MASSACHUSETTS

Blue Cross Blue Shield of Massachusetts is an Independent Licensee of the Blue Cross and Blue Shield Association

Medical Policy
Autonomic Nervous System Testing

Table of Contents

Policy Number: 713

BCBSA Reference Number: 2.01.96 (For Plan internal use only)

Related Policies

Neural Therapy, #914

Policy

Commercial Members: Managed Care (HMO and POS), PPO, and Indemnity

Autonomic nervous system testing, consisting of a battery of tests in several domains may be considered **MEDICALLY NECESSARY** when the following criteria are met:

- Signs and/or symptoms of autonomic dysfunction are present; AND
- A definitive diagnosis cannot be made from clinical examination and routine laboratory testing alone; AND
- Diagnosis of the suspected autonomic disorder will lead to a change in management or will eliminate the need for further testing.

Although there is not a standard battery of tests that are part of autonomic nervous system (ANS) testing, a full battery of testing generally consists of individual tests in 3 categories.

- Cardiovagal function (heart rate variability, heart rate response to deep breathing and Valsalva)
- Vasomotor adrenergic function (blood pressure response to standing, Valsalva maneuver, and hand grip, tilt table testing)
- Sudomotor function (Quantitative Sudomotor Axon Reflex Test, quantitative sensory test, Thermoregulatory Sweat Test, silastic sweat imprint, sympathetic skin response, electrochemical sweat conductance).

At least 1 test in each category is usually performed. More than 1 test from a category will often be included in a battery of tests, but the incremental value of using multiple tests in 1 domain is not known.

Autonomic nervous system testing is considered **INVESTIGATIONAL** in all other situations when criteria are not met, including but not limited to the evaluation of the following conditions:

- Chronic fatigue syndrome
- Fibromyalgia

- Anxiety and other psychologic disorders
- Sleep apnea
- Allergic conditions
- Hypertension
- Screening of asymptomatic individuals
- Monitoring progression of disease or response to treatment.

Autonomic nervous system testing using portable automated devices is considered **INVESTIGATIONAL** for all indications.

Prior Authorization Information

Inpatient

- For services described in this policy, precertification/preauthorization **IS REQUIRED** for all products if the procedure is performed **inpatient**.

Outpatient

- For services described in this policy, see below for products where prior authorization **might be required** if the procedure is performed **outpatient**.

	Outpatient
Commercial Managed Care (HMO and POS)	Prior authorization is **not required**.
Commercial PPO and Indemnity	Prior authorization is **not required**.

CPT Codes / HCPCS Codes / ICD Codes

Inclusion or exclusion of a code does not constitute or imply member coverage or provider reimbursement. Please refer to the member's contract benefits in effect at the time of service to determine coverage or non-coverage as it applies to an individual member.

Providers should report all services using the most up-to-date industry-standard procedure, revenue, and diagnosis codes, including modifiers where applicable.

The following codes are included below for informational purposes only; this is not an all-inclusive list.

The above medical necessity criteria MUST be met for the following codes to be covered for Commercial Members: Managed Care (HMO and POS), PPO, and Indemnity:

CPT Codes

CPT codes:	Code Description
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	Testing of autonomic nervous system function; 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
95923	Testing of autonomic nervous system function; 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	Testing of autonomic nervous system function; combined parasympathetic and sympathetic adrenergic function testing with at least 5 minutes of passive tilt

The following ICD Diagnosis Codes are considered medically necessary when submitted with the CPT codes above if medical necessity criteria are met:

ICD-10 Diagnosis Codes

ICD-10-CM Diagnosis codes:	Code Description
E10.41	Type 1 diabetes mellitus with diabetic mononeuropathy
E10.42	Type 1 diabetes mellitus with diabetic polyneuropathy
E10.43	Type 1 diabetes mellitus with diabetic autonomic (poly)neuropathy
E10.49	Type 1 diabetes mellitus with other diabetic neurological complication
E10.610	Type 1 diabetes mellitus with diabetic neuropathic arthropathy
E11.41	Type 2 diabetes mellitus with diabetic mononeuropathy
E11.42	Type 2 diabetes mellitus with diabetic polyneuropathy
E11.43	Type 2 diabetes mellitus with diabetic autonomic (poly)neuropathy
E11.49	Type 2 diabetes mellitus with other diabetic neurological complication
E11.610	Type 2 diabetes mellitus with diabetic neuropathic arthropathy
E13.41	Other specified diabetes mellitus with diabetic mononeuropathy
E13.42	Other specified diabetes mellitus with diabetic polyneuropathy
E13.43	Other specified diabetes mellitus with diabetic autonomic (poly)neuropathy
E13.49	Other specified diabetes mellitus with other diabetic neurological complication
E13.610	Other specified diabetes mellitus with diabetic neuropathic arthropathy
E85.1	Neuropathic heredofamilial amyloidosis
E85.3	Secondary systemic amyloidosis
E85.4	Organ-limited amyloidosis
E85.81	Light chain (AL) amyloidosis
E85.82	Wild-type transthyretin-related (ATTR) amyloidosis
E85.89	Other amyloidosis
G20.A1	Parkinson's disease without dyskinesia, without mention of fluctuations
G20.A2	Parkinson's disease without dyskinesia, with fluctuations
G20.B1	Parkinson's disease with dyskinesia, without mention of fluctuations
G20.B2	Parkinson's disease with dyskinesia, with fluctuations
G20.C	Parkinsonism, unspecified
G23.0	Hallervorden-Spatz disease
G23.2	Striatonigral degeneration
G23.8	Other specified degenerative diseases of basal ganglia
G60.3	Idiopathic progressive neuropathy
G60.8	Other hereditary and idiopathic neuropathies
G60.9	Hereditary and idiopathic neuropathy, unspecified
G61.0	Guillain-Barre syndrome
G61.1	Serum neuropathy
G61.81	Chronic inflammatory demyelinating polyneuritis
G61.89	Other inflammatory polyneuropathies
G61.9	Inflammatory polyneuropathy, unspecified
G90.09	Other idiopathic peripheral autonomic neuropathy
G90.1	Familial dysautonomia [Riley-Day]
G90.3	Multi-system degeneration of the autonomic nervous system
G90.50	Complex regional pain syndrome I, unspecified
G90.511	Complex regional pain syndrome I of right upper limb
G90.512	Complex regional pain syndrome I of left upper limb
G90.513	Complex regional pain syndrome I of upper limb, bilateral
G90.521	Complex regional pain syndrome I of right lower limb
G90.522	Complex regional pain syndrome I of left lower limb
G90.523	Complex regional pain syndrome I of lower limb, bilateral

G90.59	Complex regional pain syndrome I of other specified site
G90.A	Postural orthostatic tachycardia syndrome [POTS]
I95.1	Orthostatic hypotension
K59.00	Constipation, unspecified
K59.89	Other specified functional intestinal disorders
M35.00	Sjogren syndrome, unspecified
M35.01	Sjogren syndrome with keratoconjunctivitis
M35.02	Sjogren syndrome with lung involvement
M35.03	Sjogren syndrome with myopathy
M35.04	Sjogren syndrome with tubulo-interstitial nephropathy
M35.05	Sjogren syndrome with inflammatory arthritis
M35.06	Sjogren syndrome with peripheral nervous system involvement
M35.07	Sjogren syndrome with central nervous system involvement
M35.08	Sjogren syndrome with gastrointestinal involvement
M35.09	Sjogren syndrome with other organ involvement
M35.0A	Sjogren syndrome with glomerular disease
M35.0B	Sjogren syndrome with vasculitis
M35.0C	Sjogren syndrome with dental involvement
Q79.60	Ehlers-Danlos syndrome, unspecified
Q79.61	Classical Ehlers-Danlos syndrome
Q79.62	Hypermobile Ehlers-Danlos syndrome
Q79.63	Vascular Ehlers-Danlos syndrome
Q79.69	Other Ehlers-Danlos syndromes
R00.0	Tachycardia, unspecified
R10.84	Generalized abdominal pain
R10.9	Unspecified abdominal pain
R11.0	Nausea
R11.10	Vomiting, unspecified
R11.11	Vomiting without nausea
R11.2	Nausea with vomiting, unspecified
R13.10	Dysphagia, unspecified
R14.0	Abdominal distension (gaseous)
R19.7	Diarrhea, unspecified
R32	Unspecified urinary incontinence
R39.14	Feeling of incomplete bladder emptying
R42	Dizziness and giddiness
R53.1	Weakness
R55	Syncope and collapse
R61	Generalized hyperhidrosis
R63.8	Other symptoms and signs concerning food and fluid intake

Description

Autonomic Nervous System

The autonomic nervous system (ANS) has a primary role in controlling physiologic processes not generally under conscious control. They include heart rate, respirations, gastrointestinal (GI) motility, thermal regulation, bladder control, and sexual function.[1,2,] The ANS is a complex neural regulatory network that consists of 2 complementary systems that work to maintain homeostasis: the sympathetic and the parasympathetic systems. The sympathetic nervous system is responsible for arousal, and sympathetic stimulation leads to increased pulse, increased blood pressure (BP), increased sweating, decreased GI motility, and an increase in other glandular exocrine secretions. This is typically understood as the "fight or flight" response. Activation of the parasympathetic nervous system will mostly have the

opposite effects;: BP and pulse decrease, GI motility increases, and decreased sweating and other glandular secretions.

Autonomic Nervous System Disorders

Disorders of the ANS, also called dysautonomias, are heterogeneous in etiology, clinical symptoms, and severity. Autonomic nervous system disorders can be limited and focal, such as with isolated neurocardiogenic syncope or idiopathic palmar hyperhidrosis. At the other extreme, some ANS disorders can be widespread and severely disabling, such as multiple systems atrophy, which leads to widespread and severe autonomic failure.

Symptoms of autonomic disorders can vary based on the etiology and location of dysfunction. Cardiovascular manifestations are often prominent. Involvement of the cardiovascular system causes abnormalities in heart rate control and vascular dynamics.[3,] Orthostatic hypotension and other manifestations of BP lability can occur, causing weakness, dizziness, and syncope. Resting tachycardia and an inability to appropriately increase heart rate in response to exertion leads to exercise intolerance. There is a 2- to 3-fold higher incidence of major cardiac events in patients with diabetic autonomic neuropathy, including myocardial infarction, heart failure, resuscitation from ventricular arrhythmia, angina, or the need for revascularization.[4,] There is also an increase in sudden cardiac death and overall mortality for these patients.[3,]

Many other organ systems can be affected by autonomic neuropathy. Involvement of the bladder can lead to incomplete emptying, resulting in urinary retention and possible overflow incontinence. Gastrointestinal involvement is commonly manifested as gastroparesis, which is defined as slowed gastric emptying and can cause nausea, vomiting, and a decreased tolerance for solid food and large meals. Constipation may also occur if the lower GI tract is involved. Impairment of sexual function in males can manifest as erectile dysfunction and ejaculatory failure. Dysfunction of thermal regulation and sweating can lead to anhidrosis and heat intolerance. Paradoxically, excessive sweating can also occur as a compensatory mechanism in unaffected regions.[5,]

A classification of the different types of autonomic dysfunction, adapted from Freeman (2005)[5,] and Macdougall and McLeod (1996),[6,] can be made as follows:

- Diabetic autonomic neuropathy
- Amyloid neuropathy
- Immune-mediated neuropathy
    - Rheumatoid arthritis
    - Systemic lupus erythematosus
    - Sjögren syndrome
- Paraneoplastic neuropathy
- Inflammatory neuropathy
    - Guillain-Barré syndrome
    - Chronic inflammatory demyelinating polyneuropathy
    - Crohn disease
    - Ulcerative colitis
- Hereditary autonomic neuropathies
- Autonomic neuropathy secondary to infectious disease
    - HIV disease
    - Lyme disease
    - Chagas disease
    - Diphtheria
    - Leprosy
- Acute and subacute idiopathic autonomic neuropathy
- Toxic neuropathies.

Other chronic diseases may involve an ANS imbalance, without outright dysfunction of the nerves themselves. Approximately 40% of individuals with essential hypertension will show evidence of excess sympathetic activity.[7,] Sympathetic overactivity is also a prominent feature of generalized anxiety, panic disorder, and some types of depression, as well as certain cardiac disorders such as chronic heart failure. These types of ANS imbalances are not usually classified as ANS disorders.

Treatment of Autonomic Nervous System Disorders

Much of the treatment for autonomic disorders is nonpharmacologic and supportive. However, there are specific actions that can improve symptoms in patients with specific deficits. For patients with orthostatic hypotension, this involves adequate intake of fluids and salt, moving to an upright position slowly and deliberately, use of lower-extremity compression stockings, and keeping the head of the bed elevated 4 to 6 inches (ie, 10- to 15 cm).[1,] In severe cases, medications that promote salt retention, such as fludrocortisone, are often prescribed. Patients with symptoms of hyperhidrosis may benefit from cooling devices and potent antiperspirants such as Drysol™, and patients with decreased tearing and dry mucous membranes can use over-the-counter artificial tears or other artificial moisturizers.[1,]

Autonomic Nervous System Testing

Autonomic nervous system testing consists of a battery of tests. Any single test may be performed individually, or the entire battery of tests may be ordered. Individual components of testing may include cardiovagal function testing, sudomotor function, salivation testing, and tilt table testing.

Cardiovagal Function Testing

Beat-to-beat variability in the heart rate can be measured at rest, or in response to provocative measures, such as deep breathing or the Valsalva maneuver. Reduced or absent heart rate variability is a sign of autonomic dysfunction.[8,]

Baroreflex sensitivity is measured by examining the change in pulse and heart rate variability in response to changes in BP. A medication such as phenylephrine is given to induce a raise in BP, and baroreflex sensitivity is calculated as the slope of the relation between heart rate variability and BP.[8,]

Sudomotor Function (Sweat Testing)

Sweat testing evaluates the structure and function of nerves that regulate the sweat glands.

The Quantitative Sudomotor Axon Reflex Test is an example of a commercially available semiquantitative test of sudomotor function.[8,] The test is performed by placing the color-sensitive paper on the skin, which changes color on contact with sweat. Measurement of the amount of color change is a semiquantitative measure of sudomotor function.

For the silastic sweat imprint, silastic material is placed on the skin, and the sweat droplets form indentations on the silastic surface, allowing quantitation of the degree of sweating present. The Neuropad® test is an example of a commercially available silastic sweat imprint.

A more complex approach in some centers is the use of a thermoregulatory laboratory.[9,] This is a closed chamber in which an individual sits for a defined period under tightly controlled temperature and humidity. An indicator dye is brushed on the skin, and it changes color when in contact with sweat. Digital pictures are taken and projected onto anatomic diagrams. Computer processing derives values for a total area of anhidrosis and the percent of anhidrotic areas.

Sympathetic skin response tests use an electric current to stimulate sympathetic nerves. The tests measure the change in electrical resistance, which is altered in the presence of sweat. In general, these tests are considered to be sensitive but have high variability and potential for false-positive results.[9,]

A variant of sympathetic skin response testing is electrochemical sweat conductance measured by iontophoresis (eg, Sudoscan®). In this test, a low-level current is used to attract chloride ions from sweat glands. The chloride ions interact with stainless-steel plate electrodes to measure electrochemical resistance.

Salivation Testing

The protocol for salivation testing involves the subject chewing on a preweighed gauze for 5 minutes. At the end of 5 minutes, the gauze is removed and reweighed to determine the total weight of saliva present.

Tilt Table Testing

Tilt table testing is intended to evaluate for orthostatic intolerance. The patient lies on the table and is strapped in with a foot rest. The table is then inclined to the upright position, with monitoring of the pulse and BP. Symptoms of lightheadedness or syncope in conjunction with changes in pulse or BP constitute a positive test. A provocative medication, such as isoproterenol, can be given to increase the sensitivity of the test.

Composite Autonomic Severity Score

The Composite Autonomic Severity Score, which ranges from 0 to 10, is intended to estimate the severity of autonomic dysfunction. Scores are based on self-reported symptoms measured by a standardized symptom survey. Scores of 3 or less are considered mild, scores of 3 to 7 are considered moderate, and scores greater than 7 are considered severe. Autonomic nervous system testing consists of tests in 3 categories:

- Cardiovagal function (heart rate variability, heart rate response to deep breathing, and Valsalva maneuver).
- Vasomotor adrenergic function (blood pressure response to standing, Valsalva maneuver, hand grip, and tilt table testing).
- Sudomotor function (Quantitative Sudomotor Axon Reflex Test, quantitative sensory test, Thermoregulatory Sweat Test, silastic sweat imprint, sympathetic skin response, and electrochemical sweat conductance).

At least 1 test in each category is usually performed. More than 1 test from a category will often be included in a battery of tests, but the incremental value of using multiple tests in a category is unknown.

There is little evidence on the comparative accuracy of different ANS tests, but the following tests are generally considered to have uncertain value in ANS testing:

- Pupillography
- Pupil edge light cycle
- Gastric emptying tests
- Cold pressor test
- Quantitative direct and indirect testing of sudomotor function test
- Plasma catecholamine levels
- Skin vasomotor testing
- The ANSAR® test.

Summary

The autonomic nervous system (ANS) controls physiologic processes that are not under conscious control. Autonomic nervous system testing consists of a battery of tests intended to evaluate the integrity and function of the ANS. These tests are intended as adjuncts to clinical examination in the diagnosis of ANS disorders.

Summary of Evidence
For individuals who have signs and symptoms of autonomic nervous system (ANS) dysfunction who receive ANS testing, the evidence includes studies of diagnostic accuracy. Relevant outcomes are test accuracy, symptoms, functional outcomes, and quality of life. The evidence base is limited. There is a lack of a criterion standard for determining autonomic dysfunction, which limits the ability to perform high-quality research on diagnostic accuracy. Also, numerous tests are used in various conditions, making it difficult to determine values for the overall diagnostic accuracy of a battery of tests. Scattered reports of diagnostic accuracy are available for certain tests, most commonly in the diabetic population, but these reports do not specify estimates of accuracy for the entire battery of tests. Reported sensitivities and specificities are high for patients with clinically defined distal symmetric polyneuropathy using a symptom-based score as a reference standard, but these estimates are likely biased by study designs that used patients with clinically diagnosed disease and a control group of healthy volunteers. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

Policy History

Date	Action
10/2023	Coding information clarified.
8/2023	Annual policy review. Description, summary, and references updated. Policy statement unchanged.
3/2023	Coding information clarified.
8/2022	Annual policy review. Description, summary, and references updated. Policy statement unchanged.
1/2021	Medicare information removed. See MP #132 Medicare Advantage Management for local coverage determination and national coverage determination reference.
8/2020	Annual policy review. Description, summary, and references updated. Policy statements unchanged.
8/2019	Annual policy review. Description, summary, and references updated. Policy statements unchanged.
7/2018	Annual policy review. New references added. Summary clarified.
7/2017	Annual policy review. New references added.
1/2016	Annual policy review. New references added.
4/2015	New medical policy describing medically necessary and investigational indications. Effective 4/1/2015.

Information Pertaining to All Blue Cross Blue Shield Medical Policies

Click on any of the following terms to access the relevant information:
Medical Policy Terms of Use
Managed Care Guidelines
Indemnity/PPO Guidelines
Clinical Exception Process
Medical Technology Assessment Guidelines

References

1. Klein CM. Evaluation and management of autonomic nervous system disorders. Semin Neurol. Apr 2008; 28(2): 195-204. PMID 18351521
2. Gibbons CH, Cheshire WP, Fife TD. American Academy of Neurology Model Coverage Policy: Autonomic Nervous System Testing. 2014; https://www.aan.com/siteassets/home-page/tools-and-resources/practicing-neurologist--administrators/billing-and-coding/model-coverage-policies/14autonomicmodel_tr.pdf. Accessed April 19, 2023.

3. Vinik AI, Ziegler D. Diabetic cardiovascular autonomic neuropathy. Circulation. Jan 23 2007; 115(3): 387-97. PMID 17242296
4. Valensi P, Sachs RN, Harfouche B, et al. Predictive value of cardiac autonomic neuropathy in diabetic patients with or without silent myocardial ischemia. Diabetes Care. Feb 2001; 24(2): 339-43. PMID 11213889
5. Freeman R. Autonomic peripheral neuropathy. Lancet. Apr 2005; 365(9466): 1259-70. PMID 15811460
6. McDougall AJ, McLeod JG. Autonomic neuropathy, II: Specific peripheral neuropathies. J Neurol Sci. Jun 1996; 138(1-2): 1-13. PMID 8791232
7. Goldstein DS, Robertson D, Esler M, et al. Dysautonomias: clinical disorders of the autonomic nervous system. Ann Intern Med. Nov 05 2002; 137(9): 753-63. PMID 12416949
8. England JD, Gronseth GS, Franklin G, et al. Practice Parameter: evaluation of distal symmetric polyneuropathy: role of autonomic testing, nerve biopsy, and skin biopsy (an evidence-based review). Report of the American Academy of Neurology, American Association of Neuromuscular and Electrodiagnostic Medicine, and American Academy of Physical Medicine and Rehabilitation. Neurology. Jan 13 2009; 72(2): 177-84. PMID 19056667
9. Low PA. Testing the autonomic nervous system. Semin Neurol. Dec 2003; 23(4): 407-21. PMID 15088262
10. TRIGOcare International GmbH. Neuropad: Diagnostic test for sudomotor dysfunction and early detection of diabetic foot syndrome, diabetic neuropathy. 2014; https://www.neuropad.com/. Accessed April 19, 2023.
11. França da Silva AK, Penachini da Costa de Rezende Barbosa M, Marques Vanderlei F, et al. Application of Heart Rate Variability in Diagnosis and Prognosis of Individuals with Diabetes Mellitus: Systematic Review. Ann Noninvasive Electrocardiol. May 2016; 21(3): 223-35. PMID 27226209
12. Bellavere F, Ragazzi E, Chilelli NC, et al. Autonomic testing: which value for each cardiovascular test? An observational study. Acta Diabetol. Jan 2019; 56(1): 39-43. PMID 30159748
13. Park JY, Yang D, Yang HJ, et al. Quantitative autonomic function test in differentiation of multiple system atrophy from idiopathic Parkinson disease. Chin Med J (Engl). Aug 20 2019; 132(16): 1919-1924. PMID 31373907
14. Kings Technology Evaluation Centre. Neuropad test for the early detection of diabetic foot neuropathy. 2017; https://www.nice.org.uk/guidance/mtg38/documents/assessment-report. Accessed April 19, 2023.
15. Zografou I, Iliadis F, Sambanis C, et al. Validation of Neuropad in the Assessment of Peripheral Diabetic Neuropathy in Patients with Diabetes Mellitus Versus the Michigan Neuropathy Screening Instrument, 10g Monofilament Application and Biothesiometer Measurement. Curr Vasc Pharmacol. 2020; 18(5): 517-522. PMID 31340739
16. Rajan S, Campagnolo M, Callaghan B, et al. Sudomotor function testing by electrochemical skin conductance: does it really measure sudomotor function?. Clin Auton Res. Feb 2019; 29(1): 31-39. PMID 29956008
17. Fortanier E, Delmont E, Verschueren A, et al. Quantitative sudomotor test helps differentiate transthyretin familial amyloid polyneuropathy from chronic inflammatory demyelinating polyneuropathy. Clin Neurophysiol. May 2020; 131(5): 1129-1133. PMID 32217467
18. Lai YR, Huang CC, Cheng BC, et al. Feasibility of combining heart rate variability and electrochemical skin conductance as screening and severity evaluation of cardiovascular autonomic neuropathy in type 2 diabetes. J Diabetes Investig. Sep 2021; 12(9): 1671-1679. PMID 33522129
19. D'Amato C, Greco C, Lombardo G, et al. The diagnostic usefulness of the combined COMPASS 31 questionnaire and electrochemical skin conductance for diabetic cardiovascular autonomic neuropathy and diabetic polyneuropathy. J Peripher Nerv Syst. Mar 2020; 25(1): 44-53. PMID 31985124
20. Carbajal-Ramírez A, Hernández-Domínguez JA, Molina-Ayala MA, et al. Early identification of peripheral neuropathy based on sudomotor dysfunction in Mexican patients with type 2 diabetes. BMC Neurol. May 31 2019; 19(1): 109. PMID 31151430
21. Lin K, Wu Y, Liu S, et al. The application of sudoscan for screening microvascular complications in patients with type 2 diabetes. PeerJ. 2022; 10: e13089. PMID 35310156

22. García-Ulloa AC, Almeda-Valdes P, Cuatecontzi-Xochitiotzi TE, et al. Detection of sudomotor alterations evaluated by Sudoscan in patients with recently diagnosed type 2 diabetes. BMJ Open Diabetes Res Care. Dec 2022; 10(6). PMID 36521878
23. Xu X, Liao J, Dong Q, et al. Clinical utility of SUDOSCAN in predicting autonomic neuropathy in patients with Parkinson's disease. Parkinsonism Relat Disord. Jul 2019; 64: 60-65. PMID 30890381
24. Popescu C. Small fiber neuropathy in Parkinson's disease explored by the sudoscan. Parkinsonism Relat Disord. Sep 2019; 66: 261-263. PMID 31416687
25. Cheshire WP, Freeman R, Gibbons CH, et al. Electrodiagnostic assessment of the autonomic nervous system: A consensus statement endorsed by the American Autonomic Society, American Academy of Neurology, and the International Federation of Clinical Neurophysiology. Clin Neurophysiol. Feb 2021; 132(2): 666-682. PMID 33419664
26. Recommended Policy for Electrodiagnostic Medicine. American Association of Neuromuscular & Electrodiagnostic Medicine. 2023; https://www.aanem.org/Advocacy/Position-Statements/Recommended-Policy-for-Electrodiagnostic-Medicine. Accessed April 19, 2023.
27. Proper Performance of Autonomic Function Testing: Position Statement. American Association of Neuromuscular & Electrodiagnostic Medicine. 2021; https://www.aanem.org/Advocacy/Position-Statements/Proper-Performance-of-Autonomic-Function-Testing. Accessed April 19, 2023.
28. ElSayed NA, Aleppo G, Aroda VR, et al. 12. Retinopathy, Neuropathy, and Foot Care: Standards of Care in Diabetes-2023. Diabetes Care. Jan 01 2023; 46(Suppl 1): S203-S215. PMID 36507636
29. National Institute for Health and Care Excellence (NICE). Neuropad for detecting preclinical diabetic peripheral neuropathy [MTG38]. 2018; https://www.nice.org.uk/guidance/mtg38. Accessed April 19, 2023.