying pathological processes.

SEP are altered by impairment of the somatosensory pathway which may occur because of both diffuse (e.g., disease of myelin, hereditary system degenerations, coma) or local disorders (e.g., tumors, vascular lesions). SEP abnormalities can be detected in a variety of different settings. The electrophysiologic findings should be interpreted in the clinical context in which they are obtained (e.g., assessing functional integrity, diagnostic purposes, determining the course of neurological disorders, determining pathological involvement. SEP are helpful in evaluating ill-defined complaints. SEP may detect clinically silent brain lesions in multiple sclerosis suspects. Although SEP abnormalities alone are insufficient to establish the diagnosis of MS, the diagnosis can be established when there are other objective findings, such as brain plaques on MRI, clinical lesions by history and physical exam, and/or positive CSF findings (as determined by oligoclonal bands detected by established methods such as isoelectric focusing, different from any such bands in serum, or by an increased IgG index). A physician assesses the patient and determines a preliminary differential diagnosis. SEP testing may then be performed by a trained technologist under the direct supervision of a physician. Direct supervision implies that a physician is in close proximity to the patient undergoing testing, is immediately available to provide the trained technician with assistance and direction if necessary, and is responsible for determining the SEP studies that are appropriate.

Recordings of SEP can be normal even in patients with extreme sensory deficits due to the presence of multiple, parallel, afferent somatosensory pathways. This procedure is often performed to investigate patients with MS; various coma states, such as those from post-traumatic injury or post-anoxia; suspected brain death; and to indicate the extensiveness of lesion damage in spinal cord injuries. The return of a cortically generated response to stimulation of a nerve below the injured portion of the cord, indicates an incomplete lesion and, therefore, may offer a better prognosis.

SEP testing is typically performed bilaterally. Depending on the clinical situation being investigated, several nerves in one extremity may have to be tested and compared with the

opposite limb. The physician's SEP report should indicate which nerves were tested, latencies at various testing points, and an evaluation of whether the results were normal or abnormal.

**Visual Evoked Potentials (VEP)**
Visual-evoked potentials (VEP), also known as visual-evoked responses (VER), are brain waves resulting from light stimuli. VEP are used to track visual signals from the retina to the occipital cortex. With electrodes placed at occipital and parietal locations of the scalp, a checkerboard pattern is projected on a screen and rapidly reversed 100 times at a rate of once or twice per second. The procedure is performed on each eye. Occasionally, checkerboard pattern testing is difficult to use in infants or older patients, so a stroboscopic flash stimulus is used. This type of testing is severely limited due to the great variability of responses among normal persons and its relative insensitivity to clinical lesions. Visual neural impulses from either method are recorded as they travel from the eye to the occipital cortex. VEP are abnormal in patients with optic neuritis or multiple sclerosis.

**Brain Stem Auditory Evoked Potentials (BAEP)**
Brain stem auditory evoked potentials (BAEP), also known as auditory evoked potentials (AEP) or brain stem auditory evoked responses (BAER), are brain waves resulting from sound stimuli. A brief stimulus such as a sharp click is given to one ear through an earphone, while hearing in the opposite ear is masked with white noise to prevent its stimulation by transcranially-conducted sound. After the acoustic stimulus, signals are generated in the auditory nerve and brainstem.

Depending on the amount of time elapsed between the click stimulus and the auditory evoked response, potentials are classified as early (0 to 10 msec), middle (11 to 50 msec), or late (51 to 500 msec). The early potentials reflect electrical activity at the cochlea, eighth cranial nerve, and brain stem levels. The latter potentials reflect cortical activity. In order to separate evoked potentials from background noise, a computer averages the auditory evoked responses to 1000 to 2000 clicks. Early evoked responses may be analyzed to estimate the magnitude of hearing loss and to differentiate among cochlea, eighth nerve, and brainstem lesions.

Sensitivity and specificity reports for these tests vary. There is no clearly established measure of comparison in the medical literature, making comparisons across studies difficult. Interobserver differences, the variety of tests employed, the presence of symptoms that may influence patient outcomes, such as pain, and the presence of abnormal imaging studies in asymptomatic patients, and the subjectivity of the physician's interpretations may all lead to variances in sensitivity and specificity results. Despite these variances, electrodiagnostic testing is commonly used to assist in diagnosing disorders involving the nerves, muscles, and neuromuscular junction.

**Vestibular Evoked Myogenic Potential Testing**
Vestibular evoked myogenic potential (VEMP) tests are newer techniques that use loud sound (e.g., click, tone burst) or bone vibration (e.g., tendon hammer tap to the forehead or mastoid) to assess otolith function. Both the saccule and utricle are sensitive to sound as well as vibration and movement.

Cervical VEMPs are measured by surface electrodes on the ipsilateral sternocleidomastoid muscle in the neck and are thought to originate primarily in the saccule. Abnormality in any part of the auditory cervical VEMP pathway (saccule, inferior vestibular nerve, vestibular nucleus, medial vestibulospinal tract, the accessory nucleus, the eleventh nerve, and sternocleidomastoid) can affect the response.

Ocular VEMPs detect subtle activity of an extraocular muscle using surface electrodes under the contralateral eye during an upward gaze and are thought to be due primarily to stimulation of the utricle. The vestibulo-ocular reflex stimulated by sound or vibration is very small, but synchronous bursts of activity of the extraocular muscles can be detected by electromyography. Lesions that affect the ocular VEMP may occur in the utricle, superior vestibular nerve, vestibular nucleus, and the crossed vestibulo-ocular reflex pathways.

## KEY POINTS:

The most recent literature update was performed through March 22, 2022. The following is a summary of the key literature to date.

**Summary of Evidence**

For individuals with spinal cord injuries, myelopathy, suspected brain death, spinocerebellar degeneration, central nervous system deficits that utilize somatosensory evoked potentials or dermatosensory evoked potentials to evaluate these disease processes. The evidence includes a prospective study, case series studies, systematic reviews, and a prospective cohort study retrospective analysis. Relevant outcomes are overall survival, morbid events, treatment related mortality [or morbidity], symptoms, functional outcomes, and quality of life. The evidence is sufficient to determine the effects of the technology on health outcomes.

For individuals with increased risk for developing multiple sclerosis, to diagnose or monitor multiple sclerosis patients, to evaluate vision loss in unresponsive patients, or evaluate visual deficits utilizing visual evoked potentials. The evidence includes several case studies. Relevant outcomes are overall survival, morbid events, treatment related mortality [or morbidity], symptoms, functional outcomes, QOL, etc. The evidence is sufficient to determine the effects of the technology on health outcomes.

For individuals with brain stem auditory evoked response, the evidence includes limited case studies. Relevant outcomes are overall survival, morbid events, treatment related mortality [or morbidity], symptoms, functional outcomes, QOL, etc.). The evidence is sufficient to determine the effects of the technology on health outcomes.

For individuals who have a suspected vestibular disorder not clinically diagnosed as BPPV who receive VEMP testing, the evidence includes mainly association studies. Relevant outcomes are test accuracy, symptoms, functional outcomes, and quality of life. There is a large and rapidly growing literature on VEMP tests for the assessment of otolith function, although most studies have assessed how the cervical VEMP and ocular VEMP change with various disease states. Studies on diagnostic accuracy and clinical utility of this technique for evaluating otolith organs

and central pathways are needed in the appropriate populations. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

**Practice Guidelines and Position Statements**

**American Academy of Audiology**

The 2009 American Academy of Audiology has a position statement on the audiologist's role in the diagnosis and treatment of vestibular disorders. Citing a 2009 scope of practice report, the Academy stated that "An audiologist is a person who, by virtue of academic degree, clinical training, and license to practice and/or professional credential, is uniquely qualified to provide a comprehensive array of professional services related to the prevention of hearing loss and the audiologic identification, assessment, diagnosis, and treatment of persons with impairment of auditory and vestibular function, and to the prevention of impairments associated with them." Evaluations of vestibular and extravestibular systems may include:

- Video-oculography, videonystagmography, and electronystagmography
- Tests of dynamic visual acuity,
- Tests of active and passive rotation,
- Tests of postural stability, and
- Tests of vestibular evoked myogenic potentials.

Vestibular treatment and therapy protocols that fall within the scope of practice are also described. The Academy considers vestibular function testing following treatment to be an essential part of the clinical practice.

**American Academy of Neurology**

The 2017 practice guidelines from AAN assessed the diagnostic value of vestibular evoked myogenic potential testing in individuals with vestibular symptoms. The conditions of interest included superior canal dehiscence syndrome, vestibular neuritis or migraine, Meniere disease, and benign paroxysmal positional vertigo (BPPV). The evidence for testing in BPPV was drawn from two class III studies, neither of which presented sufficient diagnostic value of vestibular evoked myogenic potential testing for the treatment to be recommended (level C evidence).

**International Federation of Clinical Neurophysiology**

A 2014 expert consensus document on cervical vestibular evoked myogenic potential methods from the International Federation of Clinical Neurophysiology has stated that the clinical use of vestibular evoked myogenic potential "is evolving and questions still exist about its physiology and measurement."

## KEY WORDS:

Somatosensory evoked potentials (SEP, SSEP), visual evoked potentials (VEP), brain stem auditory evoked potentials (BAEP, brainstem auditory evoked response (BAER), auditory evoked potentials (AEP), dermatosensory evoked potentials (DSEP), automated VEP, Diopsys NOVA VEP, Enfant VEP System, Vestibular evoked myogenic potentials , VEMP, Automated

visual evoked potentials,  Comprehensive auditory evoked response testing, comprehensive otoacoustic emissions, Cognitive evoked potentials, visual P300, P3 cognitive evoked potentials, Event-related potentials, Gustatory evoked potentials, Motor evoked potentials, Cortical auditory evoked response, CAER

## APPROVED BY GOVERNING BODIES:
FDA approved.

## BENEFIT APPLICATION:
Coverage is subject to member's specific benefits.  Group specific policy will supersede this policy when applicable.

**CODING:**
**CURRENT CODING:**
**CPT Codes:**

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| 92517 | Vestibular evoked myogenic potential (VEMP) testing, with interpretation and report; cervical (cVEMP) (Effective 01/01/2021) |
| 92518 | Vestibular evoked myogenic potential (VEMP) testing, with interpretation and report; ocular (oVEMP) (Effective 01/01/2021) |
| 92519 | Vestibular evoked myogenic potential (VEMP) testing, with interpretation and report; cervical (cVEMP) and ocular (oVEMP) (Effective 01/01/2021) |
| 92650 | Auditory evoked potentials; screening of auditory potential with broadband stimuli, automated analysis (Effective 01/01/2021) |
| 92651 | Auditory evoked potentials; for hearing status determination, broadband stimuli, with interpretation and report (Effective 01/01/2021) |
| 92652 | Auditory evoked potentials; for threshold estimation at multiple frequencies, with interpretation and report (Effective 01/01/2021) |

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| 92653 | Auditory evoked potentials; neurodiagnostic, with interpretation and report (Effective 01/01/2021) |
| 92700 | Unlisted Otorhinolaryngological Service or Procedure |
| 95925 | Short-latency somatosensory evoked potential study, stimulation of any/all peripheral nerves or skin sites, recording from the central nervous system; in upper limbs |
| 95926 | ; in lower limbs |
| 95927 | ; in the trunk or head |
| 95928 | Central motor evoked potential study (transcranial motor stimulation); upper limbs |
| 95929 | ; lower limbs |
| 95930 | Visual evoked potential (VEP), checkerboard or flash testing, central nervous system except glaucoma, with interpretation and report. |
| 95938 | Short-latency somatosensory evoked potential study, stimulation of any/all peripheral nerves or skin sites, recording from the central nervous system; in upper and lower limbs |
| 95939 | Central motor evoked potential study (transcranial motor stimulation); in upper and lower limbs |
| 0333T | Visual evoked potential, screening of visual acuity, automated, with report |
| 0464T | Visual evoked potential, testing for glaucoma, with interpretation and report (Effective 01/01/17) |

## PREVIOUS CODING:

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| 92585 | Auditory evoked potentials for evoked response audiometry and/or testing of the central nervous system; comprehensive (Deleted 12/31/2020) |
| 92586 | Auditory evoked potentials for evoked response audiometry and/or testing of the central nervous system; limited (Deleted 12/31/2020) |

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## POLICY HISTORY:

Medical Policy Group, April 2020: Reinstated policy effective March 24, 2020.
Medical Policy Group, March 2021
Medical Policy Group, March 2022: Reviewed by consensus. No new literature identified that would alter the coverage statement of this policy.

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