



Autonomic Nervous System Function Testing

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Current Procedural Terminology (CPT®) codes 95921-95924 and 95943 in the Autonomic Function Tests subsection of the Medicine section of the CPT code set were identified by the American Medical Association (AMA)/Specialty Society Relative Value Scale (RVS) Update Committee (RUC) through a screening process for codes with high-volume growth and that are reported by different specialty(ies) other than the specialty(ies) surveyed for physician work recommendations in the Medicare program. This article provides clarity on the intent of these codes and the required service components for correct reporting.

Autonomic Function Tests

95921

Testing of autonomic nervous system function; cardiovagal innervation (parasympathetic function), including 2 or more of the following: heart rate response to deep breathing with recorded R-R interval, Valsalva ratio, and 30:15 ratio

95922

vasomotor adrenergic innervation (sympathetic adrenergic function), including beat-to-beat blood pressure and R-R interval changes during Valsalva maneuver and at least 5 minutes of passive tilt

(Do not report 95922 in conjunction with 95921)

95923

sudomotor, including 1 or more of the following: quantitative sudomotor axon reflex test (QSART), silastic sweat imprint, thermoregulatory sweat test, and changes in sympathetic skin potential

95924

combined parasympathetic and sympathetic adrenergic function testing with at least 5 minutes of passive tilt



(Do not report 95924 in conjunction with 95921 or 95922)

#95943

Simultaneous, independent, quantitative measures of both parasympathetic function and sympathetic function, based on time-frequency analysis of heart rate variability concurrent with time-frequency analysis of continuous respiratory activity, with mean heart rate and blood pressure measures, during rest, paced (deep) breathing, Valsalva maneuvers, and head-up postural change

(Do not report 95943 in conjunction with 93040, 95921, 95922, 95924)

Autonomic Nervous System

The autonomic nervous system controls and regulates involuntary body functions, such as blood pressure (BP) and heart rate (HR), as well as regulating a number of functions ranging from pupil size to gastrointestinal function. This system consists of a network of nerves divided into two parts: parasympathetic nervous system and sympathetic nervous system. The parasympathetic nervous system predominates during times of relaxation, acting to conserve and restore energy. The sympathetic nervous system prepares the body to cope during stressful situations. The two systems act together and, normally, balance each other.

Code 95921 may be reported only when the electrocardiographic monitoring of HR derived from the elapsing time between two consecutive R-waves in the electrocardiogram (ECG), ie, R-R interval, is displayed on a monitor and stored for subsequent analysis of waveforms. Testing is typically performed with the patient in a prone position. A tilt table may be used; however, it is not required for parasympathetic-function testing. At least two of the following three components are required to report this code:

- HR response to deep breathing is derived from a visual quantitative analysis of recordings with the subject breathing at a rate of five to six breaths per minute.
- Valsalva ratio is determined by dividing the maximum HR by the lowest HR. The initial HR responses to sustained oral pressure (orally blowing into a tube or device at a constant pressure) consist of tachycardia followed by a bradycardia at 15 to 45 seconds after the Valsalva pressure has been released. A minimum of two Valsalva maneuvers are to be performed. The initial cardioacceleration is an exercise-triggered reflex, while the subsequent tachycardia and bradycardia are baroreflex-mediated response.
- A 30:15 ratio ([R-R interval at beat 30]/[R-R interval at beat 15]) is used as an index of cardiovascular function.

Other terms and definitions related to autonomic function testing are listed later in this article.

Coding Tip

If only one of the tests listed in the code descriptor of code 95921 is performed, modifier 52, Reduced Services, must be appended to indicate a reduced service was provided.

Code [95922](#) may be reported only when testing includes all of the following required components:

- Continuous recording of beat-to-beat BP and HR. The HR needs to be derived from an ECG unit in which an accurate quantitative graphical measurement of the R-R interval is obtained.
- A period of supine rest for at least 20 minutes prior to testing.
- The performance and recording of beat-to-beat BP and HR during a minimum of two Valsalva maneuvers.
- The performance of passive head-up tilt with continuous recording of beat-to-beat BP and HR for a minimum of 5 minutes, followed by passive tilt back to the supine position. This must be performed using a tilt table.

When reporting code 95922, testing for HR variability (HRV) with respiratory activity and BP may be measured from a standing or sitting position. Measurements for the parasympathetic nervous system and sympathetic nervous system are conducted simultaneously, under any condition, quantitatively.

Coding Tip

Tilt table testing is required for reporting code 95922.

Code 95923 may be reported for sudomotor testing such as the quantitative sudomotor axon reflex test. This test is used to evaluate the distal postganglionic sympathetic nerve fibers. Evaluations of these fibers are important in conditions that affect the autonomic nerves (eg, diabetic and other neuropathies) and progressive autonomic disorders. The sympathetic nerve fibers of the sweat glands are stimulated at standard sites by the iontophoresis of acetylcholine. The test is performed optimally on one forearm site and three lower extremity (LE) sites to determine the severity and distribution of the sympathetic deficit.

Codes [95924](#) and [95943](#) describe combined parasympathetic function and sympathetic function testing. Code 95924 is reported only when the parasympathetic function and the adrenergic function are tested together with the use of a tilt table. Code 95943 is reported for simultaneous, independent quantitative measures of both parasympathetic and sympathetic functions based on time-frequency analysis of HRV concurrent with time-frequency analysis of continuous respiratory activity with mean HR and BP measures during rest, paced (deep) breathing, Valsalva maneuvers, and head-up postural change, which allow for HRV with respiratory activity and BP to be measured from a standing or sitting position. Code 95943 is reported either when autonomic function testing does not include beat-to-beat recording or the use of a tilt table. The guidelines provide instructions for reporting parasympathetic function, sympathetic adrenergic function, and simultaneous parasympathetic and sympathetic functions. Exclusionary parenthetical notes that restrict the reporting of code [95924](#) in conjunction with codes 95921 and [95922](#) are also provided. In addition, code [95943](#) should not be reported with codes [93040](#), 95921, [95922](#), and [95924](#) because the procedural components of these codes are inherent in code [95943](#).

Coding Tip

Code [95924](#) should be reported only when both the parasympathetic and adrenergic functions are tested together with the use of a tilt table.

Tilt Table Testing

In the past, a tilt table test would be performed to document parasympathetic and sympathetic changes that occurred while the patient was supine and standing. There is current technology that allows direct measures of parasympathetic and sympathetic functions without using a tilt table; however, some patients may still require the use of a tilt table to diagnose dysfunctions that may be associated with head-up postural changes

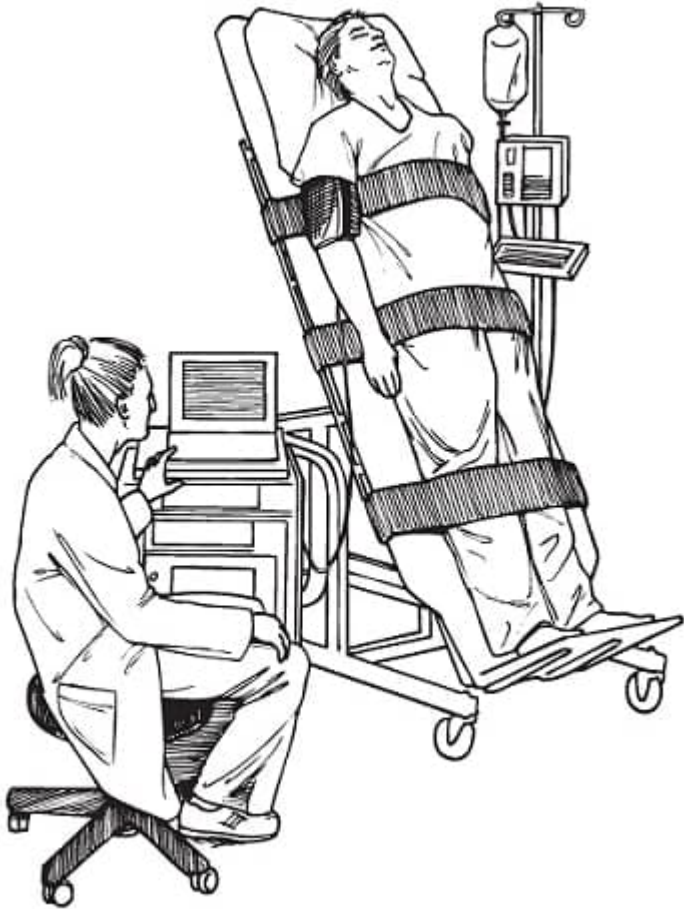
Tilt table testing is one method of testing a patient's parasympathetic function. Testing is typically performed with the patient initially in the supine position and then tilted toward a vertical axis (see Figure 1). At least two of the following three components need to be included in the testing:

- HR response to deep breathing derived from a visual quantitative analysis of recordings with the subject breathing at a rate of five to six breaths per minute
- Valsalva ratio determined by dividing the maximum HR by the lowest HR. A minimum of two Valsalva maneuvers are to be performed
- 30:15 ratio used as an index of cardiovascular function

Coding Tip

To report autonomic function testing that does not include beat-to-beat recording or the use of a tilt table, use code 95943.

Figure 1. Tilt Table Testing



Terms Related to Autonomic Function Testing

To identify the specific measures or components performed for autonomic function testing, the following definitions of the terms used in the descriptor language are provided:

Tilt table test. The tilt table test (also called a passive head-up tilt test or head-upright tilt test) records BP and HR on a minute-by-minute basis while the table is tilted in a head-up position at different levels.

Valsalva maneuver. Any forced expiratory effort (strain) against a closed airway whether at the nose and mouth or at the glottis. This causes high intrathoracic pressure that impedes venous return to the right atrium; therefore, it may be used to study cardiovascular effects of raised peripheral venous pressure and decreased cardiac filling and cardiac output, as well as post-strain responses. Changes in BP are recorded. The study is repeated to verify if the response is reproducible. A simplified version would be to hold a deep breath while maximally contracting the abdominal muscles.

R-R interval. The time interval (in milliseconds) between the R-waves of two consecutive QRS complexes in an ECG.

HR response to deep breathing. A derived value from an analysis of HR recordings with the subject breathing at a rate of five to six breaths per minute. All HR recordings are performed with ECG monitoring of HR derived from R-R interval, displayed on a monitor, and stored for offline analysis.

Valsalva ratio. The ratio obtained when maximum HR is divided by the lowest HR measured while the subject performs a standardized Valsalva maneuver.

30:15 ratio. The 30:15 ratio ($[\text{R-R interval at beat 30}]/[\text{R-R interval at beat 15}]$) is used as an index of cardiovascular function.

Passive tilt. The act of placing a patient on a tilt table for the purpose of obtaining a baseline recording, and then tilting the table to 60° to 80° for at least 5 minutes (unless there is an excessive decrease in BP or other indicators of patient distress).

Thermoregulatory sweat test. A test of sympathetic nerves that supply the skin. For this procedure, the skin is dusted with an indicator powder that changes color when the patient sweats in response to the patient's raised temperature, which is accomplished by raising the ambient temperature in a controlled environment.

Quantitative sudomotor axon reflex test. An evaluation that uses a quantitative noninvasive method to determine the integrity of the distal postganglionic sympathetic nerve fibers in diabetic and other neuropathies, which affect autonomic nerves, and in progressive autonomic disorders. It utilizes the stimulation of sympathetic nerve fibers to the sweat glands at standard sites. The test is performed optimally on one forearm site and three LE sites to determine the severity and distribution of the sympathetic deficit.

Syncope. The brief loss of consciousness and posture caused by a temporary decrease in BP, a decrease in HR, or changes in blood volume or distribution.

The following clinical examples and procedural descriptions reflect typical clinical scenarios when it would be appropriate to report these codes. The intraprocedural descriptions



highlight the different testing parameters required to report codes 95921, [95922](#), [95923](#), [95924](#), and [95943](#).

Clinical Example (95921)

A patient who has diabetes and numbness of her feet presents because of frequent light-headedness, which is interfering with her ability to function normally. A general examination is unremarkable. Testing of the autonomic nervous system, specifically the parasympathetic function, is recommended.

Description of Procedure (95921)

Supervise patient preparation and performance of the test by technician. ECG monitoring of the heart rate is derived from the R-R interval displayed on a monitor and stored for analysis. The heart response to deep breathing is derived from an analysis of recordings with the patient breathing at a rate of five to six breaths per minute. Determine the Valsalva ratio by dividing the maximum heart rate by the lowest heart rate. The initial heart rate responses to standing consist of tachycardia at three and then at 12 seconds to 15 seconds followed by a bradycardia at 20 seconds. The initial cardioacceleration is an exercise reflex while the subsequent tachycardia and bradycardia are baroreflex-mediated. The 30:15 ratio (R-R interval at beat 30)/(R-R interval at beat 15) is used as an index of cardiovascular function. Review results of these measures, interpret data, and make a clinical correlation of the findings based on patient's history.

Clinical Example (95922)

A patient has frequent syncopal episodes, which have impaired his ability to function normally. Prolonged tilt study confirmed syncope and a diagnosis of neurocardiogenic syncope was made, but treatment for this did not result in meaningful improvement. Because of this, testing of his autonomic nervous system, specifically, the vasomotor adrenergic innervation is recommended.

Description of Procedure (95922)

Supervise patient preparation and performance of the test by technician. Perform continuous beat-to-beat recording of BP and heart rate in response to the Valsalva maneuver. Position patient on a tilt table and after period of rest he undergoes at least five minutes of passive tilt-up and tilt-back motions. Perform a series of Valsalva maneuvers until reproducible arterial responses are obtained. Review results of these measures, interpret data, and make a clinical correlation of the findings on patient's history.

Clinical Example (95923)

A patient develops severe burning sensation affecting his toes and proximal foot. Standard laboratory tests are unremarkable. On examination, there is no compelling sensory loss and normal reflexes. The EMG and nerve conduction studies are within normal limits. Testing of the autonomic nervous system, specifically sudomotor function, is recommended.

Description of Procedure (95923)

Supervise patient preparation and performance of the test by technician. Stimulate sympathetic nerve fibers to the sweat glands at standard sites by the iontophoresis of acetylcholine. Measure the evoked sweat response by sudometers. Optimally perform the test on one forearm site and three lower extremity sites to determine the severity and distribution of the sympathetic deficit. The thermoregulatory sweat test is a test of sympathetic nerves that supply the skin and involves dusting the skin with an indicator powder that changes color when the patient sweats in response to raising patient's temperature in a heat cabinet. Sympathetic skin potentials are evoked through electrical stimulation of the skin and recordings are made over the palm and soles of the feet. The skin potential change is carried by autonomic nerve fibers and determines if these fibers are working normally. Review results of these measures, interpret data, and make a clinical correlation of the findings based on patient's history.

Clinical Example (95924)

A patient presents with repeated, unexplained episodes of fainting. Tests of cardiovascular function indicate severe cardiovagal impairment. Testing of the autonomic nervous system, specifically of parasympathetic function and vasomotor adrenergic function using at least a 5-minute tilt with a passive tilt table, is recommended.

Description of Procedure (95924)

Supervision of patient preparation and the performance of the test by the technician. The patient lays on a tilt table in a flat position. The patient is connected to an electrocardiography machine and electrodes are attached to the chest, legs, and arms. If needed, an intravenous (IV) line is placed in the arm. The patient's blood pressure and heart rate are monitored while lying still and are constantly monitored during the procedure. Deep breathing and a series of Valsalva maneuvers are performed until reproducible arterial responses are obtained. Electrocardiograph monitoring of the patient's heart rate derived from the R-R interval is displayed on a monitor and stored for analysis. Heart response to deep breathing is derived from an analysis of recordings with the patient breathing at a rate of five to six breaths per minute. This is a measure of cardiovagal or parasympathetic testing. Continuous beat-to-beat recording of blood pressure and heart rate in response to the Valsalva maneuver are captured and at least five minutes of passive tilt-up and tilt-back are performed. A series of Valsalva maneuvers are performed until reproducible arterial responses are obtained. These blood pressure responses are analyzed in order to assess cardiac and vascular adrenergic function. The Valsalva ratio is determined by dividing the maximum heart rate by the lowest heart rate. This is another measure of cardiovagal or parasympathetic function. The initial heart rate responses to standing consist of tachycardia at 3 and then at 12 to 15 seconds followed by a bradycardia at 20 seconds. The initial cardioacceleration is an exercise reflex while the subsequent tachycardia and bradycardia are baroreflex-mediated. The 30:15 ratio (R-R interval at beat 30)/(R-R interval at beat 15) is used as index of cardiovascular function. The physician reviews and analyzes this data.

After obtaining a baseline heart rate and blood pressure measurement, safety straps are applied across the patient's chest and legs to hold the patient in place. The patient is raised to the upright and lowered to the supine position several times. The duration of time spent in the supine and upright position can vary from 5 to 30 minutes. Medication may be administered and adjusted during the testing to increase the patient's heart rate and blood pressure. After completing the test, the patient remains flat or supine until the patient's heart rate and blood pressure return to normal. The patient is observed for 10 to 20 minutes and then disconnected from the equipment. The results of these measures are re-

viewed, data are interpreted, and a clinical correlation of the findings is done based on the patient's history.

Clinical Example (95943)

A 63-year-old female with hypertension presents with complaints of dizziness and lightheadedness, mild depression, sleep disturbance, and frequent headaches for which common treatments are unsuccessful. Physical exam does not completely explain symptoms. Autonomic function testing is ordered.

Description of Procedure (95943)

Patient sits in a chair. The tech or physician connects electrodes. Measurements are made while at rest seated in a chair, followed immediately by paced breathing, then rest, followed immediately by a series of short Valsalva maneuvers followed immediately by rest, followed immediately by a rapid head-up postural change, followed immediately by quiet standing. Throughout this study, EKG and continuous respiratory activity data are collected and analyzed and parasympathetic and sympathetic activity is computed, and mean HR and BP measures are recorded for each of the six phases of the clinical study. The patient is observed for any complications. ♦